Final Program
Thirty-Ninth Annual Meeting
International Neuropsychological Society

February 2-5, 2011
Boston, Massachusetts

WEDNESDAY, FEBRUARY 2, 2011

9:00 AM–12:00 PM **Wednesday Morning Continuing Education Courses**
Refer to CE Schedule for Location

1:00–4:00 PM **Wednesday Afternoon Continuing Education Courses**
Refer to CE Schedule for Location

4:30–6:00 PM **Symposium 1: Mapping Neural Circuitry in Cognitive Disorders Using Magnetoencephalography (MEG)**
Chair: Robert J. Thoma
Discussant: Erin Bigler
Salon ABC

1. THOMA, RJ — Mapping Neural Circuitry in Cognitive Disorders Using Magnetoencephalography (MEG)
2. STUFFLEBEAM, S — Magnetoencephalography: From The Physics Lab to the Bedside
3. ROJAS, DC — Gamma-band Phase-locking Abnormalities in Autism Spectrum Disorders
4. THOMA, RJ — Timing of Neural Events in Adolescent Alcohol-induced Dysexecutive Syndrome
5. LEWINE, JD — Making the Invisible Wounds of War Visible: Functional Brain Imaging of Mild TBI, PTSD, and Depression using Magnetoencephalography

4:45–6:15 PM **Poster Session 1: Autism Spectrum Disorders, Emotion, Learning Disabilities, Psychopathology**
Gloucester

Autism Spectrum Disorders

1. BOORSTEIN, HC — Toddlers with Significant Cognitive Delays and Autistic Symptoms: Stability of Diagnosis and Outcome at Age Four
2. CAMODECA, A — Investigation of Executive Function Deficits Associated with the Broader Autism Phenotype
3. CASNAR, C — Verbal learning, Memory and Discriminability in Children with Attention Deficit Hyperactivity Disorder (ADHD), Autism, and co-occurring ADHD and Autism
4. CHRIST, SE — Changes in Brain Activation Associated with Social Competence Intervention in Adolescents with Autism
5. BODNER, K — Improvements in Context Processing Following Administration of a Beta-Adrenergic Antagonist in Adults with an Autism Spectrum Disorder (ASD)
6. COOPER, K — Anomalous Patterns of Cerebral Dominance for Language in Children with Autism Spectrum Disorders
7. MCKNIGHT, ME — Neuropsychological Profile of Girls with Asperger's Disorder
8. MCKNIGHT, ME — Neurobehavioral Differences in School-Aged Children with Asperger's Disorder and Learning Disabilities
9. DEWEY, D — Development of Hand Preference in Relation to Cognitive, Language and Motor Skills in Children with Autism Spectrum Disorders
10. ABDULLAH, M — How Early Can Differences in Social Communication Between Children With and Without Autistic Spectrum Disorders (ASD) be Identified?
11. GREEN, RR — Spatial Learning Deficits in Autism Spectrum Disorder
12. HARDY, SE — Stability of Autism Spectrum Disorder Diagnoses Made During the Second Year of Life
13. HERLIHY, LE — Ethnic Disparities in Screening but not Rate of Diagnosis of Autism Spectrum Disorders in a Population-Based Sample of Toddlers
14. KNOCH, K — The Development of Repetitive and Stereotyped Behaviors: Changes in Frequency and Severity of High- and Low-Level Behaviors in Children with ASD

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Emotional Processes

Learning Disabilities/Academic Skills

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

64. MORKEN, F — Computer-Based Writing Processing in Dyslexia
65. OLDS, J — Neuropsychological Functioning associated with Pediatric Hearing Loss and Oral Communication
66. OSMON, DC — Are symptom validity tests specific to a population?
67. PARK, H — Processing Speed Deficits in Young Adults with Developmental Dyslexia
68. WONG, CG — The Effects of Stimulant Medication on ADHD Working Memory Functional Connectivity

Psychopathology/Neuropsychiatry (Other)

69. BHALLA, RK — Neuropsychological functioning pre-and post-treatment in late-life Generalized Anxiety Disorder
70. CHAURET, M — Fear circuitry function in anxious youths, youths at familial risk for anxiety disorders and healthy youths
71. DAWSON, E — Clinical and Cognitive Predictors of Time to Reach Euthymia Among Mixed and Manic Adults with Bipolar Disorder
72. GADE, A — Cognitive Impairment in Remitted Depression is Associated with the Number and Duration of Prior Episodes
73. GARRISON, D — PTSD, harm avoidance, and performance on tasks of EF and fluid reasoning in pediatric inpatient psychiatric residents
74. GOLDSTEIN, KE — Is Maternal Psychopathology Associated With Child Attention Difficulties?
75. GOPIN, C — Emotion Based Inhibition in Stable Patients with Bipolar I Disorder: A Comparison with Healthy and Schizophrenic Subjects
76. HANEY-CARON, E — Atypical Frontal Lobe Activity to Emotional Visual Stimuli in Adolescents with Conduct Disorder
77. HEIDEMAN, E — Maternal Parenting Behavior, Parenting Stress, and Parenting Efficacy as Predictors of Internalizing and Externalizing Outcomes in Children Referred for Neuropsychological Evaluations
78. KERWIN, L — Global-Local Processing in Body Dysmorphic Disorder (BDD)
79. KILLGORE, WD — Similarities and Differences in Cortico-Limbic Responses to Masked Affect Probes Across Anxiety Disorders
80. KINOSHITA, LM — PTSD, Sleep Disordered Breathing, APOE e4 and Cognitive Functioning on the RAVLT
81. NAVE, AM — White Matter Abnormalities in Adolescents with Major Depressive Disorder
82. NELSON, B — The Effects of a Comorbid Anxiety Disorder on Measures of Executive Functioning in Depression
83. SAVLA, GN — Utility of Rey Tangled Lines Test in Detecting Cognitive Deficits of Bipolar Disorder
84. SULLIVAN, EA — Error-monitoring in psychopaths: A physiological study of attentional processes in an affective flanker paradigm
85. SUSMARAS, TM — Exploration of Regional Brain Volume and a 2- and 3-factor Structure within Levenson's Self Report Psychopathy Scale
86. VEDERMAN, A — Neuropsychological and Neuroimaging Evidence of Impaired Affect Processing in Bipolar Disorder

Psychopathology/Neuropsychiatry (Schizophrenia)

87. ALL, SD — Cohort Effects in the Relationship between Measures of Cognition and Social Functioning in Schizophrenia
88. FANNING, M — Everyday Error Monitoring in Schizophrenia: Impaired Detection with Preserved Correction
89. GOODING, AL — Insight Into Neuropsychological Impairment in Individuals With Schizophrenia Who Attend Cognitive Remediation
90. KIM, M — Relationships between neuropsychological deficits and schizotypic symptom dimensions in female college students with schizotypal traits
91. MARCOPULOS, BA — Prevalence of Failed TOMM Performance in Consecutive Neuropsychology Referrals in a Psychiatric Hospital
92. OJEDA, N — Cognitive Predictors of Outcome in First-episode Schizophrenia and Non-Schizophrenia Syndromes: a Two-year Follow-up Study
93. OJEDA, N — The Interaction Among Processing Speed Effect and Other Neuropsychological Domains in Schizophrenia
94. RACKHAM, D — Performance Monitoring Abilities in Schizophrenia: A Meta-Analysis
95. SELIGMAN, S — The Relationship Between Emotion Perception and Functional Outcome in Schizophrenia: A Meta-Analysis
96. GERNER, G — The Contribution of Processing Speed to Neurocognitive Deficits Associated with Schizophrenia

TBI (Adult)

97. HUFFORD, BJ — Use of Behavioral Contracting to Increase Compliance with Rehabilitation Treatments on an Inpatient Brain Injury Unit: A Case Study

5:00–6:45 PM

Paper Session 1: Brain Behavior Relationships
Moderator: Duke Han
Salon F

1. HAN, SD — Diffusion Tensor Imaging and Cognitive Functioning of Older Adults Undergoing Chemotherapy
2. HARCIAREK, M — The effects of kidney transplant on cognitive performance of dialyzed patients: a longitudinal controlled study
3. HILSABECK, RC — Brain Glucose Metabolism and Cognitive Performance after 12 weeks of Interferon-alpha Therapy
4. SABSEVITZ, D — Co-Lateralization of Wada Language and Memory Performance Is Associated With Better Verbal Memory Encoding In Left Temporal Lobe Epilepsy Patients (LTLE)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

5.	GALLAGHER, A	Language Representation in Patients with Tuberous Sclerosis Complex (TSC) using MEG and fMRI
6.	HEILMAN, KM	Cortical Morphology of Visual Creativity
7.	MATTIS, P	Relationship Between Catechol-O-methyltransferase (COMT) Genotype, Neuropsychological Functioning, and Metabolic Network Activity in Parkinson's Disease

5:00–6:45 PM **Paper Session 2: Predictors of Brain Health and Decline in Aging**
Moderator: Adam Brickman
Salon G

1.	LU, PH	Myelin Integrity Mediates Age-Related Slowing in Cognitive Processing Speed in a Sample of Healthy Elderly Males
2.	SMITH, J	Effects of Walking Exercise on White Matter Integrity in Amnestic Mild Cognitive Impairment
3.	JAK, AJ	Impact of a Walking Intervention on Executive Functioning in Older Adults
4.	WEINSTEIN, AM	The Effect of Aerobic Fitness on N-Acetylaspartate and Memory in Neurologically Healthy Older Adults
5.	MEIER, IB	White matter predictors of cognitive functioning in older adults
6.	CHAPMAN, G	White Matter Integrity in the Entorhinal Cortex & Parahippocampal Region is Associated with Memory Performances in Individuals with Mild Cognitive Impairment
7.	BANGEN, KJ	Assessment of Alzheimer's Disease Risk with Functional Magnetic Resonance Imaging: An Arterial Spin Labeling Study

5:45–6:45 PM **Benton Award Lecture: Childhood Brain Disorders as a Window on the Developing Social Brain: An Essay in Honor of Arthur Benton**
Keith Yeates
Salon E

1.	YEATES, K	Childhood Brain Disorders as a Window on the Developing Social Brain: An Essay in Honor of Arthur Benton

6:45–7:15 PM **Distinguished Career Award Ceremony**
Salon E

7:15–8:00 PM **Wednesday Evening Reception**
4th Floor Atrium Foyer

THURSDAY, FEBRUARY 3, 2011

7:20–8:50 AM **Thursday Morning Continuing Education Courses**
Refer to CE Schedule for Location

9:00–10:00 AM **Invited Address: Order and Disorder in the Emotional Brain**
Speaker: Richard Davidson
Salon E

1.	DAVIDSON, R	Order and Disorder in the Emotional Brain

9:00–10:30 AM **Symposium 2: We Use Them, But Should We? Psychometric Properties of the VA TBI Screening Tool, NSI, and Combat Experiences Scale**
Chair: MIna Dunnam
Discussant: Rodney D. Vanderploeg
Salon F

1.	DONNELLY, K	We Use Them, But Should We? Psychometric Properties of the VA TBI Screening Tool, NSI, and Combat Experiences Scale
2.	DUNNAM, M	Cognitive Assessment of Veterans after Traumatic Brain Injury
3.	DONNELLY, K	Reliability and Validity of the VA TBI Screening Tool
4.	KING, PR	A Psychometric Study of the Neurobehavioral Symptom Inventory
5.	GUYKER, WM	Dimensionality and Validity of a Measure of Combat Experience

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

9:00–10:30 AM

Symposium 3: Preventing Cognitive Decline in Aging and Neurologic Disease

Chair: James F. Sumowski
Discussant: Yaakov Stern
Salon G

1.	SUMOWSKI, JF	Preventing Cognitive Decline in Aging and Neurologic Disease
2.	GÓMEZ-PINILLA, F	Diet and exercise therapy to enhance cognitive development
3.	ERICKSON, KI	Aging, Exercise, and Brain Function
4.	SUMOWSKI, JF	Benefits of early life cognitive leisure activity and aerobic exercise in multiple sclerosis
5.	BRICKMAN, AM	Integrating neuropsychology and neuroimaging to identify treatment targets for age-related cognitive decline and Alzheimer's disease

9:00–10:30 AM

Poster Session 2: Cognitive Neuroscience, Epilepsy, Executive Functions, Imaging, Memory

Gloucester

Cognitive Neuroscience

1.	ACOSTA, MT	The Neurocognitive and Metabolic Impact of Lovastatin in Treatment of Cognitive Deficiencies in Children with Neurofibromatosis Type 1 (NF1)
2.	ACOSTA, MT	Changes in Executive Function Pre and Post Lovastatin Treatment: fMRI Study in Neurofibromatosis type 1 (NF1) Children
3.	BAKER, LM	Relationship Between Cognitive and Physical Activity Levels and Brain Integrity
4.	DIETZ, J	Divergent effects of emotional arousal on physiology and behavior in Parkinson's disease
5.	FLAKS, MK	Neuropsychological Evaluation Of Brazilian Victims Of Urban Violence With And Without Post-traumatic Stress Disorder
6.	GRANDE, LJ	Increased Distractibility Associated with Post-traumatic Stress Disorder Symptom Severity
7.	KAUFMAN, DA	Cognitive Control, Empathy, and Gender
8.	KILLGORE, WD	Baseline Executive Function Abilities Correlate with Risky Behavior Following Sleep Deprivation
9.	KILLGORE, WD	Resistance to Sleep Loss and Decision Making During Sleep Deprivation
10.	KOSEKI, Y	Dissociating areas for novelty detection and for episodic encoding within the human medial temporal lobe
11.	LAKE, T	Estrogenic Influence on Risk-taking and Reward Dependent Behaviors
12.	LANE, EM	A Latent Variable Model of Cognitive Reserve and the Relationship to White Matter and Executive Function
13.	MACDONALD WER, B	The gray/white (GM/WM) matter ratio as a marker of brain development
14.	RACE, L	Episodic Future Thought in Amnesia: Retrieval of Episodic Details Versus Personal Facts
15.	WARREN, DE	Long-term Neuropsychological and Neuroanatomical Outcomes of Amnesia Subsequent to Status Epilepticus and Cerebral Anoxia

Epilepsy/Seizures

16.	BAIR, LD	Social Adjustment in Children with Epilepsy: A Self-report
17.	BANKS, SJ	Aging Without a Hippocampus: Long term cognitive outcomes of temporal lobe surgery for epilepsy
18.	BENITEZ, OJ	Fearing the Worst: Anxiety in Children with Secondary Generalized Seizures
19.	BONGIOLATTI BOWEN, SR	Left Temporal Resection in Pediatric Epilepsy: Neuropathology and Memory Outcome
20.	WAGNER, MT	Out-of-body Experience and Autoscopy in a Case of Focal Epilepsy
21.	CHIN, E	Lateralization and plasticity of emotional processing in individuals with a history of intractable epilepsy and hemispherectomy surgery
22.	FAY-MCCLYMONT, TB	Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV) Performance in Children with Temporal (TLE) versus Frontal Lobe Epilepsy (FLE)
23.	GRANADER, Y	Correlations Between Seizure Variables and Measures of Executive Functioning in Children and Adolescents with Epilepsy
24.	TYSON, BT	Differential Diagnosis of Video-EEG Confirmed Epilepsy and Psychogenic Nonepileptic Seizures Using Psychometric Inventories and Clinical Interview
25.	JOHNSON, CP	Explaining Discrepant Math Performance in Children with Epilepsy: Relative Contribution of Cognitive and Attentional Factors
26.	KENDALL, D	Linguistic reorganization of proper faces and proper places prior to anterior temporal lobe surgery. Can deficits be mitigated?
27.	LEAFFER, E	Cognitive and motor development in children with first febrile seizure
28.	LINEWEAVER, T	Does Mother Know Best? Self-Reports and Parent-Reports of Memory in Pediatric Epilepsy Patients at Two Time Points
29.	LUTHER, E	Visual Stimuli in the Wada Test: Evidence for Bilateral Processing
30.	O'REILLY, H	Early-Onset Epilepsy and Autism Spectrum Disorder
31.	RAMIREZ, M	Memory Outcome Following Temporal Lobectomy in Epilepsy Patients with Bilateral Mesial Temporal Sclerosis
32.	RECKESS, GZ	Clinical and Neurocognitive Relevance of Collateral-Rhinal Sulcal Connection in Temporal Lobe Epilepsy

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Executive Functions/Frontal Lobes

Imaging (Structural)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

78. TANNER, JJ — Examining A Case of Hemiatrophy with Parkinsonism Using Neuropsychology and Diffusion Imaging Approaches
79. TREBLE, A — Predicting Verbal and Visuospatial Working Memory Deficits following Pediatric Traumatic Brain Injury through Callosal Subregion Integrity: A Diffusion Tensor Tractography Study
80. TREBLE, A — Functional Significance of Neocortical Reorganization in Spina Bifida: Relations among Cortical Thickness, Cortical Complexity, and IQ
81. TREBLE, A — Reduced White Matter Integrity following Pediatric Traumatic Brain Injury: A Tract Based Spatial Statistics Study
82. VANNORSDALL, TD — The Neural Substrates of Personality: A Voxel-based Morphometry Study of the Big Five Personality Traits
83. WARD, J — Cerebellar Gray Matter Volume and Divided Attention/ Working Memory in Patients with Schizophrenia

Memory Functions

84. ADAMS, SE — Valence of Event Stimuli Differentially Affects Memory for Central and Peripheral Items Under Conditions of High Arousal
85. ATTALI, E — On the influence of the semantic relatedness on the Word Frequency Mirror Effect
86. BARNABE, A — The Pattern of Autobiographic Memory Loss in Transient Global Amnesia – What Does it Tell Us About Models of Memory Consolidation?
87. DEASON, RG — Shifting Response Bias and Alzheimer's Disease: The Role of Self-Monitoring on Memory Tests
88. EASTMAN, JA — The Relationship Between Cortical Thickness and Verbal Memory
89. FINE, EM — Frontal Lobe Correlates of Intrusion Errors on the CVLT-II: A Quantitative MRI Study
90. GONZALEZ, DL — Impact of Media Exposure for Recent and Remote Famous Names in MCI
91. GUERRERO, KA — Concept formation in scholars with antecedent of perinatal Hypoxic-Ischaemic Encephalopathy
92. LUGO, ML — Can We Escape the Past?: Investigations in Short-Term Memory
93. MAY, P — Effect of Gum Chewing on Memory and Processing Speed
94. MCDONALD, BC — Differentiation of Neural Networks Involved in Episodic Memory Encoding and Retrieval in Children
95. MILLER, JB — Working Memory contributions to Latent Inhibition: Exploring the roles of maintenance vs. manipulation
96. PRESTON, T — Prospective Memory Functions in Referred and Nonreferred Children
97. RICHARDSON, EE — Subscales of the Anxiety Sensitivity Index Predict One-Year Change in Retroactive Interference as Measured by the Rey Auditory-Verbal Learning Task
98. VILLALOBOS ESMA, JT — Episodic memory: neuroanatomical and neuropsychological bases of the autobiographic store

Assessment/Psychometrics/Methods (Adult)

99. MISHAAN, J — Convergence Across a Performance-Based Executive Function Measure and Behavioral Ratings of Real-World Executive Functions in a College Sample

10:15 AM–12:00 PM — Paper Session 3: Memory Systems and Memory Disorders
Moderator: Christina Wierenga
Salon E

1. ADAMSON, MM — Reduced hippocampal activity during encoding in cognitively normal adults carrying the APOE ε4 allele
2. GROBER, E — Memory Impairment and Executive Dysfunction is Associated with Poor Diabetes Control in Older Adults
3. CHERTKOW, H — Does the Pattern of Autobiographic Memory Loss in MCI and Alzheimer's Disease Support the Multiple Trace Theory or the Standard Consolidation Model?
4. GROTE, C — Memory and Seizure Outcome After Tailored Temporal Lobe Resection
5. WIERENGA, C — Does Increased Resting Cerebral Blood Flow Correspond to Better Cognitive Performance in MCI?
6. LOACANO, CC — Semantic Memory Processes in Healthy Aging: Contrasting Familiarity versus Knowledge
7. HAN, SD — Resting-State Functional Connectivity Differences Associated with Mild Cognitive Impairment in a Community Sample

10:45 AM–12:15 PM — Invited Symposium: New Technologies in Neurorehabilitation
Chair: John DeLuca
Salon F

1. DELUCA, J — New Technologies in Neurorehabilitation
2. ZAFONTE, R — New Technologies in Neurorehabilitation
3. RIZZO, A — Virtual Reality and Neuropsychology: A Brief Review of the Future
4. GOEDERT, KM — Translating Prism Adaptation for Post-Stroke Neglect - Baby Steps to the Clinic
5. RICKER, JH — Neuroimaging Technologies in Neurorehabilitation Research

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

10:45 AM–12:15 PM **Invited Symposium: Preclinical Changes in Huntingtons**
Chair: Jane Paulsen
Salon G

1. PAULSEN, JS — Preclinical Changes in Huntingtons
2. PAULSEN, JS — Introduction to PREDICT-HD: A 10-year study of biomarkers and refined clinical markers in preclinical HD
3. AYLWARD, E — Structural Imaging in Preclinical HD
4. EIDELBERG, D — Metabolic Brain Networks in Preclinical HD
5. RAO, SM — Functional Imaging in Preclinical HD
6. HARRINGTON, DL — Cognitive Neuroscience Approaches in Preclinical HD

10:45 AM–12:15 PM **Poster Session 3: Aging, Dementias, Executive Functions**
Gloucester

Aging

1. AMBLE, C — Impact of Physical Activity on Brain Aging: Framingham Offspring Study
2. DIXON, RA — Does Cognitive Status Modulate Memory Aging: Comparing Cognitively Elite, Normal, and Impaired Older Adults
3. GUIDOTTI BRETING, LM — Temporal Gradient for Famous Names in Young and Older Participants
4. HANTKE, N — Comparison of Semantic and Episodic Memory Activation in Predicting Cognitive Decline in Older Adults
5. JACKSON, CE — Massed Versus Spaced Visuospatial Learning and Memory in Healthy Young and Older Adults
6. GENTILE, A — Neuropsychological Outcomes for Minimally Invasive and Traditional Coronary Artery Bypass Graft Surgery
7. JEFFERSON, AL — Left Ventricular Ejection Fraction and Neuropsychological Functioning in the Framingham Heart Study
8. JURADO, M — Executive functions across the adult lifespan
9. MATTHEWS, MA — Cortical and Subcortical Volumetric Differences between Cognitively Stable and Declining Older Adults
10. OOSTERMAN, J — The Role of Strategy Use in the Age-related Decline in Associative Memory
11. POREH, AM — Analysis of Cognitive Aging Using Reliability Theory
12. RAHMAN, A — Normative Data for the Fuld Object Memory Evaluation in Octogenarians and Centenarians
13. ROGALSKI, E — The Neuroanatomy of SuperAging: Increased of Cortical Thickness in the Anterior Cingulate Cortex
14. ROGALSKI, Y — Levels of Processing Effects on Text Memory in Older Adults
15. ROGERS, SA — Does a Change in Spirituality Impact Cognitive Functioning Among Older Adults?
16. SPRINGATE, BA — Hippocampal Volume, White Matter Hyperintensities and Cognition in the Healthy Elderly
17. SUK, J — Proportional Reasoning Task: A neuropsychological test sensitive in detecting decline in higher cognitive function in older adults with low educational background
18. WILLIAMSON, J — The Right Hemisphere Aging Hypothesis and Right-Left Spatial Distractibility
19. SUGARMAN, MA — Prediction of Future Cognitive Decline using Brief Measures of Physical and Cognitive Activity in Healthy Older Adults
20. AHMED, FS — Social Cognition in Aging: Exploring the Relationship Between Proverb Interpretation and Theory of Mind
21. DÍAZ, U — Cognitive Interventions in the Old Age: Background Characteristics that Influence Engagement and the Role of Cognitive Reserve
22. DÍAZ, U — The Use of Bilingualism and Occupational Complexity Measures as Proxies for Cognitive Reserve: Results from a Community-Dwelling Elderly Population in the North of Spain
23. DÍAZ, U — Technological System Adapted to the Cognitive and Perceptual Capabilities of Disabled and Elderly People: Presenting the GUIDE Project
24. BUIZA, C — The More Responsible, the Less Complainer: Subjective Memory Complaints, Cognitive Performance and Personality Traits in the Elderly

Dementia (Alzheimers)

25. BUIZA, C — Neuropsychological Assessment in the Severely Demented Patients with Alzheimers Disease. Validation of the Severe Cognitive Impairment Profile (SCIP) into Spanish
26. BUIZA, C — Predictive Power over the Level of Severity in Advanced Alzheimers Disease of the Severe Cognitive Impairment Profile (SCIP)
27. BONNER-JACKSON, A — Buffer Effect of Apolipoprotein ε2 on Functional Decline in Mild Cognitive Impairment and Alzheimer's Disease
28. WAGNER, MT — The Sensitivity of the Clinical Diagnosis of Amnestic MCI Confirmed by CSF Biomarkers and Longitudinal Follow-up
29. BRICKMAN, AM — Distribution of MRI-derived white matter hyperintensities in mild cognitive impairment
30. CLARK, LR — Predicting Global Cognitive Decline in Older Adults Using Executive Function Measures
31. CORONADO, NC — Considerations for MoCA Clock: Improved Diagnostic Efficacy with Rater Training and Addition of the Copy Condition
32. COSENTINO, SA — Deconstructing Awareness Deficits in Alzheimer's Disease: Failure to attend, detect, or integrate?
33. DAVIS, JD — Road Test and Naturalistic Driving Behavior in Older Adults with and without Memory Loss: Environment Matters
34. ENNOK, M — What are Intrusions Made Of?

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Executive Functions/Frontal Lobes

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

81.	DUVALL, SW	Executive Function in Very Low Birth Weight Preschoolers and its Relationship with Current and Perinatal Medical Factors
82.	EPSTEIN, NM	Simple Reaction Time to Appearing and Disappearing Visual Stimuli
83.	FALCHOOK, A	Alternate Hand Postures, but Do Not Swim: A Test for Executive Motor Dysfunction in Parkinson Disease
84.	FOURNIER, I	What virtual reality learns us about cognitive development among adolescent
85.	GODOY, S	Cognitive flexibility and attention in preschoolers: a validity study of instruments and developmental considerations in Brazilian sample
86.	KAFADAR, H	Cognitive Model of Problem Solving
87.	LØVSTAD, M	Focal lesions to the lateral and orbital prefrontal cortex: Neuropsychological profiles and self reported executive functions in everyday living
88.	LUKOSE, A	Neuropsychological correlates of decision making in frontal lobe lesion patients
89.	MENEZES, A	Cognitive Flexibility in Brazilian Children and Adolescents Measured by the Trail Making Test
90.	NZEREM, CK	Comparison of Verbal Fluency Switching Measures in HIV
91.	OCAMPO-FLORES, A	The role of working memory in planning during performance in the tower of London task
92.	PIERCE, CA	A Comparative Analysis of the Category Test and the Wisconsin Card Sorting Test
93.	RHODES, E	The Role of Executive Dysfunction on Visuoconstructional Processing in Late Life Depression
94.	SATLER, C	Visuo-spatial Working Memory in Alzheimer's Disease: Role of Emotion
95.	SAVLA, GN	A Comprehensive Study of Executive Functions in Schizophrenia Using the Delis-Kaplan Executive Function System (D-KEFS)
96.	THORGUSEN, SR	Emotional Distracters Affect Task Performance under High Executive Demands
97.	WALKER, D	Executive Function and Social Cognition in Typically Developing Adolescents
98.	WELLER, JA	Differences in Executive Functioning in Children with an Autism Spectrum Disorder versus Children with ADHD
99.	WILSON, JP	Too Many Stroops Spoil the broth? Effects of Congruent Stimuli and Cue-Switching on Stroop Performance
100.	YEHYAWI, NT	Disconnect between BRIEF-A and performance-based measures of executive functioning: Where's the clinical relevance?

12:00–1:30 PM **Thursday Lunchtime Continuing Education Courses**
Refer to CE Schedule for Location

12:15–1:15 PM **Students of INS (SINS) Organizational Meeting**
Salon E

1:30–3:00 PM **Invited Symposium: The Impact of Amyloid-β on Cognitive Aging: PET Amyloid Imaging and Neuropsychological Performance**
Chair: Reisa Sperling
Salon F

1.	SPERLING, R	The impact of amyloid-β on cognitive aging: PET amyloid imaging and neuropsychological performance
2.	SPERLING, R	Introduction - Amyloid-β deposition and large-scale neural networks
3.	PARK, D	The Cognitive Consequences of Amyloid Deposition in a Lifespan Sample of Healthy Adults
4.	RESNICK, SM	Amyloid Imaging and Memory Change as Predictors of Cognitive Decline and Resilience
5.	RENTZ, DM	Detecting Amyloid-related Neuropsychological Alterations in Cognitively Normal Adults

1:30–3:00 PM **Symposium 4: Endophenotypes for Schizophrenia Spectrum Disorders: Evidence from Neurological, Cognitive, and Emotional Findings**
Chair: Raymond C. Chan
Discussant: Matcheri Keshavan
Salon G

1.	CHAN, RC	Endophenotypes for Schizophrenia Spectrum Disorders: Evidence from Neurological, Cognitive, and Emotional Findings
2.	CHAN, R	Functional Connectivity of Neurological Soft Signs in First-episode Schizophrenia and Their Non-psychotic First-Degree Relatives
3.	STONE, W	Recent developments in neuropsychological endophenotypes for schizophrenia: Relationships to other dimensions of function and to liability syndromes
4.	GUR, R	Findings from a computerized neurocognitive battery applied to phenotype large-scale genomic studies of schizophrenia: Lessons and a glimpse into future applications of item response theory
5.	SEIDMAN, L	Comparison of genetic and clinical high risk studies for early detection of schizophrenia in adolescence

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

1:30–3:00 PM

Poster Session 4: Aging, Epilepsy, Functional and Structural Imaging, Memory
Gloucester

Aging

1. ANDERS, M — Can Anxiety Hinder Frontal-Executive Performance Among Older Adults?
2. ANDERS, M — Is There An Interaction Between Personality and Memory Among Older Adults?
3. BENITEZ, A — Intact Cognition in Depressed Elderly Veterans Providing Adequate Effort
4. CHUNG, C — A cross-cultural examination of the positivity effect in memory: China vs. United States
5. HOLCOMB, EM — Serial Position Effects as Predictors for Change in Global Cognition as Measured by the Dementia Rating Scale-2
6. BADARACCO, M — The Relation of Hypertension to Cognition in Observational Studies: A Meta-Analysis
7. LEA, JC — The Montreal Cognitive Assessment (MOCA)'s Subtests and Mild Cognitive Impairment in Oldest Old Adults
8. LEON, S — Divergent Thinking as a Measure of Creative Processing in Aging
9. LEON, S — Story Production Using Novel Associates as a Measure of Creative Processing in Aging
10. LERITZ, EC — Elevated Cholesterol is Differentially Associated with Brain Structure and Cognition in Older Adults
11. LIU, L — Longitudinal memory decline and apolipoprotein ε4 status in healthy older adults
12. MAHONEY, JR — Multisensory Integration in Young and Old Adults: A Simple Reaction Time Study
13. MARQUINE, MJ — Cognitive Decline in Normal Aging: The Impact of Anterior and Posterior WMH Progression
14. MORROW, LA — Comparing Cognitive Impairment by Clinical Adjudication, Computerized Assessment and Diagnostic Algorithm in Older Adults
15. POWELL, J — Brief Visuospatial Memory Test – Revised: Form Equivalency for Ages 80-89
16. RICHMOND, LL — Older Adults Show Improved Everyday Memory and Attention via a Working Memory Training Regime
17. RICHMOND, LL — Errors in Hierarchical Ordering of Scripts: A Performance-based Analysis
18. SARTORI, A — The Relationship Between Cognitive Function and Life Space: The Potential Role of Personal Control Beliefs
19. SCHNEIDER, B — Vascular Burden and Cognitive Impairment in Older Adults with Depression
20. WENDELL, CR — Plasma Lipid Levels and Neuropsychological Function: Nonlinear Relations and Effect Modification by Age
21. MCFALL, G — Effects of Obesity on Cognition: Differential Roles of Age and Gender
22. WILLS, CL — Attention and Off-topic Speech in the Recounts of Middle-Aged and Elderly Adults: A Pilot Investigation
23. YAMOUT, KZ — Alzheimer's Disease Pathology, Vascular Neuropathology, and Cognition
24. YEH, D — APOE ε4 status and executive functioning decline in cognitively intact older adults
25. YOCHIM, B — Anxiety, Depression, Memory, and Executive Function in Older Adults: Processing Speed as a Mediator
26. YOON, J — Aging and Comprehension: Roles of Inhibition and Attention-switching

Epilepsy/Seizures

27. ALVAREZ-CARRILES, JC — Wisconsin Card Sorting Test performance in cryptogenic and symptomatic frontal and temporal lobe epilepsy
28. BECK, C — Relationship between Age of Onset of Temporal Lobe Epilepsy and Gross Sulcal Morphology
29. BENDER, HA — The convergent validity of the intracarotid amobarbital procedure in Spanish-speaking surgical candidates
30. BENGE, J — Performance on the Structured Inventory of Malingered Symptoms in Known Epilepsy and Psychogenic Non-Epileptic Event Groups
31. BERMAN, R — Development of an Assessment of Emotional Processes during the Wada Test
32. BRAND, JG — Emotion Processing Bias in Depressed Epilepsy Patients
33. CHAPIESKI, L — Intellectual and Academic Decline in Children with Intractable Seizures
34. COHEN, ML — Presentation of Post-Traumatic Stress Disorder Due to the Misattribution of Seizure-Related Experiential Responses: A Case Report
35. CONN, C — ADHD Inattentive Symptoms in Pediatric Epilepsy
36. DAVE, JB — Verbal Fluency Localizes Seizure Onset Among Left Hemisphere Epilepsy Patients
37. HILL, SW — A Case of Upside-down Reading and Writing: A Real Condition?
38. HILL, SW — The Relationship Between Mood and Neurocognitive Functions in Nonepileptic and Epileptic Seizure Patients
39. MITTENBERG, W — Estimation of Premorbid Intelligence in Children with Intractable Epilepsy
40. MORAN, LM — Social Information Processing in Pediatric Epilepsy
41. PAPAZOGLOU, A — The Relationship Between Adaptive and Executive Functioning in Children with Epilepsy
42. PECK, CP — MCMI–III Profile Differences in Epileptic and Non–Epileptic Seizure Disorder
43. SETER, C — Visual Serial List Learning in Patients with Epilepsy: The 15-item Biber-Glosser Figure Learning Test
44. SOPER, A — Emotional State Changes and Their Awareness During the Pre-Surgical Wada Intracarotid Sodium Amobarbital Procedure
45. VERCHE, E — Learning and Visual Memory in Children and Adolescents with Frontal Lobe Epilepsy

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Imaging (Functional)

Imaging (Structural)

Memory Functions

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

93.	HESSEN, E	A rehearsal strategy significantly improves immediate and delayed recall on the Rey Auditory Verbal Learning Test
94.	KNUYCKY, L	Event Valence Affects False Alarm Rate for Never Before Seen Actions Under Conditions of High Arousal
95.	LOWE, DA	Does Level of Extroversion Impact Memory Performance in Older Adults?
96.	MCLAREN, DG	FMRI Activity and Context-Dependent Connectivity Reveals Brain-Behavior Differences in Middle-Aged Adults at Risk for Alzheimer's Disease
97.	QUINN, KM	Age Related Temporal Order Memory Deficits Are Exacerbated by Medial Temporal Lobe Dysfunction in Mild Cognitive Impairment
98.	TEDJOPRANOTO, J	Assessing the Relationship between RBANS Normative Data and Medial Temporal Volumetrics in Mild Cognitive Impairment
99.	WAHLEN, A	Cortical Dissociation Between Reality Filtering and Strategic Monitoring: an Evoked Potential Study

1:30–3:15 PM **Paper Session 4: Executive Functions**
Moderator: Scott Langenecker
Salon E

1.	IUDICELLO, J	Additive Effects of Aging and HIV Infection on Semantic Verbal Fluency: An Analysis of Clustering and Switching
2.	COLE, MA	Psychiatric Symptomatology, but Not Mild Traumatic Brain Injury, Is Associated with Cognitive Deficits in OEF/OIF Veterans
3.	BRAGA, DD	Anterior Cingulum Integrity Predicts Neurocognitive Performance in Traumatic Brain Injury: A Quantitative Tractography Study
4.	MOFFITT, AJ	Are Autism-Related Impairments in Executive Control More Apparent in the Presence of Multiple Demands?
5.	DUDANI, A	Clinical and Neuroimaging Correlates of Executive Functioning in Pediatric-Onset Multiple Sclerosis
6.	KRCH, D	Thalamic Integrity Predicts Processing Speed, Verbal Memory, and Executive Function
7.	JANECEK, JK	MCI in Parkinson Disease: Measures Matter

2:00–3:15 PM **Student Research Symposium**
Chair: Sommer Thorgusen
Salon AB

1.	THORGUSEN, SR	Student Symposium: Translational Research
2.	BREWSTER, P	Measurement Equivalence of the Neuropsychological Test Battery of the Canadian Study of Health and Aging Across Two Levels of Educational Attainment
3.	SZABO, AJ	Prevalence of Invalid Performance on the IMPACT in Division I Football Players
4.	SCHUH, JM	Perspective Taking in Autism Spectrum Disorder: Relative Contributions of Theory of Mind and Working Memory
5.	KANE, T	Cognitive Functioning Associated with Pediatric Bone Marrow Transplant
6.	WENDELL, CR	Plasma Lipid Levels and Neuropsychological Function: Nonlinear Relations and Effect Modification by Age

3:15–4:45 PM **Paper Session 5: Pediatric Neuropsychology**
Moderator: Paul Cirino
Salon F

1.	YEATES, K	Reliable Change in Postconcussive Symptoms among Children with Mild Traumatic Brain Injury
2.	MCNALLY, KA	Relative Contributions of Injury Characteristics versus Non-injury Child and Family Factors in Predicting Postconcussive Symptoms Following Mild Traumatic Brain Injury in Children
3.	CONKLIN, HM	Computerized Assessment of Cognitive Late Effects among Childhood Brain Tumor Survivors: An Alternative Use for the ImPACT Battery
4.	KRULL, KR	Neurocognitive Functions in Aging Adult Survivors of Childhood Leukemia
5.	PULSIPHER, DT	Neuropsychological Performance and Brain Structure in Early Remission New-Onset Pediatric Epilepsy
6.	MCCAULEY, SR	Diffusion Tensor Imaging of Incentive Effects in Prospective Memory Three Months after Pediatric Traumatic Brain Injury

3:15–4:45 PM **Symposium 5: Applying Neuroplasticity to Rehabilitation**
Chair: Sarah Raskin
Discussant: Catherine Mateer
Salon G

1.	RASKIN, S	Applying Neuroplasticity to Rehabilitation
2.	GONZALEZ-ROTHI, L	Neurorehabilitation: Translation from Discovery to Care
3.	ROBERTSON, I	Attention and arousal in cognitive enhancement

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

4.	RASKIN, S	Prospective Memory Intervention
5.	KERNS, K	Rehabilitation of Attention in Children

3:15–4:45 PM **Poster Session 5: Genetic Disorders, Cerebral Asymmetry, Traumatic Brain Injury**
Gloucester

Genetics/Genetic Disorders

1.	BEARDEN, DJ	A Longitudinal Case Study of the Neuropsychological Impact of CHARGE Syndrome
2.	CHANG, J	Relationships Among Attention, Processing Speed, and Biochemical Features in Children Identified with Mitochondrial Disease
3.	WINGBERMÜHLE, E	Neuropsychology of 17q21.31 microdeletion syndrome
4.	EISENGART, JB	Sanfilippo Syndrome: Characterization of a Childhood Dementia
5.	GOODRICH-HUNSAKER, N	Young Adult Female Fragile X Premutation Carriers Show Age- and Genetically-Modulated Spatiotemporal Cognitive Impairments
6.	JACOBSON, DA	Effects of Hippocampal and Temporal Lobe Volume on Social Functioning and Memory Performance in Children with Velocardiofacial Syndrome
7.	JANKE, KM	Inattention and Impulsivity in Young Children with Neurofibromatosis-1
8.	KOVEN, NS	The Role of the BDNF C270T Polymorphism in Executive Functioning
9.	KOVEN, NS	Interactions of Catechol-O-Methyltransferase Genotype and Age in Verbal Intelligence in Healthy Adults
10.	LEE, JL	Neuropsychological Sequelae in Neurofibromatosis, Type I: A Sibling Case Study
11.	NEWMAN, E	An fMRI Study of Inhibitory Control in Prodromal Huntington's Disease
12.	NORRIS-BRILLIANT, A	The Neuropsychological Profile of a Low-Income Nine Year Old Child of Puerto Rican Descent Diagnosed With Tyrosinemia - Type I
13.	OLIVEIRA, DG	Face perception in children and adolescents with Williams-Beuren Syndrome and control group
14.	PRICE, J	Gender and Depressive Symptoms Moderate the Effects of the Serotonin Transporter Gene on Hippocampal Structure and Memory in Healthy Young Adults
15.	PROSJE, MA	Cognitive Decline Starting in the 4th Decade: A Female Carrier of the Pelizaeus-Merzbacher's (PLP1) Gene
16.	RACHES, D	Early Indicators of a Cognitive Phenotype in Barth Syndrome
17.	CARREIRO, LR	Behavioral and Neuropsychological assessment of children and adolescents with Williams-Beuren Syndrome
18.	SNOW, J	Neuropsychology of Chediak-Higashi Syndrome
19.	WALSH, KS	Differential Neurocognitive Phenotype in Neurofibromatosis Type 1 (NF1) Children with Noonan-like Features
20.	WHIGHAM, K	An Investigation of the Development of Executive, Behavioral, and Emotional Functioning in a Clinic Referred Sample of Patients with 22q11.2 Deletion Syndrome
21.	WINGEIER, K	Duchenne Muscular Dystrophy: Relationship between Cognitive Functioning, Gene Mutations and Metabolites in the Brain

Hemispheric Asymmetry/Laterality/Callosal Studies

22.	LEGARDY, SN	Longitudinal Study of Crystallized versus Fluid Intelligence in Agenesis of the Corpus Callosum
23.	CHRISTMAN, S	Individual Differences in Body Dysmorphic Disorder: Handedness is More Important Than Sex
24.	DE HAAN, E	Dr Strangelove or Anarchic Hand Syndrome in the Right Hand
25.	FALCHOOK, A	Awareness of Dominant and Non-dominant Hands' Abilities to Perform Deft Movements
26.	HOLCOMB, EM	Lateral Cognitive Processing and Belief Updating within a Sociopolitical Context
27.	HOLLAND, AK	Left Lateralized Cerebral Activation as a Function of Food Absorption and Cognitive Task Demands: Examining Changes in Beta Magnitude Using a Dual Concurrent Task Paradigm
28.	LESHEM, R	The Effects of Attention on Laterality Indices in Dichotic-Listening to Words and Affects
29.	PROPPER, RE	Lateral Gaze Enhances Long Term Memory for Geographical Information
30.	PROPPER, RE	Inconsistent-Handers are More Affectively Negative and More Susceptible to Mood Induction
31.	RAU, HK	Switching and Maintaining Mental Set During Verbal and Spatial Task Performance
32.	STEFANATOS, GA	Psychometric Properties of Computerized Dichotic Listening Protocols
33.	VAN DYKE, SA	Measures of Laterality: An Explanation of Inconsistent Literature
34.	COHEN, ML	Biases During Vertical Bimanual Movements in Healthy Adults
35.	COHEN, ML	Changes in Finger-Tapping Variability Between Unimanual and Dual-Task Performance as a Function of Age and Aerobic Fitness

TBI (Child)

36.	COHEN, ML	Parent-Child Interaction Therapy as a Family-Oriented Approach to the Management of Behaviors following Pediatric Traumatic Brain Injury: A Case Report
37.	BEAUCHAMP, MH	The Socio-Cognitive Integration of Abilities Model: Theoretical Bases and Empirical Support from the Study of Pediatric TBI
38.	CICCIA, AH	Neural Correlates after Pediatric TBI: A Meta-analysis
39.	EWING-COBBS, L	Relation Between Social Communication and Regional Callosal Morphometry in Young Children with Traumatic Brain Injury

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

TBI (Adult)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

82. MERKLEY, TL — Structural and Functional Changes of the Caudal Anterior Cingulate Following Traumatic Brain Injury
83. OLIVIER, TW — Can the DRS-2 Distinguish TBI from Aging Effects In Seniors?
84. PARTOVI, D — Impact Of Parental Traumatic Brain Injury On Adolescents
85. RABINOWITZ, AR — Baseline Characteristics Predict Post-Concussion Recovery in College Athletes
86. RITCHIE, D — Concussion History and Knowledge Base in Competitive Equestrian Athletes
87. ROSKOS, P — Construct Validity of the Neurobehavioral Symptom Inventory in a Sample of Healthy Controls and Individuals with TBI
88. ROSKOS, P — The Clinical Utility of the Neurobehavioral Symptom Inventory in Persons with Traumatic Brain Injury
89. VICTOR, TL — The Association Between Headache and Neuropsychological Functioning in OEF/OIF Veterans with History of Traumatic Brain Injury
90. ETTENHOFER, ML — The Performance of OEF/OIF Veterans on Standard Tests of Cognitive Effort: A Descriptive Study
91. VOELBEL, G — White Matter Integrity and Novel Nonverbal Problem Solving Ability of Adults with Moderate to Severe TBI: A Diffusion Tensor Imaging Study
92. LENGENFELDER, J — Examination of Verbal Learning Strategies in TBI using the CVLT-II

Cancer

93. LANGER, K — Case Perspectives on Assessment of Social Cognition in the Neuropsychological Evaluation of the Oncology Patient

Medical/Neurological Disorders/Other (Adult)

94. GRIFFEN, JA — Awareness of Deficits and On-road Driving Performance

Cognitive Intervention/Rehabilitation

95. WILSON, AC — Cognitive Rehabilitation Utilising Action Video Games following Traumatic Brain Injury
96. RANDOLPH, JJ — 10-year Publication Trends in JINS: Moving Toward a Positive Neuropsychology?

3:30–4:30 PM — **Invited Address: Constructive Memory: Remembering the Past to Imagine the Future**
Speaker: Daniel Schacter
Salon E

1. SCHACTER, D — Constructive Memory: Remembering the Past to Imagine the Future

5:00–6:00 PM — **Birch Lecture: The Neurodevelopment of Memory and Decision Making: A Fuzzy-Trace Theory Approach**
Speaker: Valerie Reyna
Salon EF

1. REYNA, VF — The Neurodevelopment of Memory and Decision Making: A Fuzzy-Trace Theory Approach

FRIDAY, FEBRUARY 4, 2011

7:20–8:50 AM — **Friday Morning Continuing Education Courses**
Refer to CE Schedule for Location

9:00–10:00 AM — **Invited Address: The Brain's Default Network: Anatomy, Function, and Relevance to Disease**
Speaker: Randy Buckner
Salon E

1. BUCKNER, RL — The Brain's Default Network: Anatomy, Function, and Relevance to Disease

9:00–10:30 AM — **Symposium 6: Positive Neuropsychology: New Applications of an Old Construct**
Chair: Peter Arnett
Salon F

1. ARNETT, P — Positive Neuropsychology: New Applications of an Old Construct
2. RANDOLPH, J — 10-year Publication Trends in the Neuropsychological Literature: Moving Toward a Positive Neuropsychology?
3. RABINOWITZ, A — General Contentment as a Protective Factor in MS Patients
4. RAMANATHAN, D — Dispositional Optimism and Outcome Following Traumatic Brain Injury
5. VARGAS, G — Correlates of Positive Affect in Multiple Sclerosis
6. UKUEBERUWA, D — Predicting positive functional outcomes: Job stability in multiple sclerosis

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

9:00–10:30 AM

Symposium 7: Neuropsychological Functioning in Rare Diseases; Research Challenges and Potential Solutions

Chair: Lauren Krivitzky
Discussant: Elsa Shapiro
Salon G

1.	KRIVITZKY, L	Neuropsychological Functioning in Rare Diseases; Research Challenges and Potential Solutions
2.	ADAMS, H	Neuropsychological assessment and challenges in evaluation of juvenile-onset Batten Disease
3.	WAISBREN, S	Neuropsychological Profiles in PKU and other Metabolic Disorders
4.	KRIVITZKY, L	Neuropsychological Functioning in Neontatal Onset Proximal Urea Cycle Disorders
5.	EISENGART, JB	How subtypes of the mucopolysaccharidoses differentially affect the brain: Neurobehavioral and structural distinctions
6.	RICHARD, Z	Neuropsychological Functioning in Boys with Cerebral Adrenoleukodystrophy (CALD)Treated with Stem Cell Transplant
7.	SNOW, J	Neurocognitive assessment of patients with isolated methylmalonic acidemia (MMA) and cobalamin C (cblC)

9:00–10:30 AM

Poster Symposium: Neuropsychological traits as targets in genetic studies of ADHD

Arlington

1.	DOYLE, AE	Multivariate association of ADHD and neuropsychological phenotypes in the 3q13.21 and 22q12.3 regions
2.	SCHACHAR, R	Response inhibition as a candidate endophenotype for ADHD
3.	KUNTSI, J	Candidate gene associations with quantitative trait measures of ADHD and intermediate phenotypes
4.	LOO, S	The additive effects of genes involved in brain efficiency and integrity on human intelligence
5.	DOYLE, A	Neuropsychological traits as targets in genetic studies of ADHD
6.	WILLCUTT, EG	Using twins to understand the etiology and neuropsychology of comorbidity between ADHD and learning disorders

9:00–10:30 AM

Poster Session 6: Behavioral Neurology, Rehabilitation, Language and Speech Disorders, Stroke

Gloucester

Behavioral Neurology

1.	CHAN, RC	A structural equation modeling analysis on neurological soft signs and neurocognition in healthy elder people
2.	DRAGO, V	The Influence of Sleep on Creativity
3.	FALCHOOK, A	Awareness of Limb Kinetic Apraxia in Parkinson Disease
4.	MISHRA, M	Recognition Test for Optional Cued Recall on the Montreal Cognitive Assessment
5.	MISHRA, M	Utilization of the Montreal Cognitive Assessment PLUS Semantic Fluency Task in the Clinical Setting
6.	NAHUM, L	Disorientation is Associated with Impaired Reality Filtering in Amnesia
7.	WOODS, M	Case Study: Shifts in Hemispatial Attention Over Time with Repeated-Trials Line Bisection
8.	HAMMAR, ÅSA	Normalized Cognitive Impairment in Effortful Processing in Major Depressive Disorder Results From a Ten Year Follow Up Study

Cognitive Intervention/Rehabilitation

9.	ABRISQUETA-GOMEZ, J	Practice Effects: Implications for Neuropsychological Interventions in Alzheimers disease
10.	WAGNER, MT	Application of Technological Innovations for Neurorehabilitation: Case Examples
11.	BUTLER, B	'Making the Most of Your Memory': A Pilot Study of a Cognitive Strategy Training Group for Community-dwelling Stroke Survivors
12.	CONWAY, T	Multi-modal intensive Treatment (MMiT) of Phonological Alexia: Unique Behavioral and fMRI Outcomes
13.	COOPER, D	Education and Neurorehabilitation Outcome: A Rural Sample
14.	DYE, RV	Memory Improves With Extended Use of Computerized Brain Fitness Program Among Older Adults
15.	ALLEN, SC	Making Working Memory Better: Role of the Central Executive
16.	FAZELI, PL	Speed of Processing Training in Adults with HIV
17.	GRILLI, MD	Enhancing Cued Recall in Memory-Impaired Individuals: the Mnemonic Advantage of Self-Imagining
18.	GRILLI, MD	Imagining from a Field Perspective Enhances Recognition Memory more than Imagining from an Observer Perspective
19.	JAYARO, CR	Cognitive Decline and Theoretical Insights On Two Patients with Concurrent Epileptic Seizures and Pseudoseizures Studies
20.	LEE, SB	Rehabilitative Mindfulness Training for Car Accident-related Traumatic Brain Injury Patients: A Pilot Study
21.	MACSWEEN, J	Investigating the Efficacy of an Computerized Attention Training Program in Children with Epilepsy

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Language and Speech Functions/Aphasia

Stroke/Aneurysm

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

64. HEINKS-MALDONADO, TH — Physical and emotional well-being and quality of life following acquired hemorrhagic cerebellar lesions in childhood

Visuopatial Functions/Neglect/Agnosia

65. BURTIS, DB — Line Bisections in Normal Subjects with Constrained Monocular Viewing
66. KIRKPATRICK, MR — Children With Heavy Prenatal Alcohol Exposure are Distinguishable from Children with ADHD and Controls on Visuospatial Memory
67. DOUGLAS, J — Relation of Executive Functioning to Pragmatic Outcome following Severe Traumatic Brain Injury
68. GOEDERT, KM — Assessment of Spatial Neglect in an Acute Post-Stroke Sample: Psychometric Properties of the Catherine Bergego Scale and Behavioral Inattention Test
69. HAQUE, S — The Effects of Stimulus Proximity on Spatial Bias (Neglect) and Distractibility
70. KING, KE — Developmental Prosopagnosia: A Pediatric Case Study
71. LEE, Y — Compromised face processing network in developmental prosopagnosia
72. MCDERMOTT, A — The Test of Visuospatial Construction: Continuing the Psychometric Evaluation of a Motor Free Test of Visuoconstruction
73. MCDERMOTT, A — Evaluating the Efficacy of the Test of Visuospatial Construction (TVSC) in Clinical Populations: Can the TVSC Distinguish Between Various Neurological, Medical and Psychiatric Conditions?
74. MCDERMOTT, A — Mild Cognitive Impairment and Alzheimer's Disease: Can the Test of Visuospatial Construction Distinguish Between Groups and Help Track Possible Progression of Impairment?
75. NORTON, DJ — Hemineglect in Left-Onset Parkinson's Disease is Independent of Visual Scanning Patterns
76. SPRINGER, US — Paradoxical Visuospatial Cognition in Essential Tremor: a Case of Compensation?
77. WILLIAMSON, J — Asymmetrical Distractibility in Mediating Focal Spatial Attention in Normal Subjects
78. WILLIAMSON, J — Ego and Allocentric Peripersonal Spatial Hypometria in Parkinson's Disease
79. WILLIAMSON, J — The influence of meditation on creativity
80. ZINK, T — A Modern Version of a Classic: Combining the Cross Copy Task with a Computerized Tablet Reveals Subtle Motoric Deficits in Hemispatial Neglect
81. ZUKERMAN, JM — Two Cases of Progressive Visuospatial Dysfunction Suggestive of Posterior Cortical Atrophy
82. MUSIL, S — Preserved Semantic Processing in Progressive Visuospatial Dysfunction: Influence on Visual Perception

9:30–11:00 AM — Publishing in Scientific Journals: A Professional Development Workshop hosted by Students of INS
Speakers: Kathy Haaland, Stephen Rao, and Russell Bauer
Salon AB

10:15–11:45 AM — Invited Symposium: The Study of Anosognosia
Chair: George Prigatano
Salon E

1. PRIGATANO, G — The Study of Anosognosia
2. HEILMAN, KM — Anosognosia and Anosodiaphoria of Hemiplegia: Signs, Symptoms and Possible Mechanisms
3. KORTTE, K — Anosognosia for Hemiplegia: Evidence of an Underlying Neuroanatomic Circuit
4. TRANEL, D — The insula and interoceptive awareness
5. COCCHINI, G — Does left brain damage play some role in anosognosia?
6. PRIGATANO, G — Reflections and suggestions

10:45 AM–12:15 PM — Symposium 8: Space and Number in Neurodevelopmental Disorders: A Comparison of Spina Bifida Meningomyelocele (SBM) and Chromosome 22q11.2 Deletion Syndrome (22q11.2 DS)
Chair: Maureen Dennis
Discussant: Jack M. Fletcher
Salon F

1. DENNIS, M — Space and Number in Neurodevelopmental Disorders: A Comparison of Spina Bifida Meningomyelocele (SBM) and Chromosome 22q11.2 Deletion Syndrome (22q11.2 DS)
2. BARNES, M — Space and Number In Infants, Preschoolers, and School-Aged Children With Spina Bifida Meningomyelocele
3. SIMON, T — Space, Time and Number Processing in School-Aged children with Chromosome 22q11.2 Deletion (VCFS/DiGeorge) Syndrome
4. JURANEK, J — Imaging the Spina Bifida Brain For Cross-Disorder Comparisons: Spatial Patterns of Cortical Thickness and Thinning, Volumetrics of Subcortical Gray Matter, and Cerebellar Parcellations
5. SRIVASTAVA, S — Atypicalities in the Neural Substrates Associated with Space, Time and Number Processing in School-Aged Children with Chromosome 22q11.2 Deletion (VCFS/DiGeorge) Syndrome

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

10:45 AM–12:15 PM

Symposium 9: Vascular Cognitive Aging: Mechanisms and Prevention
Chair: Angela L. Jefferson
Discussant: Robert Paul
Salon G

1. JEFFERSON, AL — Vascular Cognitive Aging: Mechanisms and Prevention
2. WALDSTEIN, S — Hypertension and Cognitive Function: Blood Pressure and Beyond
3. REYNOLDS, C — The Association of Serum Lipids with Cognitive Aging
4. CRAFT, S — The Role of Insulin Resistance in Pathological Brain Aging
5. JEFFERSON, AL — Cardiac Output and Abnormal Brain Aging

10:45 AM–12:15 PM

Poster Symposium: Alcohol and Drug Use in College Students: Cognition and fMRI
Arlington

1. RASKIN, S — Alcohol and Drug Use in College Students: Cognition and fMRI
2. ANDERSON, B — The Effects of Family History and Alcohol Use on Alcohol Cue Reactivity: An fMRI Study
3. DECUIR, D — Effects of Drinking Patterns on Cognitive Functions in College Students
4. GLAHN, D — Risk Taking Measure Sensitive to Family History of Alcoholism
5. ROSEN, R — Collegiate Academic Performance in Relation to Alcohol Consumption and High School Standardized Test Scores

10:45 AM–12:15 PM

Poster Session 7: Adult Assessment, Cognition and Cancer, Cognitive Neuroscience, Electrophysiology, Drugs and Toxins
Gloucester

Assessment/Psychometrics/Methods (Adult)

1. BAEK, MJ — The Usefulness of the Korean Dementia Screening Questionnaire in Patients with Mild Cognitive Impairment and Alzheimer's Disease
2. MILLER, AK — Examining the Errors and Self-Corrected Errors on the Stroop Test
3. MITTENBERG, W — Selection Criteria for Clinical Neuropsychology Internships
4. ESTEVIS, E — Effects of Practice on the Wechsler Adult Intelligence Scale-4th edition (WAIS-IV) Across 3- and 6-Month Intervals
5. TURNER, TH — Clinical Neuropsychological Evaluation via Telemedicine: Preliminary Findings
6. MUELLER, A — Psychometric Properties of the Geriatric Anxiety Scale: Comparison to the Beck Anxiety Inventory and Geriatric Anxiety Inventory among Older Adults
7. PIERCE, CA — Testing the Equivalency of Three Recognition Formats of the Rey Auditory Verbal Learning Test
8. SUBIRANA MIRETE, J — Use of Processing Speed measures to assess Cognitive Impairment. Preliminar study
9. ANDRESEN, E — ADHD Simulators Perform Significantly Worse than Neurological Populations on the Gordon Diagnostic System
10. BROWNING, ES — Sex Differences in Divergent Thinking
11. BREWSTER, P — Measurement Equivalence of the Neuropsychological Test Battery of the Canadian Study of Health and Aging Across Two Levels of Educational Attainment
12. SHENG, X — PPVT-I Rules Significantly Shorten PPVT-III/IV Administration
13. UMFLEET, LG — Estimating WAIS-IV Indexes in Brain Damaged and Medical Samples: Proration versus Linear Scaling
14. VAN DYKE, SA — Test-Retest Reliability of the Traumatic Brain Injury Screening Instrument
15. VAN DYKE, SA — The Utility of the Postconcussive Symptom Questionnaire
16. MACKINNON, S — Completion of Executive Functioning Tasks in a Memory Clinic Dementia Sample
17. SPENCER, RJ — A new measure of suggestibility as measured by endorsement of urban myths
18. BIELIAUSKAS, LA — Reliability and validity of a scale of "need for cognition"
19. CARPENTER, CD — Valid incidental learning measures derived from the WAIS-IV Vocabulary and Similarities subtests
20. JOHNSON, C — Does the Spatial Position of Card Decks Influence Selections on Iowa Gambling Task?
21. KRAYBILL, M — Test operating characteristics of a motor programming task used in the prediction of cognitive decline

Cancer

22. ASHFORD, JM — Adaptive Functioning of Childhood Brain Tumor Survivors following Radiation Therapy as Measured by Parent Report and Examiner Interview
23. NETSON, KL — The Impact of Conformal Radiation Therapy on Adaptive Functioning in Children Treated for Localized Ependymoma
24. KING, KE — Neurocognitive Effects Associated with TNP-470 Administration in Patients with Advanced Adenocarcinoma of the Prostate
25. WONG, AL — Pre-Surgery Neurocognitive Functioning in Post-Menopausal Women Newly Diagnosed With Breast Cancer
26. KRULL, KR — Construct Validity of the Childhood Cancer Survivor Study Neurocognitive Questionnaire
27. KRULL, KR — Neurocognitive Outcomes in Adult Survivors of Childhood Hodgkin Lymphoma

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Cognitive Neuroscience

Electrophysiology/EEG/ERP

Drug/Toxin-Related Disorders (Including Alcoholism)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

71.	GRUBER, SA	Age of Onset of Marijuana Use Impacts Executive Function and Brain Activation
72.	DINGWALL, K	Measuring Cognitive Recovery following Inhalant Abuse
73.	CYR, E	Evolution of the Cognitive Profile of Children Exposed to Alcohol During Pregnancy
74.	SKEEL, R	Behavioral Risk-Taking and Alcohol Attitudes Uniquely Predict Alcohol Consumption
75.	BURCIAGA, J	Marijuana Craving and Memory in Bipolar Disorder
76.	MAGRYS, S	Differential Effects of Alcohol and Stress on Sustained Attention
77.	BLACK, DN	Impulsivity, Habit and Addiction in Online College Gamblers
78.	SCHUSTER, RM	Compensatory Effects of Nicotine On Declarative Memory Among Recent Cannabis and Nicotine Using Young Adults
79.	SULLIVAN, K	Hippocampal Volumes and Visual Memory Differences in Neurotoxicant Exposed Gulf War veterans: A Pilot Study
80.	VENNE, J	Drinking Behavior Predicts Associative Learning Performance in Young OEF/OIF Service Members
81.	LONG, EA	Fluency Abilities in Adolescents with Co-Occuring Bipolar and Alcohol Use Disorders
82.	GONZALEZ, R	Co-factors Contributing to Declarative Memory and Decision-Making Among Young Adult Cannabis Users
83.	WILSON, K	Relationships between Obesity and Neuropsychological Function in Women ages 30-55
84.	SISANTE, J	Alcohol Use in College Freshmen: Differences in Self-reported Sensation-seeking, Trait Impulsivity, and Motivation, but Not in Behavioral Delay-discounting or Risk-taking Tasks

12:00–1:30 PM **Friday Lunchtime Continuing Education Courses**
Refer to CE Schedule for Location

1:30–2:30 PM **Invited Address: The Role of the Cerebellum in Cognition and Emotion**
Speaker: Jeremy Schmahmann
Salon E

1.	SCHMAHMANN, JD	The Role of the Cerebellum in Cognition and Emotion

1:30–3:00 PM **Symposium 10: Building Bridges in Neuropsychology: Evolution of the Discipline and Remembering Edith Kaplan**
Chair: Sandra J. Shaheen
Discussant: Deborah Fein
Salon F

1.	SHAHEEN, SJ	Building Bridges in Neuropsychology: Evolution of the Discipline and Remembering Edith Kaplan
2.	BARR, PH.D. ABPP-CN, WB	History of Neuropsychology: The Process Approach in Context
3.	DELIS, DC	Evolution of Test Development: The Role of Cognitive-Process Data in Assessment
4.	AU, R	Using Qualitative Neuropsychological Measures in an Epidemiologic Study: The Framingham Offspring Cohort
5.	BAUER, PH.D. ABPP-CN, R	Disconnection, Dissociation Logic, and the Legacy of the Process Approach
6.	FEIN, D	Building Bridges: Further Application of the Hybrid Approach to Addressing Diagnostic and Clinical Need

1:30–3:00 PM **Symposium 11: fMRI-based Evidence of Neuroplasticity in Neurological Populations**
Chair: Benjamin M. Hampstead
Discussant: John DeLuca
Salon G

1.	HAMPSTEAD, BM	fMRI-based Evidence of Neuroplasticity in Neurological Populations
2.	HILLARY, FG	The Meaning of Neural Network Change after Neurological Compromise
3.	TRACY, J	Epilepsy and Cognitive Plasticity
4.	CROSSON, B	Implications of Aging for Functional Neuroimaging in Stroke and Stroke Rehabilitation
5.	HAMPSTEAD, BM	Cognitive rehabilitation of memory increases activation in patients with mild cognitive impairment relative to healthy elderly

1:30–3:00 PM **Poster Session 8: ADHD, Child and Adult Neurological and Medical Disorders**
Gloucester

ADHD/Attentional Functions

1.	AHERN, DC	Reaction Time Enhancement in a Modified Attention Network Task
2.	ANTONINI, T	Exploring the Relationship Between Reaction Time Variability and Off Task Behavior in Children With and Without ADHD

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Medical/Neurological Disorders/Other (Adult)

Medical/Neurological Disorders/Other (Child)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

50.	BEEBE, DW	Impact of Experimental Sleep Restriction on Adolescents' Attention, Learning, and Arousal Level in a Simulated Classroom
51.	BEEBE, DW	Metacognition and Behavior Regulation in Childhood Survivors of Complex Congenital Heart Disease
52.	BERNABEU, J	Neuropsychological Follow-up and Rehabilitation in two children with Neuroblastoma and Opsoclonus-Myoclonus syndrome
53.	BUTT, S	Preliminary Results from a Longitudinal Pediatric Sickle Cell Disease Study: Do Parent Focused Advocacy Interventions Improve Academic Success?
54.	CUNNINGHAM, T	Radiation Dose Effects on Sustained and Selective Attention
55.	DAY, LA	A Comparison of Neurodevelopment in Children with Hearing Loss: Cochlear Implantation in Children with Intellectual Disabilities
56.	DEWEY, D	Developmental Outcomes of Children Born to Mothers with Type 1 Diabetes who Experienced Severe Hypoglycemia During Pregnancy
57.	EDELSTEIN, K	Chronotype, Morning-Evening Preferences, and Sleep Problems in Spina Bifida
58.	EPPIG, J	Sinistrality, Learning Problems, and Autoimmune Disorder in Complex Regional Pain Syndrome: Revisiting the Geschwind- Galaburda Hypothesis
59.	HAMPTON, LE	Hydrocephalus status in spina bifida: Variations in cognitive profile
60.	JANOS, AL	Processing Speed and Variability in Children with Phenylketonuria
61.	KANE, T	Cognitive Functioning Associated with Pediatric Bone Marrow Transplant
62.	KING, KE	Visual Perception in Children with MPS I and II
63.	LANCASTER, MA	Post-Surgical Functioning in Children with Chiari Malformation Type 1
64.	LEE, JL	Neuropsychological Sequelae of Lightning Strikes in Adolescents: Two Serial Case Studies
65.	LEISER, KL	The Neuropsychological Profile of a 7-year-old Patient with Cobalamin C Deficiency: Results of Longitudinal Assessment
66.	LEISER, KL	The Influence of Family Factors on Intellectual Functioning and Language in Preschoolers with Neurological Insult
67.	LUTON, L	Timing is Everything: Examining Neurocognitive Changes Over Time in an Adolescent with Encephalopathy
68.	ZIMMERMAN, E	Comparison of WISC-III and WISC-IV Perceptual Indices in Children Diagnosed with Cerebral Palsy
69.	MCNALLY, KA	Iowa Gambling Task Performance in Overweight Children and Adolescents At-Risk for Obstructive Sleep Apnea
70.	PERRY-AVERY, JM	WISC Profile Analysis of Children with Early Orphanage Experience as a Function of Duration Institutionalization
71.	POWELL, MR	Acute Effects and Natural Recovery Following Concussion in High School Football Players
72.	RESENDIZ, CV	Neurocognitive Performance among Bilingual and Monolingual Children with Spina Bifida
73.	SLONAKER, A	Wolff-Parkinson-White Syndrome: A Case Study of Neuropsychological Functioning
74.	SLONAKER, A	CHARGE Syndrome: A Neuropsychological Case Study of Siblings
75.	PASS, L	Tetralogy of Fallot: A Pediatric Neuropsychological Case Study and Educational Implications
76.	PASS, L	Neurofibromatosis type 1: A Pediatric Neuropsychological Case Study and Educational Implications
77.	FARROW, S	Cognitive and Academic Profiles of Sickle Cell Disease In School-aged Children: Educational Implications
78.	TAYLOR, H	Classroom behavior of kindergarten children with extreme prematurity: Comparisons with term-born controls and neuropsychological correlates
79.	VELAZQUEZ, CC	Regression Based Norms for Motor Speed and Manual Dexterity in Pediatric Sickle Cell Disease and Human Immunodeficiency Virus
80.	WESTMACOTT, R	The Impact of Disease Laterality and Stroke on Intellectual Ability and Executive Function in Pediatric Moya-moya Disease
81.	WILLIAMS, T	Cerebrovascular reactivity and neuropsychological functioning in pediatric moya-moya disease
82.	ROSENBERG, JL	Clinician Ratings of Diffusion Tensor Imaging Do Not Predict Neuropsychological Status in Children with Cerebral Palsy

2:45–3:30 PM

Neurocognitive Aspects of Obesity
John Gunstad
Salon E

1.	GUNSTAD, J	Neurocognitive Aspects of Obesity

3:15–4:45 PM

Symposium 12: The Ubiquity of Sex Differences in Neuropsychological Research
Chair: Cynthia A. Munro
Discussant: Edith V. Sullivan
Salon F

1.	MUNRO, CA	The Ubiquity of Sex Differences in Neuropsychological Research
2.	MAHONE, E	Sexual Dimorphism in Children with ADHD
3.	MENDREK, A	Sex Differences in the Default-Mode Network in Schizophrenia and in Health
4.	COSGROVE, KP	Sex Differences in Beta2*-Nicotinic Acetylcholine Receptors in Abstinent Tobacco Smokers

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

5.	MUNRO, CA	The Influence of Age on Sex Differences in Cognitive Test Performance and on Indices of Serotonin Function

3:15–4:45 PM **Symposium 13: Functional and effective connectivity: Communication within neural networks underlying cognition in clinical populations**
Chair: Victoria Leavitt
Discussant: Andrew J. Saykin
Salon G

1.	LEAVITT, VM	Functional and effective connectivity: Communication within neural networks underlying cognition in clinical populations
2.	WYLIE, GR	Connectivity Changes in Traumatic Brain Injury across Recovery
3.	SUMOWSKI, JF	Default Network Activity is a Sensitive and Specific Biomarker of Memory Capacity in Multiple Sclerosis
4.	LEAVITT, VM	Abnormal Patterns of Effective Connectivity in Multiple Sclerosis
5.	KELLY, C	Reduced Interhemispheric Resting State Functional Connectivity in Cocaine Dependence
6.	HOPTMAN, MJ	Functional Connectivity in the Default Mode Network in Schizophrenia: Abnormalities and Structural Substrates

3:15–4:45 PM **Poster Symposium: Recent Advances in the Science of Consciousness**
Arlington

1.	NAKASE-RICHARDSON, R	Prospective Characterization of the Natural History of Recovery from Severe Acquired Brain Injury and Relation to Functional Outcome
2.	KATZ, DI	The Effectiveness of Amantadine Hydrochloride in Restoring Behavioral Functions Following Severe Brain Injury

3:15–4:45 PM **Poster Session 9: Adult Assessment, Forensic Neuropsychology, Traumatic Brain Injuiry**
Gloucester

Assessment/Psychometrics/Methods (Adult)

1.	ATKINSON, TM	Establishing Distinct Cognitive Flexibility and Language Function Factors in the Controlled Oral Word Association Test (COWAT-FAS)
2.	BARWICK, F	Base Rates of Abnormally Low Test Scores Among Male and Female Collegiate Athletes at Baseline Concussion Assessment
3.	BARWICK, F	Correlates of Abnormally Poor Test Performance Among Male and Female Collegiate Athletes at Baseline Concussion Assessment
4.	WATSON, P	Visual Search for Meaningful Line Drawings: The Effects of Top-Down and Bottom-Up Attentional Mechanisms and Efficiency of Search
5.	HEITZMAN, T	Investigating the Use of the ROCF-Developmental Scoring System to Assess Qualitative Neurodevelopmental Patterns in Young Adults
6.	JERRAM, M	Differential Correlations of Tests of Impulsivity in Healthy Males
7.	JOHNSON, SK	Validating Subjective Cluster Coding in Verbal Fluency Using Response Times
8.	JOHNSON, CP	Risky Decisions and Ambiguous Decisions: Explaining Poor Performance on the Iowa Gambling Task
9.	JONES, RG	Test-Retest Reliability and Effort Testing of the CNS-Vital Signs (CNSVS)
10.	KLEMAN, VM	The Influence of Verbal Mediation on WAIS-IV Matrix Reasoning
11.	MARK, VW	The NIH Toolbox's Sensitivity To Cognitive Illness In Acute Brain Rehabilitation
12.	MCKEEVER, JD	Driving and Texting: Exploring the Hazards of Distracted Driving
13.	MITCHELL, MB	Relationship of Neuropsychological Test Performance and Cognitive Reserve in Healthy Aging and the AD Spectrum: A Theoretically-Driven Factor Analysis
14.	NOVITSKI, J	Modified Effort Index for the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Preliminary Validation
15.	PATWARDHAN, SY	Differences in Standardized Scores on Controlled Oral Word Association Based on MAE and Ruff Normative Data
16.	REESE, EG	Standard and Computer Test Performance: Changes across Four Administrations in One Day
17.	ROEBUCK-SPENCER, TM	Effect of Test-retest Interval in Computerized Cognitive Testing
18.	SACHS, BC	Validation of the NAB Naming Test in a Consecutive Clinical Series
19.	SAWYER, K	Reliable Digit Span in Older Adult Outpatient Clinical Groups
20.	SHARMA, V	The effect of increasing FSIQ scores on verbal and perceptual indices of the WAIS-III
21.	SISCO, S	Assessing Interference Independent of Processing Speed on the Stroop test in a Parkinson's Disease Sample
22.	MITCHELL, E	Effort Indicators Embedded Within the California Verbal Learning Test-II (CVLT-II) in a Sample of Criminal Adults
23.	WELLMAN, JN	Evaluation of a Visual Serial Addition Task in a Virtual Environment

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Forensic Neuropsychology

TBI (Adult)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

68.	MORRA, L	Assessment of Mild Traumatic Brain Injury in OEF/OIF Service Members: Blast and Lifetime TBI Semi-Structured Interview (BLT)
69.	WHITTINGTON, LT	Normal Aging vs. Dementia vs. Motor Vehicle Accident Sequelae
70.	RABINOWITZ, AR	Validity of an Affective Verbal Memory Test in a College Athlete Sample
71.	RESENDIZ, CV	Early Prediction of Functional Outcome of Traumatic Brain Injury by the Neurobehavioral Rating Scale-Revised
72.	RITCHIE, D	How Are Student Athletes Really Feeling? Utilizing the 21-item Post-Concussion Scale on Athletes With No Reported Concussion History
73.	SZABO, AJ	Prevalence of Invalid Performance on the IMPACT in Division I Football Players
74.	THOMAS, KR	Cognitive Efficiency in Veterans with TBI is Reduced by Psychiatric Symptom Severity, Not Post-Concussive Symptoms
75.	NEUMANN, MR	Sleep devrivation has a small effect on memory among veterans being evaluated for mild traumatic brain injury
76.	GAJEWSKI, SL	The psychometrics of brief psychiatric screening inventories for veterans undergoing assessment for possible traumatic brain injuries
77.	MAGHSOODI, N	The Rey Complex Figure is moderately useful as a screen for poor effort among veterans with possible mild traumatic brain injury
78.	TREE, H	Informational literature influences symptom expectation following head injury: An analog study
79.	VILLEMURE, R	Impact of Stressful Life Events on Self-Reported Symptoms Three Months After a Mild Traumatic Brain Injury
80.	WINGO, J	Cognitive Discrepancies by APOE Genotype among Head-Injured Military Personnel
81.	WOODHOUSE, J	Efficacy of the Response Bias Scale (RBS) Among OEF/OIF Veterans
82.	WRIGHT, MJ	Metabolic Crisis-Related Brain Atrophy and Neuropsychological Impairment Following Traumatic Brain Injury

3:45–4:45 PM **Invited Address: Lasting Traces: How H.M. Shaped the Science of Memory**
Speaker: Sue Corkin
Salon E

1.	CORKIN, S	Lasting Traces: How H.M. Shaped the Science of Memory

5:00–6:00 PM **Presidential Address: Strategies for Preclinical Detection and Prevention of Alzheimer's Disease**
INS President: Stephen Rao
Salon EF

1.	RAO, SM	Strategies for Preclinical Detection and Prevention of Alzheimer's Disease

6:00–6:30 PM **INS Business Meeting**
Salon EF

6:30–7:30 PM **Friday Evening Reception**
4th Floor Atrium Foyer

SATURDAY, FEBRUARY 5, 2011

7:20–8:50 AM **Saturday Morning Continuing Education Courses**
Refer to CE Schedule for Location

9:00–10:30 AM **Paper Session 6: Traumatic Brain Injury**
Moderator: Molly Zimmerman
Salon E

1.	KIM, J	Methylphenidate Modulates Sustained Attention and Cortical Activation in Survivors of Traumatic Brain Injury: A Perfusion fMRI Study
2.	ZIMMERMAN, ME	Soccer Heading is Associated with Neuropsychological Function in Amateur Players
3.	PONSFORD, J	Predicting the Development of Psychiatric Disorders Following Traumatic Brain Injury
4.	MCDONALD, S	An examination of orientation and engagement in response to emotional faces following severe Traumatic Brain Injury
5.	YEO, RA	A Longitudinal Proton Magnetic Resonance Spectroscopy Study of Mild Traumatic Brain Injury
6.	VERFAELLIE, M	Long-Term Clinical Outcomes of Blast-Induced Neurotrauma

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

9:00–10:30 AM **Symposium 14: Baby Signing**
Chair: Brenda C. Seal
Salon F

1.	SEAL, BC	Baby Signing
2.	BROWN, M	The Hype and Controversy Surrounding Baby Signing
3.	KOEGLER, H	Manual Activity and Vocal Activity at 9 Months of Age
4.	AN, Y	Spoken Language Acquisition in Hearing Babies Exposed to Sign and Hearing Babies Not Exposed to Sign
5.	STEVEN, K	A Visual Head-Turn Preference Paradigm for Familiar and Unfamiliar Signing in 10-Month Olds

9:00–10:30 AM **Symposium 15: Understanding and Assessing the Neuropsychological, Neurological Consequences of Chronic Exposure to Manganese**
Chair: Muriel Lezak
Salon G

1.	GUILARTE, T	Understanding and Assessing the Neuropsychological, Neurological Consequences of Chronic Exposure to Manganese
2.	BELLINGER, D	Exposure to Manganese and Children's Neurodevelopment in Infancy
3.	BOWLER, RM	Manganese Exposure in Adults: An Epidemiologic Study of Symptoms, Mood Effects, Motor and Neurological Function
4.	HARRIS, M	Manganese Exposure and Components of Executive Function in Environmentally-Exposed Adults
5.	KIM, Y	Neuroimaging in Manganese neurotoxicity: From Structural to Functional Neuroimaging
6.	GUILARTE, T	Manganese Neurotoxicity: A New Perspective

9:00–10:30 AM **Poster Symposium: Language-Independent Cross-Cultural Tests of Executive Effort: 2004 Edith Kaplan Award.**
Arlington

1.	SEDO', MA	Language-Independent Cross-Cultural Tests of Executive Effort: 2004 Edith Kaplan Award
2.	SEDO, M	Testing Kolla schizophrenics, siblings and neighbours with Language-Independent Neuropsychological Tests (in Quechuan and in Spanish)
3.	JAYARO, C	Measurement of Academic Maturity, Executive Control and Pervasive Developmental Diagnosis in Venezuela, Through Rapid Recurrent Reading Tests
4.	MOREIRA, A	Executive functions and reading ability: evidence from language-independent culture-free tests
5.	SALVADOR-CRUZ, J	Multisensory Performance, Working Memory and Executive Performance in Rural and City-Dwelling, Mexican and Zapotecan-Speaking Children 6 to 11

9:00–10:30 AM **Poster Session 10: Aging, Cross Cultural Issues, Dementia and Mild Cognitive Impairment**
Gloucester

Aging

1.	CERNIN, P	Preliminary Support for Ecological Validity of Trail-Making Test B and Health Behaviors in Older African Americans
2.	FLORIAN, AR	Does the Cognitive and Emotional Functioning of Older Adults Vary by Marital Status?
3.	GAVETT, R	WAIS-III Profiles in SuperAgers
4.	HEVERLY-FITT, SJ	All Vascular Risk Factors Are Not Created Equal
5.	HOLLAND, AK	Examining Changes in Regulation of Parasympathetic Tone as a Function of Age and Performance on a Left-Lateralized Cognitive Task Before and After Undergoing Digestive Stress
6.	JURICK, S	Quantitative and Qualitative Features of List Learning as Predictors of Global Cognitive Decline
7.	KELLY, H	Effect of Encoding Context on Word Recognition in Younger and Older Adults
8.	LALWANI, LN	The Effects of Demographic Variables on Differential Strategy Usage in Addition Problems among Cognitively Normal Adults
9.	LEE, AK	The 90 Year Old Driver: The "Oldest Old" is the New "Old"
10.	LEVY, IF	Semantic Inhibition in Older and Younger Adults
11.	MAHONEY, JR	Differential Effects of Sensory Cueing in Young and Old Adults: A Modified Attention Network Test (ANT) Study
12.	MANNING, K	Stopping Behaviors in Virtual Reality Driving: Age Differences and the Relation to Cognition
13.	PARSEY, CM	Effects of Normal Aging on Instrumental Activities of Daily Living in a Smart Environment
14.	DELEON, A	Default-mode Network Dysfunction in Aging: Implications For Cognitive Performance
15.	RAO, J	Personality Factors Associated with Preservation of Episodic Memory in SuperAgers
16.	ROSEN, A	Semantic Knowledge and the Temporal Gradient in Older and Younger Adults
17.	VANDERMORRIS, S	Neuropsychological Correlates of Problem-Solving in Normal Aging
18.	VANNORSDALL, TD	Serum Uric Acid and Mild Cognitive Dysfunction in the Women's Health and Aging Study-II

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

61. DAVIS, R — The Digital Clock Drawing Test (dCDT) - I: Development of A New Computerized Quantitative System
62. PENNEY, DL — The Digital Clock Drawing Test (dCDT) - II: A new Computerized Quantitative System
63. PENNEY, DL — The Digital Clock Drawing Test (dCDT) - III: Clinician reliability for a new quantitative system
64. PENNEY, DL — Digital Clock Drawing Test (dCDT) – IV: Total clock drawing and inter-stroke latencies or information revealed between the lines
65. SCHMID, AD — Utility of the Neuropsychological Assessment Battery in Patients with Normal Pressure Hydrocephalus
66. SIDERS, CA — The Role of Encoding and Consolidation in Alzheimer's Disease and Amnestic Mild Cognitive Impairment
67. SPITZNAGEL, MB — Impact of a 6-Month Exercise Program on Global Cognition and Factors Associated with Weight Loss in Mild Cognitive Impairment (MCI)
68. SPRINGATE, BA — Relationship Between Awareness of Deficits and Cognitive and Functional Decline in Mild Cognitive Impairment and Dementia
69. TREMONT, G — Use of the Telephone-Administered Minnesota Cognitive Acuity Screen (MCAS) to Detect Mild Cognitive Impairment
70. TUMINELLO, ER — Mild Cognitive Impairment, Executive Functioning, and Anterior Cingulate Cortex Volumetry
71. WELDON, A — Neuropsychiatric Symptoms and Executive Functioning in Patients with Mild Cognitive Impairment (MCI): Relationship to Caregiver Burden
72. WYLIE, SA — Expression and suppression of action impulses in Parkinson's disease: effect of speed pressure

Cross Cultural

73. COOK, NE — Structured Data Collection of Culturally Relevant Risk Factors in Refugees: A Case Example of Somali Bantus
74. FUNES, CM — Informing Clinicians: Considering the Standardization Samples of Spanish-language WAIS Batteries used with US Adults
75. KAMAT, R — Effects of Marathi-Hindi Bilingualism on Neuropsychological Performance
76. KELDERMAN, J — Cultural Considerations in the Neuropyschological Evaluation of Children on Grand Cayman
77. KOSMIDIS, MH — Examining Memory Deficits in the Greek Population
78. LEE, PH — Collectivistic Coping Predicting Psychosocial Outcomes Among Asian Americans with Acquired Brain Injury
79. PUENTE, AE — Are Different Spanish Versions of the WAIS "Equivalent?"
80. ROBBINS, RN — Assessing the feasibility and acceptability of neuropsychological testing for HIV-associated neurocognitive disorders among Xhosa-speaking South Africans
81. ROBBINS, RN — Detecting HIV-Associated Neurocogntive Disorders in South Africa: The Need for Culturally Appropriate Tests and Norms
82. RODRIGUEZ-RIVERA, M — Premorbid Estimates of Neuropsychological Functioning in Hispanics
83. SCOTT, TM — ESL Status and SES in Neuropsychological Test Performance in Hispanic College Students
84. STRUTT, AM — A comparison of Rey-15 scoring systems and alternative indices of suspect effort with primarily Spanish speaking older adults

10:45 AM–12:15 PM — Symposium 16: The Differential Contribution of White and Gray Matter to the Phenotypic Expression of Dementia.
Chair: David Libon
Discussant: Kenneth M. Heilman
Salon F

1. LIBON, DJ — The Differential Contribution of White and Gray Matter to the Phenotypic Expression of Dementia
2. PRICE, CC — Re-Examination of the 25% Threshold for Symptomatic Leukoaraiosis
3. TANNER, J — Dissociating Gray and White Matter Contributions to Verbal List Learning and Memory
4. LAMAR, M — The impact of white matter and subcortical structure alterations on mood in euthymic older adults with dementia
5. SEIDEL, G — Neuroimaging Predictors of IADLs and Everyday Action Errors in Dementia

10:45 AM–12:15 PM — Symposium 17: Cross-cultural neuropsychology: Translation, modification, and empirical testing of cognitive measures across diverse populations and settings.
Chair: Reuben N. Robbins
Salon G

1. ROBBINS, RN — Cross-cultural neuropsychology: Translation, modification, and empirical testing of cognitive measures across diverse populations and settings
2. THOMAS, K — Cultural modification and testing of a Boston Naming Test short form in South Africa
3. FERRETT, H — Neuropsychological assessment in South Africa: Empirical evaluation of the suitability of three WHO-endorsed tests
4. SCHULER, M — Cross cultural neuropsychological evaluation in newly arrived populations with limited education in practice settings
5. STRUTT, AM — The clinical utility of a translated dementia battery for primarily Spanish speaking older adults

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

10:45 AM–12:15 PM **Poster Symposium: The Emerging Applied Neuropsychology in Venezuela.**
Arlington

1. JAYARO, CR — The Emerging Applied Neuropsychology in Venezuela
2. JAYARO, C — Neuropsychological consideration in evaluating Hispanic Patient: A theorical and practical case study César jayaro, PhD
3. MORENO, M — A Transdiciplinary Approach to Applied Neuropsychology Marianela Moreno de Ibarra, Msc (UNIMET – UCAB)
4. PIÑA, A — A Case Report from the Applied Neuropsychology Approach: Is It possible the transdisciplinarity? Carballo, E., León, A., Piña, A. and Rivas, A. Diplomado de Neuropsicología Aplicada (UNIMET)
5. RAMIREZ, R — Cerebellar Cognitive Affective Syndrome After Cerebellar Stroke: A Case Study

10:45 AM–12:15 PM **Poster Session 11: Adult and Child Assessment Methods, Multiple Sclerosis and Related Disorders**
Gloucester

Assessment/Psychometrics/Methods (Adult)

1. ALTMANN, LJ — Does the N-Back Task Measure Working Memory or Executive Function?
2. ALTMANN, L — Not Just Working Memory: Complex Sentence Comprehension during Rapid Serial Visual Presentation Relates to Executive Functions
3. BAKER, AM — Impact of non-diagnostic information in assessment: Identification and corrective procedures
4. BENITEZ, A — Utility of the RBANS Cortical-Subcortical Index in MCI and Alzheimer's Disease
5. DENNEY, DA — Dyadic Short Forms of the Wechsler Adult Intelligence Scale-IV for Estimating FSIQ and GAI
6. FERNÁNDEZ, AL — Reliability Of The Five-Point Test
7. FERNÁNDEZ, AL — Symbol Digit Modalities Test Alternate Forms
8. LYON, AC — Factor Structure of a Neuropsychological Protocol for Older Adults with Vascular Disease
9. GROSCH, MC — Brief Telecognitive Assessment vs. Face to Face Evaluation in Urban Caucasians and Rural American Indians
10. GULLETT, JM — Reliability of a Benton JOLO Short Form in Parkinson's Disease
11. HARP, JP — Detection of Malingered ADHD Among College Students
12. HASHIMOTO, Y — Recognition of Six Basic Emotions from Facial Expression After Traumatic Brain Injury- Explore Study
13. HENRY, M — ClinicaVR Stroop: Stroop Version 2.0?
14. SNYDER, A — Why is Part B of the Trail Making Test More Difficult than Part A?
15. IVERSON, GL — Evidence-Based Diagnosis of DSM-V Neurocognitive Disorders
16. IVERSON, GL — Psychometric Criteria for Identifying Cognitive Impairment in Older Adults on CNS Vital Signs
17. IVERSON, GL — Evidence-Based Psychometric Criteria for Memory Impairment
18. RYU, K — The Test-Retest Changes of the MMSE in Healthy and High-Risk Elderly
19. MINER, D — A Comparison of Alzheimer's Disease, Huntington's Disease and Mild Cognitive Impairment using the RBANS
20. KAUFMAN, DA — Relationships Between Temperament and WAIS-IV Matrix Reasoning Performance
21. KAY, D — Apathy in Parkinson's Disease: Comparing FrsBe and Apathy Scale
22. KRAUSKOPF, EE — Feasibility of Brief Computerized Cognitive Battery to Assess Cognitive Function in Migraine Patients Pre and Post-Contrast Transcranial Doppler Testing
23. LEININGER, S — Cortisol and Self-Report Measures of Anxiety as Predictors of Neuropsychological Performance
24. MATEREK, AD — Does Verisimilitude Improve Veridicality: Using Executive Measures to Predict Money Management Skills in Older Adults
25. MCCLINTOCK, SM — Gender and Race Effects on the Columbia University Primate Cognitive Battery
26. MELROSE, RJ — The Use of Cognitive Effort Instruments in OEF/OIF Veterans who Speak English as a Second Language
27. MIELE, AS — Base Rates of Clinically Impaired Scores on the Wisconsin Card Sorting Test in a Sample of Community Dwelling Neurologically Intact Older Adults
28. GUNNER, JH — Base Rates for Impairment on the Stroop Color-Word Test in Community Dwelling Older Adults: A Cautionary Note
29. PEREIRA, DA — Validation of Philadelphia Brief Assessment of Cognition (PBAC) in a Brazilian Population
30. PHILLIPS, N — Validation of Alternate Forms for the Montreal Cognitive Assessment (MoCA), a Screening Test for Mild Cognitive Impairment
31. REED, B — Age Effects on Components of Visual Feature Conjunction Measured with the California Cognitive Assessment Battery
32. RIDDLE, T — Utility of the Contingency Naming Test in an Adult Clinical Sample
33. ROBERG, BL — Patient Perceptions of Information Processing Speed Difficulties in Multiple Sclerosis
34. SUNDERARAMAN, P — How does task demand affect gender differences in verbal memory and organization? A comparative study of the California Verbal Learning Test (CVLT –II) and the Philadelphia (repeatable) Verbal Learning Tests (PrVLT)
35. JOHNSON, WJ — Incremental Validity of TOMM Versus Commonly Used Embedded Symptom Validity Measures in a MTBI Veteran Population

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Assessment/Psychometrics/Methods (Child)

36. JOHNSON, WJ — Test-Retest Reliability of the Lebby-Asbell Neurocognitive Screening Examination for Adolescents (LANSE-A)

Assessment/Psychometrics/Methods (Adult)

37. WEISSBERGER, G — An Assessment of Bilinguals' Ability to Self-Report Language Dominance
38. WILD, K — Validation of Self-Reported Activity Data: Application of Day Reconstruction Methods to a Cohort of Monitored Elders
39. WISDOM, NM — Increased Variability in Wechsler Adult Intelligence Scale, Fourth Editon (WAIS-IV) Performance Across Adulthood
40. WONG, AL — Comparison of Standardized and Virtual Environment Versions of the Paced Auditory Serial Addition Task

Assessment/Psychometrics/Methods (Child)

41. ANDERSON, M — Verbal Memory and Language Assessment
42. BALDWIN, R — Prevalence of Co-occurring Disorders with Dyslexia in a Clinical Sample: Implications for Clinical Practice
43. BARBOSA, AC — Evidence of Validity of a test of non-verbal intelligence for Brazilian Deaf Students
44. BARBOSA, AC — Analysis of Physiological Measures During the Reading Texts by Dyslexics and Good Readers
45. PURCELL, C — The Relationship Between the WISC-IV PRI and the Executive Functioning Scale of the BASC-2 in Children Referred for Psychoeducational Assessment
46. HALE, CR — A Cluster Analytic Investigation of the WISC-IV Core and Supplemental Subtests in Children Referred for sychoeducational Assessment
47. PETRAUSKAS, VM — Exploratory factor analysis of the WISC-IV Perceptual Reasoning Index in a referred sample using a CHC framework
48. ERDODI, LA — Memory as a Predictor of Adaptive Functioning
49. ERTELT, TW — Neuropsychological, Academic Achievement, and Behavioral Differences Between the Child Behavior Checklist Pediatric Bipolar Disorder Profile, Attention-Deficit/Hyperactivity Disorder, and Emotionally Normal Controls
50. IRWIN, JK — Confirmatory Factor Analysis of the Reynolds Intellectual Assessment Scales (RIAS) in Typically-Developing Canadian Children
51. KURIAKOSE, G — Differentiating Between Typically and Atypically Developing Child Populations: A Microanalysis of the Children's Clock Drawing Test
52. MCGILL, C — Evidence of Validity for a Monitoring Version of the Behavior Rating Inventory of Executive Function (BRIEF)
53. NAKAGAWA, Y — Grammatical development of written language in Japanese A comparison between children with normal hearing and those with a hearing loss
54. PEDOTO, A — Breastfeeding: The Neuro-developmental Effects
55. GARBARINO, J — Psychometric Properties of the Memory for Intentions Screening Test for Youth (MISTY)
56. ROSENQVIST, JE — Recognition of Emotional Expressions in 3 to 6-Year-Old Finnish Children – Effects of Age, Other Neurocognitive Capacities, and Social Stimulation
57. WEINBERG, J — Using an Ecological Lens to Examine the Neurocognitive Outcomes of Congenital Heart Disease: A Case Study
58. RYAN, JJ — Stability of WISC–IV Process Scores

Multiple Sclerosis/ALS/Demyelinating Disorders

59. RYAN, JJ — WAIS-IV Performance in Multiple Sclerosis
60. ARENIVAS, A — Quality of Life, Fatigue, and Cognition in Pediatric Demyelinating Diseases
61. BERARD, J — Impact of PASAT Scoring Method When Measuring Cognitive Fatigue in Multiple Sclerosis
62. BERRIGAN, LI — Cognitive Processing Speed is Linked to Vocational Status in Individuals with Relapsing-Remitting Multiple Sclerosis
63. FROST, R — PASAT Performance as a Predictor of Peak Alpha Frequency in Multiple Sclerosis
64. BRUCE, J — Personality Characteristics in Multiple Sclerosis: Association with Depression and Anxiety
65. CHENG, A — Subjective Ratings of MS Subjects and Healthy Controls on Tests of Information Processing Speed
66. CHENG, A — Subjective Ratings of Memory Tests by MS Subjects and Healthy Controls
67. DEHNING, M — Neurological Correlates of Multiple Sclerosis
68. FUCHS, K — Cognition in MS: Clinic vs. Community Setting
69. HANCOCK, L — Investigating the Association Between Processing Speed and Neurologic Disability in Multiple Sclerosis
70. KALAHANI-BARGIS, M — Lack of Interhemispheric Cooperation in a Global-Local Visual Processing Task in Pediatric Multiple Sclerosis
71. LAU, K — Cognition, emotions and coping in multiple sclerosis in Hong Kong
72. MORSE, C — Do differences between physical and mental health predict fatigue in multiple sclerosis?
73. JANSSEN, A — Examining the association between physical activity, cognition and hippocampal volume in multiple sclerosis
74. RANDOLPH, JS — Further Assessment of the Cognitive Reserve Construct in MS: The Role of Smoking Status

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

75.	REILLY, EJ	Brain Activity During Verbal Working Memory Tasks in Multiple Sclerosis: Effects of Task Difficulty and Performance
76.	STROBER, L	Variables which lead to unemployment in multiple sclerosis: The role of coping
77.	TILL, C	White Matter Integrity and Math Performance in Pediatric Multiple Sclerosis: A Diffusion Tensor Imaging Study
78.	UKUEBERUWA, D	Protective factors in MS: A longitudinal analysis of coping, anxiety, and cognition
79.	VARGAS, GA	Testing the Learned Helplessness Theory in Multiple Sclerosis
80.	WEISSER, VD	Examining the Relationship Between Clinical Measures and Driving in Multiple Sclerosis
81.	WISHART, H	Development and Testing of a New Approach to MS Lesion Segmentation using 3T FLAIR Images
82.	WOJTOWICZ, M	Intra-individual Variability in Attention and Executive Functioning in Multiple Sclerosis

Autism Spectrum Disorders

83.	MARSH, MC	Model of Social Information Processing in Boys with Asperger's Syndrome

10:45 AM–12:30 PM

Paper Session 7: Pediatric Neuropsychology
Moderator: Deborah Waber
Salon E

1.	PALTIN, I	Everyday Executive Function in Childhood Acute Lymphoblastic Leukemia (ALL) Survivors Compared with Attention Deficit/Hyperactivity Disorder and Healthy Controls
2.	JAYAKAR, R	Radiation Impacts CVLT Performance in Long Term Survivors of Childhood Brain Tumors
3.	BEHEN, ME	Brain Damage and IQ in Sturge-Weber Syndrome: Support for a "Fresh Start" Hypothesis
4.	MRAKOTSKY, C	Corticosteroids, Inflammation and Memory in Children with Crohn's Disease: Longitudinal Outcomes
5.	SADY, MS	Cerebellar Motor Task Performance in Three Etiologies of Congenital Hydrocephalus
6.	WABER, D	Infantile Malnutrition and Childhood Socioeconomic Circumstances Independently Predict Adult Neurocognitive Outcomes: The Barbados Nutrition Study
7.	BARRE, N	Language Abilities in Very Preterm/Very Low Birth Weight Children: A Meta-Analysis

12:30–2:00 PM

Symposium 18: Self and Awareness in Dementia
Chair: Daniel Mograbi
Discussant: Robin G. Morris
Salon F

1.	SCHROETER, M	Self and Awareness in Dementia
2.	RIES, ML	Impaired Awareness of Memory Difficulty in MCI and AD: Relation to Connectivity of Cortical Midline Structures
3.	MOGRABI, DC	Anosognosia in Alzheimer's Disease – The Petrified Self
4.	SCHROETER, M	Losing your Self: Neural Correlates of Frontotemporal Dementia

12:30–2:00 PM

Symposium 19: Implementing qualitative scoring of neuropsychological tests in a community-based cohort: Framingham Heart Study
Chair: Rhoda Au
Salon G

1.	AU, R	Implementing qualitative scoring of neuropsychological tests in a community-based cohort: Framingham Heart Study
2.	DRAXLER HANKEE, L	Distribution of qualitative performance on executive functioning tasks: Results from the Framingham Offspring Cohort
3.	NISHTALA, A	Relationship of Cardiovascular Risk and Qualitative Measures of Executive Function in the Framingham Offspring Study
4.	GUPTA, A	The Association between Cardiovascular Risk Factors and Qualitative Measures of Trails B: Framingham Offspring Study
5.	NYBORN, J	Framingham Heart Study Clock Drawing Performance 2005-2008: Normative Data from the Offspring Cohort

12:30–2:00 PM

Poster Symposium: Concussion in Female Collegiate Athletes: Examining Gender Differences
Arlington

1.	PERNA, R	Concussion in Female Collegiate Athletes: Examining Gender Differences
2.	COOPER, D	Sports Concussion and Symptom Severity: A Sample of Female Recreational Ice Hockey Players
3.	COOPER, D	Do Prior Sports Concussions in Females Affect Subsequent Concussion Symptoms?
4.	COOPER, D	Symptoms of Prolonged Recovery from Sports Concussion in Females
5.	JACKSON, A	Diagnosis of and Recovery from Sports Concussion in Female Athletes
6.	JACKSON, A	Predicting Concussion Severity in Female Athletes
7.	JACKSON, A	Impact of Prior Concussions in Female Collegiate Athletes

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

12:30–2:00 PM

Poster Session 12: Neuropsychology in HIV, Infectious Diseases, Neurological and Medical Disorders, TBI
Gloucester

HIV/AIDS/Infectious Disease

1. ARENTOFT, A — The impact of acculturation on neuropsychological test performance among HIV+ Latino/a individuals
2. BECKER, BW — Interpersonal Functioning and Neuropsychological Performance in HIV/AIDS
3. CLARK, US — Relation of HIV-Associated Brain Volume Abnormalities to Facial Emotion Recognition Impairments in Individuals with HIV
4. CROTTY, K — An Expanded Model of Frontotemporal Dysfunction in Prospective Memory with HIV/AIDS
5. CYSIQUE, LA — Cortical and subcortical neuronal damage as potential markers of chronic brain HIV infection: A 1H-MRS and neuropsychological study
6. FAMA, R — Visuomotor Procedural Learning in HIV Infection, Alcoholism, and Their Comorbidity
7. FAZELI, PL — The Effect of Age and HIV on Neuropsychological and Everyday Performance
8. VAN DYK, K — Aging and HIV: the roles of speed and attention
9. HEATON, RK — HIV-associated Neurocognitive Disorders Before and During the Era of Combination Antiretroviral Therapy
10. GONGVATANA, W — Impact of Hepatitis C and HIV Coinfection on Cerebral White Matter Integrity
11. HARDY, DJ — Antisaccade Errors Relate to Working Memory in Older but not Younger HIV-1-Seropositive Adults
12. HEAPS, JM — Diffusion Tensor imaging and neuropsychological performance in HIV/HCV coinfection
13. HINES, LJ — Intra-Individual Variability and Aging in HIV+ Adults
14. HOEBEL, CJ — HIV Associated Deficits in Visuospatial Temporal Order Memory
15. LOPEZ, E — A Validity Study of the HUMANS Battery: A Comparison of an Adapted Spanish Neuropsychological Test Battery to a Standard English-Language Battery in Younger HIV-Positive Adults
16. MARCOTTE, TD — Neuropsychological Consequences of HIV in India
17. MARTIN, E — Decision Making and Drug Abuse in HIV+ Men Who Have Sex with Men: A Preliminary Report from the Chicago Multicenter AIDS Cohort Study
18. WICKS, S — Effects of HIV and Attention Deficit Disorder Symptoms on Procedural Learning Performance
19. MCINTOSH, RC — Stress-Coping and Outcomes in Women with HIV/AIDS: A Meta-analysis
20. MONZONES, J — Medial Orbitofrontal/Ventromedial Prefrontal Function is Uniquely Related to Neurocognitive Complaints in HIV
21. MOORE, DJ — Delayed Recall Impairment Among HIV+ Methamphetamine Users is Associated with Medication Nonadherence
22. PANOS, S — HIV and Aging: The Interactive Effects of Aging and Cocaine use on Neurocognition
23. PATTON, D — Relationship of Medication Management Test-Revised (MMT-R) Performance to Neuropsychological Functioning and Antiretroviral Adherence in Adults with HIV
24. WOODS, S — Prospective Memory Deficits Are Associated with Unemployment in Persons Living With HIV Infection
25. POSADA, C — Emotional Stroop Performance Among HIV-Infected Individuals with Bipolar Disorder
26. RAMEZANI, A — Neuropsychological Impairment and Cocaine Use Reduce Simulated Driving Performance in HIV+ Patients
27. WEBER, E — Exploring the Age-Prospective Memory Paradox in HIV+ Adults: Evidence in Time- and Event-Based Semi-Naturalistic Tasks

Medical/Neurological Disorders/Other (Adult)

28. ALOSCO, M — Cognitive Impairment Is Independently Associated With Reduced IADLs In Persons With Heart Failure
29. DINISHAK, DM — Neuropsychological Deficits of Adult Polyglucosan Body Disease Over Time: A Case Study
30. GARCIA, SL — Depression is Independently Associated with Cognitive Dysfunction in Older Adults with Heart Failure
31. GONZALES, M — Increased Atherogenic Lipoproteins at Midlife Relate to Altered Functional Activation
32. GRAVER, C — Undiagnosed Delirium in a Hospital Setting
33. GROSCH, MC — Herpes Simplex Encephalitis: A Neuropsychological Case Study
34. GROSSMAN, AE — Treatment Compliance in Persons With End-Stage Renal Disease
35. JONES, J — Self Perceived Changes in Apathy and Executive Function: Parkinson Disease and Dystonia
36. KOZORA, E — Comparing Cognitive Function in Non-neuropsychiatric SLE Patients from Denver, Colorado and New York, New York
37. LANGILL, MA — Feasibility of Computerized Cognitive Testing in Parkinson's Disease
38. LEININGER, S — Rey-Osterrieth Complex Figure (ROCF) Flowchart Units and Associations to Memory Performance in Parkinson's Disease
39. WOON, F — Long-term Psychiatric Sequelae in Survivors of Critical Illness
40. MILLER, LA — Associations Between Cardiovascular Fitness, Cerebral Perfusion, and Cognitive Outcomes in Heart Failure
41. MYERSON, C — Decompression Surgery and Cognitive Functioning in Adults with Chiari Malformation
42. NEMETH, DG — Frog Man: A Unique Case of Eosinophilic Meningitis

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

43. PAULSON, D — Validation of a three-factor model of cognitive functioning for hepatic encephalopathy and implications for quality of life
44. PECK, CP — Differences in Quality of Life Between Individuals with and without Freezing of Gait in Parkinson's Disease
45. PECK, CP — The Association Between Neuropsychological Functioning and Freezing of Gait in Parkinson's Disease
46. READY, R — Quality of Life and Psychological Well-being in Populations affected by Huntington's Disease: Prodromal, At-risk, and Early Stage HD
47. SUHR, J — Cogniphobia and Pain Avoidance Behavior as Contributors to Cognitive Performance in Headache
48. TAKAGI, M — Cognitive Deficits in Patiens with Type 1 Diabetes and GAD Autoimmunity
49. WERTHEIMER, JC — Understanding Pain in Parkinson's Disease for Individuals with and without Deep Brain Stimulation: The Patient's Perspective
50. ZAHODNE, LB — Naturalistic Trajectories of Mood and Motor Symptoms in Parkinson's Disease: A Multivariate Latent Growth Curve Analysis

TBI (Adult)

51. CHANDLER, L — Relationship Between Psychiatric Complaints and Report of Postconcussive Symptoms in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) Veterans
52. LANNI, E — Right Hemisphere White Matter Changes Predict Psychiatric Distress in Veterans with Mild to Moderate TBI
53. DEMERY, J — Serum Biomarker Levels Predict Memory Impairment Following Traumatic Brain Injury: A Pilot Study
54. MCGRATH, N — Neuropsychological Assessment of Iraq/Afghanistan Veterans with Blast Injury
55. DOUGLAS, J — Encoding Facial Expression after Severe Traumatic Brain Injury
56. KOSMIDIS, MH — Invalid MMPI-2 Profiles and Neuropsychological Test Performance in Traumatic Brain Injury Patients
57. KOSMIDIS, MH — Assesing Motivation for Rehabilitation after Traumatic Brain Injury: The Role of Psychopathology
58. LANGE, RT — Neuropsychological Outcome from Blast versus Non-Blast Mild Traumatic Brain Injury
59. LANGE, RT — Influence of Poor Effort on Neuropsychological Test Performance in Military Personnel following Mild Traumatic Brain Injury
60. LARSON, E — Memory Problems and Objective Assessment of Sleep in TBI Survivors
61. LEQUERICA, A — Sleep Disturbance, Fatigue, and Endocrine Function After Traumatic Brain Injury
62. LIPPA, SM — Demographic, Clinical, and Behavioral Correlates of Employment in OEF/OIF Veterans with Histories of Mild Traumatic Brain Injury
63. LIPPA, SM — Cognitive Versus Physical Independence: What is Most Related to Supervision Levels Following Brain Injury?
64. MELIKYAN, Z — Cognitive recovery 1-6 months after mild and moderate TBI. A neuropsychological report
65. NAKASE-RICHARDSON, R — Prospective evaluation of the nature and impact of acute sleep abnormality at one-month post TBI
66. NAKASE-RICHARDSON, R — The impact of daytime hypersomnolence on cognition and rehabilitation in an acute TBI sample
67. PARDINI, J — The Effect of Cognitive Exertion on Post-Concussion Symptoms
68. PARDINI, J — The Relation Between Test Performance and Changes in Post-Concussion Symptoms following Cognitive Exertion
69. RABINOWITZ, AR — Correlates of the ImPACT Impulse Control Composite in a Non-Injured College Athlete Sample
70. RABINOWITZ, AR — Factor Analysis of the ImPACT Subtests: An Examination of ImPACT Composite Scores
71. RAMANATHAN, P — Effects of Priming and Antipriming on Speed of Cognitive Processing in Traumatic Brain Injury Survivors
72. ROMESSER, J — A Preliminary Study of the Effect of Deployment Related Concussion on PTSD Symptoms and Other Psychiatric Variables at the Time of Treatment Seeking Among Veterans
73. ROMESSER, J — Mild Traumatic Brain Injury, Pain, and Headaches in OEF/OIF Veterans
74. SCHIEHSER, D — Neuropsychological Predictors of Fatigue in Mild to Moderate TBI
75. SHANDERA-OCHSNER, AL — Relationship of Executive Functioning to Outcome after Brain Injury
76. SOZDA, C — Differential Impairments of Cognitive Control Component Processes after Severe TBI: An fMRI study
77. SPRINGER, US — Barriers to Medical Care in OEF/OIF Veterans: Unique Roles of Mood and Cognition
78. SUMOWSKI, JF — Cognitive reserve protects against learning and memory problems in traumatic brain injury
79. TYNER, CE — Demographic Factors Predictive of Attrition in Adult Severe Traumatic Brain Injury (TBI) Research
80. VAKIL, E — Direct and indirect memory measures of contextual information: High versus low functioning patients with Traumatic Brain Injury (TBI)
81. VAKIL, E — Conceptual and Perceptual Skill Learning: High versus low functioning patients with Traumatic Brain Injury (TBI)
82. VILLAR, R — Comorbid Traumatic Brain Injury and Posttraumatic Stress Disorder: Conceptualization and Treatment Through a Psychodynamic Framework
83. WATSON, W — Replication and Extension of a Prognostic Model in Severe Traumatic Brain Injury
84. WILDE, EA — The Relation between Diffusion Tensor Imaging and Volumetrics in the Midbrain and Brainstem and Neurological Functioning in Severe Traumatic Brain Injury

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

12:45–2:15 PM

Paper Session 8: Syndromes and Systems
Moderator: Dorene Rentz
Salon E

1. CHEN, P — Spatial Neglect and Global Spatial Representations: Clock Drawing
2. KEMMOTSU, N — Effects of Age of Seizure Onset and Disease Duration on Cortical Thinning and White Matter Compromise in Mesial Temporal Lobe Epilepsy
3. PAYNE, J — Sleep Preferentially Benefits Emotional Components of Scenes: Behavioral and Neural Evidence
4. TANAKA, Y — Aphasia, Anxiety, and Beta-Adrenergic Antagonists
5. MEDAGLIA, JD — Examining Network Change with Extended Unified Structural Equation Modeling: Implications for the Latent Support Hypothesis in Brain Trauma
6. WYLIE, SA — The effect of dopamine agonists on risk behavior in Parkinson's disease patients with and without impulse control disorder

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Abstracts Presented at the Thirty-Ninth Annual Meeting International Neuropsychological Society

February 2-5, 2011
Boston, Massachusetts

WEDNESDAY AFTERNOON, FEBRUARY 2, 2011

Symposium 1: Mapping Neural Circuitry in Cognitive Disorders Using Magnetoencephalography (MEG)

Chair: Robert J. Thoma

Discussant: Erin Bigler

4:30–6:00 p.m.

R.J. THOMA, E. BIGLER, S.M. STUFFLEBEAM, D.C. ROJAS, R.J. THOMA & J.D. LEWINE. Mapping Neural Circuitry in Cognitive Disorders Using Magnetoencephalography (MEG).

Symposium Description: Magnetoencephalography, or MEG, is a functional neuroimaging technique that promises to change the way that cognitive neuroscientists think about brain function. In addition to having millisecond temporal resolution, MEG has millimeter spatial resolution for cortical signals and can image the timecourse of local cortical events with great accuracy. Thus, network modeling of complex cognitive systems can be done that involves showing not just localizations, but the temporal order of local neural activations at the speed with which cognition occurs. While MEG has long been used in the clinic as a tool for mapping seizure foci in epilepsy, it is increasingly being applied to probe neural events underlying cognitive abnormality in disorders of cognition. This symposium is designed to give the audience a brief primer on MEG, and then to describe the latest research in clinical disorders such as epilepsy, autism, TBI, schizophrenia and alcohol-induced cognitive disorder.

Correspondence: *Robert J. Thoma, Ph.D., Psychiatry, Univeristy of New Mexico, Center for Neuropsychological Services; MSC 09 5030, 1 University of New Mexico, Albuquerque, NM 87131. E-mail: rjthoma@salud.unm.edu*

S. STUFFLEBEAM. Magnetoencephalography: From The Physics Lab to the Bedside.

Objective: Magnetoencepahlography [MEG] continues to emerge as a key tool in both cognitive and clinical neuroscience. MEG provides a high degree of both temporal and spatial resolution making it ideal for the study of the brain in health and disease. This presentation will provide an introductory tutorial overview of the basic principles of MEG and highlight activities in my laboratory using MEG for the evaluation of patients with brain tumors, epilepsy, and schizophrenia. Data collection and analysis strategies will be discussed, and examples will be given of how analyses of evoked responses and spontaneous data can provide novel insights into brain function, especially when MEG data are integrated with data from other imaging modalities.

Correspondence: *Steven Stufflebeam, Building 149, Room 2301, 13th Street, Charlestown, MA 02129. E-mail: sms@nmr.mgh.harvard.edu*

D.C. ROJAS, E. SLASON, L. WILSON, P. TEALE, K. YOUNGPETER & S. HEPBURN. Gamma-band Phase-locking Abnormalities in Autism Spectrum Disorders.

Objective: Gamma band oscillatory activity is thought to play an important role in perceptual binding and central coherence. We have published data demonstrating that auditory steady-state response (ASSR) gamma activity is reduced in people with autism. This current study extends the ASSR gamma-band findings to 1st degree relatives.

Participants and Methods: We examined MEG recorded ASSR in 21 parents of children with autism spectrum disorders (pASD) and 18 healthy adult control subjects (HC) using a 248 channel MEG system. Responses to repeated, 32, 40 and 48 Hz amplitude modulated white noise (100% depth, 500 ms duration, 75 dB SPL) were examined in the time-frequency domain from source space projected auditory "virtual electrodes" for the left and right hemispheres. Gamma-band phase-locking factor (PLF), normalized phase-locked power and normalized total power were computed.

Results: The pASD subjects had significantly lower PLF and phase-locked power across all modulation frequencies compared to the HC group in the left, but not right hemisphere, while total power did not differ. The preservation of total gamma-band power suggests a shift of power from phase locking to non-phase locking in the pASD group, consistent with prior results for ASD and pASD. While ASSR gamma-band power may be significantly higher to 40+ Hz modulation rates, the phase-locking deficit appeared consistent across the range of frequencies employed in this study.

Conclusions: This study, together with previous results for the transient gamma-band response in first-degree relatives, highlights the potential of gamma-band deficits as a potential new endophenotype for autism research.

Correspondence: *Donald C. Rojas, University of Colorado Denver, Department of Psychiatry, Mail Stop F-54613001, E 17th Place, PO Box 6508, Aurora, CO 80045-0508. E-mail: Don.Rojas@ucdenver.edu*

R.J. THOMA. Timing of Neural Events in Adolescent Alcohol-induced Dysexecutive Syndrome.

Objective: In adults, long-term alcohol use at the level of alcohol use disorders (AUDs) is known to manifest as an overall reduction in brain volume and in a neuropsychological syndrome that includes impairments in sustained attention, memory, and executive functioning. Very little is known however, about alcohol toxicity on the course of neurodevelopment in adolescents with AUDs.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Ten healthy control adolescents (HC), ten adolescents who currently meet DSM-IV criteria for alcohol abuse or dependence (AUD), and ten non-drinking adolescents considered to be at high risk for alcohol use disorders (HR), ages 12-18, volunteered for the study. Brain function was assessed using MEG and EEG during a "novel" oddball paradigm, in oddball tones (1500 Hz) required a response, effectively making this a Go/No-Go task
Results: . To successfully accomplish the task, neural activation in control and high-risk subjects began in sensory cortex, were mirrored shortly after in cingulate cortex, and then involved highly distributed cortical regions, most notably, a strong lateral prefrontal cortical response in the novel and oddball conditions beginning at approximately 250 ms and ending by 450 ms. While regional localization of activation was much the same in the alcohol group, the timing of the regional activations was very different. Most notably, during the period when prefrontal cortex was active in the control group, the AUD group had little or no prefrontal activation ($F(1,19) = 4.503$, $p = .03$) in the left hemisphere, but rather had parietal activation not seen in controls. Prefrontal cortex activity was not seen until almost 500 ms after stimulus presentation in AUD.
Conclusions: These results suggest that there is a cascade of abnormal processing in adolescents with AUD that begins very early in the decision-making process and that is reflected behaviorally as attention and executive decision-making deficits.
Correspondence: *Robert J. Thoma, 1 University of New Mexico, MSC 09 5030, Department of Psychiatry, Albuquerque, NM 87131. E-mail: rjthoma@salud.unm.edu*

J.D. LEWINE. Making the Invisible Wounds of War Visible: Functional Brain Imaging of Mild TBI, PTSD, and Depression using Magnetoencephalography.
Objective: Data from the RAND Corporation suggest that in excess of 300,000 servicemen and women deployed during Operation Enduring Freedom and Operation Iraqi Freedom may exerience the "Invisible" Wounds of War — Post-Traumatic Stress Disorder, Mild Truamatic Brain Injury, and Depression. Given that treatment strategies are different for each condition, appropriate medical management requires accurate differential diagnosis. This, however, is challenging because of symptom overlap [especially between mild TBI and depression] and potential co-occurrence of
conditions [especially mild-TBI and PTSD]. This study was designed to identify neuroimaging markers for PTSD, mTBI, and depression.
Participants and Methods: In considering the clinical applicability of a method, it is critical to show that it is viable with individual subjects - not just group data. Ultimately, a successful clinical imaging strategy needs to demonstrate high sensitivity to pathophysiology and high specificity with respect to differential diagnosis of conditions. It is not enough to show that one can distinguish mTBI patients from neurologically normal control subjects. The real challenge is to distinguish them from patients with depression or PTSD who are without a history of head trauma.
Results: Using a combination of evoked response and spontaneous data analysis strategies, we have found that magnetoencephalography [MEG] can provide for accurate and objective, differential diagnosis of individual subjects with PTSD, mTBI, and depression.
Conclusions: Data are available for more than 100 civillian and veteran subjects with discriminant function accuracy above 60%.
Correspondence: *Jeffrey D. Lewine, 1101 Yale NE, Mind Research Network, Albuquerque, NM 87131. E-mail: jlewine@mrn.org*

Poster Session 1: Autism Spectrum Disorders, Emotion, Learning Disabilities, Psychopathology

4:45–6:15 p.m.

Autism Spectrum Disorders

H.C. BOORSTEIN, M. BARTON, J. GREEN, D. ROBINS & D. FEIN. Toddlers with Significant Cognitive Delays and Autistic Symptoms: Stability of Diagnosis and Outcome at Age Four.
Objective: To examine the diagnostic stability, prognosis, and characteristics of a cohort of young children (mean age=25 months) with severe developmental delays and clinically significant symptoms of an autism spectrum disorder (ASD).
Participants and Methods: In our study of the early detection of ASD, we place children with clinically significant ASD symptoms who have no mental age equivalences above 12 months into a research category of "ASD-low MA." Sixteen of the children (13 males, 3 females) evaluated at both age 2 and 4 received this designation at age 2 (7% of total sample).
Results: At re-evaluation, 13 children received a diagnosis of Autistic Disorder, one received a diagnosis of PDD-NOS, and two continued to meet criteria for ASD-low MA (mean age=50 months); all continued to display severe cognitive delays. Repetitive and stereotyped behaviors were present in 13 of 16 children at age 2 and in all children at age 4.
Conclusions: Diagnostic and symptom stability was strikingly strong in this sample of young children presenting with severe developmental delays and symptoms of ASD. It is notable that the majority of children displayed stereotyped behaviors from an early age and that all presented with them at re-evaluation. This study suggests that diagnoses of ASD can be made reliably in young children with ASD and significant developmental delays, with the prognosis poor in this subsample of children. The clinical and research implications of these findings will be discussed.
Correspondence: *Hilary C. Boorstein, PhD, Psychology, University of Connecticut/Children's Mercy Hospital, 320 West 100th Terrace, Apt. 210, Kansas City, CT 64114. E-mail: h_boorstein@yahoo.com*

A. CAMODECA & S. VOELKER. Investigation of Executive Function Deficits Associated with the Broader Autism Phenotype.
Objective: This study purported to elucidate the executive function (EF) characteristics of the Broader Autism Phenotype (BAP), hypothesizing that those showing the BAP would report more problems with EF than those without the BAP (No-BAP), particularly in the area of planning (Bolte & Poutska, 2006; Gousse & Rastan, 2010; Losh et al., 2008; Piven & Palmer, 1997).
Participants and Methods: One hundred four parents of children with either Autism Spectrum Disorders (n=52) or non-Autism developmental disabilities (n=52) completed the Behaviour Rating Inventory of Executive Functioning—Adult Version (Roth et al., 2005) and the BAP Questionnaire (BAPQ; Hurley et al., 2007).
Results: Independent samples t-tests indicated significant differences between BAP (n=39) and No-BAP (n=65) groups on all subscales of the BRIEF-A (all ts>|3.816|, all ps<.001). The BAP group had higher scores on all BRIEF-A subscales; T score mean differences ranged from 8.87-12.52 points. Although group means on all subscales were in the subclinical range, significantly more BAP participants scored above T=65 on all BRIEF-A subscales (all X^2>6.687, all ps<.010). Even with these globally reported weaknesses, regression analyses indicated that BRIEF-A Plan-Organize was the best predictor of BAPQ Rigidity ($F(1, 103)=17.437$, $p<.001$, $R^2=.147$) and BAPQ Total ($F(1,103)=38.373$, $p<.001$; $R^2=.273$). Plan-Or-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ganize was also a significant predictor of BAPQ Aloof ($F(1,99)=11.487$, $p=.001$; $R^2=.105$), although separately BRIEF-A Self-Monitor was also a significant predictor ($F(1,100)=16.792$, $p<.001$; $R^2=.145$). BAPQ Pragmatic Language was best predicted by Self-Monitor and BRIEF-A Working Memory ($F(2,99)=84.919$, $p<.001$; $R^2=.636$).

Conclusions: These results explain the relatively robust findings of planning weaknesses in the BAP and also support the idea of global BAP EF weaknesses. These findings suggest that different aspects of the BAP are associated with different EF weaknesses; a single EF weakness may not adequately encompass the BAP.

Correspondence: *Amy Camodeca, M.A., University of Windsor, 401 Sunset Ave, Windsor, ON N9B 1E6, Canada. E-mail: camodeca@uwindsor.ca*

C. CASNAR, M. DIQUATTRO, C. YOUNG, L. HYMAN & S.J. HUNTER. Verbal learning, Memory and Discriminability in Children with Attention Deficit Hyperactivity Disorder (ADHD), Autism, and co-occurring ADHD and Autism.

Objective: Neuropsychological measures of working memory and cognitive flexibility are often useful when diagnosing Attention Deficit Hyperactivity Disorder and Autism (Hunter & Donders, 2007). Previous research suggests that verbal memory is one of the best predictors of social cognitive ability (Buitelaar, et. al., 1999), which is often impaired in these populations. The current study investigates verbal learning, memory and discriminability through utilization of a list-learning task, the CVLT-C, in a sample of children diagnosed with ADHD, Autism, or comorbid presentation of ADHD and Autism.

Participants and Methods: We examined performances across a clinical sample of 25 children with Autism, 25 children with ADHD, and 24 children with comorbid presentation of Autism and ADHD. 74% of the sample were male and ranged from 7 to 16 years of age.

Results: Analysis of variance results indicated no significant group differences in regard to CVLT-C clustering abilities, highlighting consistent learning strategy use. Groups also did not differ significantly in overall learning or cued recognition performance. However, groups did differ significantly in terms of discriminability ($F = 3.22$, $p<.05$), with the Autism and ADHD-only groups performing better than those children with comorbid symptoms. The ADHD-only and Autism-only groups did not differ significantly.

Conclusions: Results suggest that while children with these diagnostic categories do not differ in terms of overall verbal learning or strategy use, children with comorbid symptoms of ADHD and Autism show difficulties with differentiating between previously learned material and distractors. This may highlight difficulties with retrieval of information after a delay, which may map onto social processing deficits.

Correspondence: *Christy Casnar, University of Wisconsin - Milwaukee, P.O. Box 413, Garland Hall, Rm 325, Milwaukee, WI 53201. E-mail: clcasnar@uwm.edu*

S.E. CHRIST, J.P. STICHTER, A.J. MOFFITT, K.E. BODNER & K. VISOVSKY. Changes in Brain Activation Associated with Social Competence Intervention in Adolescents with Autism.

Objective: Older adolescents with high functioning autism (HFA) frequently express interest in engaging in social interactions; however, they lack the knowledge of necessary social skills and/or the ability to implement social skills in practice. Within this context, previous research suggests that cognitive behaviorial interventions (CBI) are effective for addressing social competence deficiencies that impact day-to-day functioning for these individuals. The objective of the present study was to evaluate intervention-related changes in brain activation and performance on a socially-relevant executive ability task.

Participants and Methods: Thus far 10 adolescents with HFA (age range: 13-14 yrs) have participated in a 10-week CBI-based intervention that focuses on social skills competence in individuals with ASD. It targets executive functioning, theory of mind and emotion recognition as key constructs in addressing social competence deficits. Functional magnetic resonance imaging (fMRI) is being used to evaluate brain activation during performance of an n-back working memory task using face stimuli. Brain activation is assessed and compared across two time points: once prior to participating in SCI (Week 0), and then again shortly after completion of the intervention (Week 12).

Results: Analysis revealed intervention-related changes in brain activation across number of brain regions. For example, regions in left inferior frontal gyrus and right superior temporal sulcus thus far show decreased working memory-related activity at post-intervention as compared to pre-intervention ($p < .01$ false discovery rate-corrected in both instances).

Conclusions: The present findings provide initial support for the hypothesis that participation in the SCI program is accompanied by changes in underlying neurocognitive processes such as executive control. Additional data collection is ongoing and recruitment of a non-intervention comparison group is underway.

Correspondence: *Shawn E. Christ, Ph.D., Psychological Sciences, University of Missouri-Columbia, 210 McAlester Hall, Columbia, MO 65211. E-mail: research@shawnchrist.com*

K. BODNER, D.Q. BEVERSDORF, S. SAKLAYEN & S.E. CHRIST. Improvements in Context Processing Following Administration of a Beta-Adrenergic Antagonist in Adults with an Autism Spectrum Disorder (ASD).

Objective: Previous studies have shown improvements in cognitive flexibility and verbal problem solving following administration of propranolol, a beta adrenergic antagonist, to individuals with an autism spectrum disorder (ASD). The observed effect is presumed to be related to the adrenergic projections to the prefrontal cortex and related brain regions. It remains unclear to what extent this benefit may extend to other aspects of executive control. The present study investigates the potential effect of propranololon context processing in individuals with and without an ASD.

Participants and Methods: Fourteen individuals with an ASD (mean age = 18.9 yrs; mean FSIQ = 103) and a demographically-matched comparison group of 13 typically developing individuals (mean age = 19.2 yrs; mean FSIQ = 108) participated. An AX continuous performance test (AX-CPT) was used to evaluate the contributions of working memory and inhibitory ability to context processing. AX-CPT performance was assessed once following propranolol administration and once following placebo administration. The order of administration was counterbalanced across participants and groups.

Results: Individuals with ASD made more errors in the working memory (BX) condition as compared to the control group, $p < .05$. Importantly, administration of propranolol was associated with improved working memory performance for the ASD group but had no apparent effect on performance in the control group, $p < .05$. Performance of the two groups was comparable in the inhibitory (AY) condition, and propranolol administration did not affect performance in this condition, $p > .2$ in both instances.

Conclusions: The present findings suggest that pharmacological treatment with propranolol may help individuals with ASD to overcome difficulties with executive control and context processing. Additional research is needed to better understand the neurophysiological mechanisms underlying this observed effect.

Correspondence: *Shawn E. Christ, Ph.D., Psychological Sciences, University of Missouri-Columbia, 210 McAlester Hall, Columbia, MO 65211. E-mail: research@shawnchrist.com*

K. COOPER, T. LAZICKI, K. DEPLONTY, C. DEMOPOULOS, B. KOPALD, L. FELIX, M. STEPANSKY, N. BANGERA & J. LEWINE. Anomalous Patterns of Cerebral Dominance for Language in Children with Autism Spectrum Disorders.

Objective: To evaluate patterns of cerebral dominance for language in children with autism spectrum disorders.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Magnetoencephalography was used to evaluate cerebral dominance in thirty-six children with an autism spectrum disorder and 23 neurotypical children. Whole-head MEG data were recorded during a dichotic listening paradigm. On each trial of the paradigm, the subject was presented a pair of words, one to each ear. Word pairs were semantically related [e.g., hot/cold, day/night] or unrelated [e.g., hot/moon, earth/sad], and subjects were instructed to listen to the words. The critical MEG response occurs between 350 and 750 milliseconds, post-stimulus, with the side of greatest response being language dominant as previously validated in 33 of 35 neurosurgical patients that underwent sodium amytal (Wada) testing.
Results: Most neurotypical children showed the expected pattern of left hemisphere dominance [83%]. 13% of neurotypical children showed bilateral profiles and 4% were right hemisphere dominant. In marked contrast, only 23% of children with an ASD were left hemisphere dominant for language. 77% of children with ASD showed right [46%] or bilateral dominance [31%].
Conclusions: The data indicate that children with ASDs show anomalous profiles of langauge dominance. This may have important implications for directing neuromodulatory strategies [transcranial magnetic stimulation and transcranial direct current stimulation] that are being explored to improve language skills.
Correspondence: *Karen Cooper, Ph.D., Mind Research Network, 3406-C Indian School Rd NE, Albuquerque, NM 87106. E-mail: kcooper@mrn.org*

M.E. MCKNIGHT & V.P. CULOTTA. Neuropsychological Profile of Girls with Asperger's Disorder.
Objective: Research examining neuropsychological profiles of girls diagnosed with Asperger's Disorder (AD) is sparse. Few studies have examined specific cognitive profiles in these children. Anecdotal reports in the literature often portray girls with AD as mildly discrepant from their neurotypic peers. This study sought to characterize the neurocognitive profiles of girls with AD by comparing them to girls diagnosed with specific learning disabilities (SLD), but not with AD. It was hypothesized that there would be few, if any, discrepancies between these groups of girls.
Participants and Methods: This study examined 23 school-aged girls consecutively referred to an outpatient neuropsychological practice for assessment. These girls were compared to a control group of same-aged peers referred to the same practice and diagnosed with a SLD. The subjects were compared on measures of intellectual, academic, neuropsychological, and behavioral function. Evaluative measures included the WISC IV, WJ III, GPP, RCF, VMI, WRAML, Word Fluency test, and CBCL.
Results: Standard two tailed t tests revealed statistically significant discrepancies in the following variables: Verbal IQ, VCI, GAF, PSI, Grooved Pegboard, Word Fluency, WRAML, and behavioral measures.
Conclusions: The neuropsychological profile of girls with AD was significantly discrepant from same-aged girls with SLD, indicating a more severe cognitive and behavioral presentation with specific weaknesses evident in processing speed, verbal memory, and manual dexterity. The severity of these discrepancies indicates the need for routine neuropsychological and behavioral screening and counters the notion that girls present with a more benign expression of the disorder.
Correspondence: *Vincent P. Culotta, Ph.D., NeuroBehavioral Associates, 5565 Sterrett Pl, Suite 320, Columbia, MD 21044. E-mail: vculotta@nbatests.com*

M.E. MCKNIGHT & V.P. CULOTTA. Neurobehavioral Differences in School-Aged Children with Asperger's Disorder and Learning Disabilities.
Objective: This study was designed to examine neurobehavioral profiles of school-aged children with Asperger's Disorder (AD) vs. children with learning disabilities (LD).
Participants and Methods: This study compared clinic-referred children diagnosed with AD and same-aged children diagnosed with LD on measures of general cognitive academic, and neurocognitive functions, and emotional and behavioral indices. Subjects consisted of 117 boys and girls with AD and 82 boys and girls with LD.
Results: Statistical analysis revealed that subjects did not differ on measures of general intelligence, however children with LD earned higher scores on measures of processing speed. Differences in academic functioning were not consistently found. Children with AD were stronger readers than children with LD. They were not, however, stronger on measures of math and written language. Neurocognitive tests revealed a consistent pattern of weakness on measures of fine motor speed, simple visual construction skill, and more complex perceptual motor organizational skills in children with AD. Behaviorally, children with AD had significantly higher scores on all CBC scales reflecting significantly more internalizing and externalizing behavioral difficulties compared to children with LD.
Conclusions: Children with AD evidenced significant weaknesses in processing speed, fine motor speed, visual construction skills and more complex perceptual organization. Gender differences were evident on select variables. Interestingly, girls with AD evidenced behavioral difficulties indistinguishable from boys, a somewhat unexpected finding given the notion that girls may demonstrate a milder expression of AD. Implications for screening, support, and intervention are discussed.
Correspondence: *Vincent P. Culotta, Ph.D., NeuroBehavioral Associates, 5565 Sterrett Pl, Suite 320, Columbia, MD 21044. E-mail: vculotta@nbatests.com*

J. HAUCK, S. CRAWFORD & D. DEWEY. Development of Hand Preference in Relation to Cognitive, Language and Motor Skills in Children with Autism Spectrum Disorders.
Objective: Ambiguous handedness is rare in normally developing children, but occurs in approximately 40% of children with autism spectrum disorders (ASD). The development of hand preference by 6 years of age has been suggested as a predictor of future functioning in children with ASD. The main purpose of this study was to explore longitudinally development of hand preference and its relation to cognitive,language and motor abilities in children with ASD.
Participants and Methods: Twenty children with ASD (mean age=58 months at initial assessment), 20 children with developmental delay (DD)(matched on chronological age and cognitive age equivalence to children with ASD), and 20 typically developing (TD) children (matched on cognitive age equivalence to children with ASD) participated. Initial assessment included measures of hand preference, intelligence, receptive and expressive language and motor skills. Children were reassessed approximately 2 years after the initial assessment.
Results: At initial assessment, 59% of children with ASD showed an ambiguous hand preference; 20% of children with DD and 62.5% of TD children were classified as ambiguous. Two years later, 35% of the children with ASD were classified as ambiguous; 20% of the children with DD and 19% of the TD children were classified as ambiguous. Children with ASD and TD children were more likely to change from an ambiguous to a definite hand preference, p=.08. When all groups were combined, children with a definite hand preference displayed significantly higher cognitive p=.008, expressive language p=.004, fine motor p=.002, and gross motor abilities p=.029. Development of a definite hand preference by age 6 accounted for 30% of the variance in gross motor abilities in children with ASD, p =.02; it was not associated with cognitive and language outcomes.
Conclusions: The present study supports the assertion that the development of a definite hand preference by age 6 may be predictive of outcomes in children and specifically, motor outcomes in children with ASD.
Correspondence: *Deborah Dewey, PhD, Pediatrics and Community Health Sciences, University of Calgary, Alberta Children's Hospital, 2888 Shaganappi Trail NW, Calgary, AB T3B 6A8, Canada. E-mail: deborah.dewey@albertahealthservices.ca*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

M. ABDULLAH, P. FILIPEK, P.L. HORNER, J.T. PHAN & K.L. PHAM. How Early Can Differences in Social Communication Between Children With and Without Autistic Spectrum Disorders (ASD) be Identified?

Objective: Early, reliable detection of ASD in toddlers enhances prognosis by facilitating early intervention during a critical period in ontogenesis. The current study examines if early differences in social communication are apparent in infancy between those later classified as ASD or No-ASD.

Participants and Methods: Forty infants (20M/20F) were enrolled between ages 1-2 months. At age three and six months, social communication skills were assessed using the Rossetti Infant-Toddler Language Scales. To obtain later ASD classification, the Toddler-ADOS was administered at chronological/ nonverbal mental ages of 12 months or greater, as measured by the Mullen Scales of Early Learning. We examined group differences in the subscales of the Rossetti (i.e., Interaction-Attachment, Pragmatics, Play, Language Communication, and Language Expression) at ages three and six months.

Results: Seventeen infants were later classified as ASD and 23 were No-ASD. Using Mann-Whitney U-tests, no significant differences were found in any social communication skills at age three months between the two groups. Although at age 6 months, infants with ASD demonstrated similar skills in Play (z= -1.45, p= .148), they scored significantly lower in Interaction-Attachment (z= -2.87, p=.034), Pragmatics (z= -2.94, p=.003), Language Communication (z= -2.92, p=.004), and Language Expression (z= -3.31, p=.001) in comparison to infants later classified No-ASD.

Conclusions: Socio-communicative deficits among infants later classified with ASD appear to be measurable as early as age six months using a relatively easy-to-use assessment. These findings have important implications for identifying ASD in high risk infants and may be helpful in the epidemiological surveillance efforts in clinical settings.

Correspondence: *Pauline Filipek, MD, Pediatrics, UT Houston, 7000 Fannin, Suite 2353, Houston, TX 77030. E-mail: Pauline.A.Filipek@uth.tmc.edu*

R.R. GREEN, J. SOUTHWICK, E.D. BIGLER, A. FROEHLICH, M.B. DUBRAY, A.L. ALEXANDER, N. LANGE & J.E. LAINHART. Spatial Learning Deficits in Autism Spectrum Disorder.

Objective: In a previous study of word list learning, individuals with autism were found to learn at the same rate as controls but with poorer overall performance. The organization and effectiveness of learning was also atypical, as demonstrated by a significant recency effect and recall inconsistency. The current study investigated whether similar trends would be found in a spatial learning task.

Participants and Methods: Spatial learning was measured using the Visual Selective Reminding Test from the Test of Memory and Learning. Recognition learning for selected dots within arrays was examined over four trials, with delayed recognition assessed 30 minutes later. Participants included children and adolescents 9-19 years old with autism (n=30) and typically developing controls (n=25) matched for non-verbal IQ, handedness, and head circumference.

Results: Overall, the autism group demonstrated significantly worse spatial learning than typical controls over four trials ($p = .008$; autism mean = 45.80, control mean = 53.76; autism standard deviation = 13.95, control standard deviation = 6.45) and after a delay ($p = .016$; autism mean =5.8, control mean =7.17; autism standard deviation =2.54, control standard deviation = 1.44). Despite reduced overall learning, the autism group demonstrated a similar rate of improvement across trials ($p > .05$). No serial memory effects were observed ($p > .05$). In addition, spatial recognition among individuals with autism was significantly less consistent ($p < .018$) relative to controls.

Conclusions: Consistent with previous research on verbal learning, the learning consistency, overall learning, and delayed recognition of spatial stimuli was impaired in autism. Various speculations have been made over why memory impairments occur in autism, including encoding of information. Results are discussed in terms of potential frontotemporal neural systems that mediate memory and their potential underlying aberrant connectivity in autism.

Correspondence: *Ryan R. Green, Brigham Young University, 1059 so. 250 we. Apt. E, Provo, UT 84601. E-mail: green.r.ryan@gmail.com*

S.E. HARDY, D. FEIN & D. ROBINS. Stability of Autism Spectrum Disorder Diagnoses Made During the Second Year of Life.

Objective: The American Academy of Pediatrics has recommended autism screening for all children at 18 and 24 months. Diagnostic stability has been shown to be good past the second birthday, but limited data bears on the stability of diagnosis made during the second year of life. The current study aims to establish the stability of diagnosis made at 18 vs. 24 months of age.

Participants and Methods: Children were screened using the MCHAT (n=10,909). Of those, 1089 children failed the screener and 255 failed the follow-up interview and agreed to a developmental-diagnostic evaluation. 85 children who were screened at 18-months (average age = 18.9 months), were evaluated and 170 children who were screened at 24-months (average age = 26 months) were evaluated. 37 children evaluated at 18-months were re-evaluated at 4 years old (average age = 48.6 months) and 108 children evaluated at 24 months received a re-evaluation (average age = 56.2 months).

Results: 63.5% (n = 54) of 18-month olds who were evaluated were diagnosed with an ASD and 36.5% (n = 31) were diagnosed as non-ASD. 72.4% (n = 123) of 24-month olds were diagnosed with an ASD and 27.6% (n = 47) were diagnosed as non-ASD. Thirty (81.1%) of the ASD and non-ASD diagnoses made at 18 months remained stable at the 4-year old re-evaluation. Eighty five (78.7%) of the diagnoses made at 24 months remained stable at the 4-year old re-evaluation.

Conclusions: Approximately 4 out of every 5 18-month olds maintained the same ASD vs. non-ASD diagnosis at a second evaluation while nearly 4 out of every 5 of the 24-month olds maintained their diagnoses. Thus, diagnoses made during the second year appear to be as stable as those made at 24 months, confirming the utility of screening and diagnoses before the age of two.

Correspondence: *Sarah E. Hardy, Psychology, University of Connecticut, 406 Babbidge Rd. Unit 1020, Storrs, CT 06268. E-mail: sarah5487@gmail.com*

L.E. HERLIHY, J. GREEN, S. HARDY, K. KNOCH, T. DUMONT-MATHIEU, M. BARTON, D.L. ROBINS & D. FEIN. Ethnic Disparities in Screening but not Rate of Diagnosis of Autism Spectrum Disorders in a Population-Based Sample of Toddlers.

Objective: This study compared ethnic groups on measures related to screening and diagnosis of autism spectrum disorder (ASD) in toddlers. Specifically, community-based samples were compared on age at screening (using the M-CHAT- Robins et al., 2001), follow-up, and assessment, the M-CHAT positive predictive value (PPV), and proportion of ASD diagnoses.

Participants and Methods: A sample of 3815 children ages 18-30 months were screened with the M-CHAT at their Pediatrician's office or their Early Intervention provider. Of these children, 615 screened positive for ASD-related concerns and 429 screened positive after the M-CHAT Follow-up Interview. 208 children were subsequently assessed for ASD, with 182 receiving an ASD diagnosis. Parents reported ethnicity data at the time of screening and assessment. Income data were not collected at the time of screening and therefore could not be controlled for in these analyses.

Results: Significant differences between ethnic groups were found on age at screening ($F= 36.33$, $p <.001$), age at follow-up ($F= 10.243$, $p<.001$), and time elapsed between screening and follow-up ($F= 142.413$, $p<.001$). Post-hoc analysis showed that both the Black/African-American and Hispanic/Latino groups were screened at later ages, and that the Hispanic/Latino group experienced longer lag time between screening and follow-up than the White and Other groups. No differences by a more general White/non-White grouping ethnicity emerged in the age at assessment, proportion of ASD diagnoses, or the PPV of the M-CHAT (z-score= 1.126, p= .38).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Consistent with existing research, Hispanic/Latino and Black/African-American participants in this sample experienced delays in screening and follow-up for ASD-related concerns. These delays were not maintained in the comparison between White and non-White participants at the age of assessment and were not reflected in the final rates of ASD diagnoses.
Funding Source: NICHD
Correspondence: *Lauren E. Herlihy, B.A., Psychology, University of Connecticut, 406 Babbidge Rd. Unit 1020, Storrs, CT 06269. E-mail: lauren.herlihy@uconn.edu*

K. KNOCH, L. HERLIHY, T. DUMONT-MATHIEU, J. GREEN, M. BARTON & D. FEIN. The Development of Repetitive and Stereotyped Behaviors: Changes in Frequency and Severity of High- and Low-Level Behaviors in Children with ASD.
Objective: Restricted and repetitive patterns of behaviors (RSB) are core features in autism spectrum disorder (ASD). These patterns of behavior are wide ranging and include motor stereotypies, circumscribed interests, and insistence on sameness. Previous literature has subdivided RSB into low- and high-levels. Low-level behavior is characterized by a repetition of movement, such as stereotyped movements, whereas high-level behavior includes insistence on sameness and rigid adherence to a routine. There is conflicting evidence regarding the relationship between changes in the frequency and severity of RSB and early developmental markers. In the current study we examined developmental differences in the frequency and severity of high- and low- level RSB in children with ASD.
Participants and Methods: 115 participants were evaluated after screening positive on the Modified Checklist for Autism in Toddlers (M-CHAT) at 24 months, with a follow-up evaluation at 48 months. Follow-up data from the ADI-R was used to categorize children's behaviors into high- and low-level RSB. Measures of cognitive functioning and social-communicative development were examined across the two time points with regards to changes in the development of RSB.
Results: Initial findings were consistent with the literature, showing an overall significant increase in the severity and frequency of RSBs between the ages of 2 and 4. Specifically, the data showed an increase in the frequency of higher-level behaviors, whereas there was no significant change in the frequency or overall severity of lower-level behaviors. Preliminary analyses further suggest that severity of low-level RSB was negatively correlated with level of intelligence and with parental report of early social skills.
Conclusions: The present study suggests that the development of low-level repetitive behaviors is associated with lower levels of cognitive functioning, which may interfere with social and communicative development in children with ASD.
Correspondence: *Kelley Knoch, University of Connecticut, 406 Babidge Road Unit 1020, Storrs, CT 06269. E-mail: kelley.knoch@uconn.edu*

M. KONISHI, F. SAITO, Y. CHEN, H. TABUCHI, T. MAEDA & M. KATO. Relationship Between RSPM and WAIS Subtests in High-Functioning Autism and Asperger's Disorder.
Objective: Previously, we found that children with Asperger's disorder (AD) achieved outstanding performance on the test of abstract reasoning ability; the Raven's Standard Progressive Matrices Test (Hayashi M, Kato M, Igarashi K, Kashima H. 2008. Superior fluid intelligence in children with Asperger's disorder. Brain and Cognition. 66: 306-310.). This implies that visuo-spatial abstract reasoning ability is enhanced in autism as well as AD, although persons with AD often show V>P discrepancy on the Wechsler scales of intelligence. In the present study, we investigated the relationship between performance on the RSPM and a WAIS profile in adults with high-functioning autism (HFA) or Asperger's disorder (AD).
Participants and Methods: Twenty-six persons with AD /HFA (male, 11; female, 15, mean age; 25.0±9.3) participated in this study, and the RSPM and WAIS-R/III were administered to them.
Results: Mean score of the RSPM was 52.3 (±5.9), corresponding to 'intellectually average'. The results of WAIS showed a significantly higher VIQ (111.2 ±14.0) than PIQ (102.6±16.3) [$t(25) = 2.18$, $p < .05$]. RSPM score was positively related to PIQ ($r=.59$, $p<.01$) and FIQ ($r=.60$, $p<.01$), and, for specific subtests in WAIS, Block design ($\geq=.49$, $p<.01$) and Arithmetic ($\geq=.44$, $p<.05$) were positively associated to the RSPM score.
Conclusions: The results suggested that visuo-spatial ability and numerical reasoning ability strongly associated with the levels of fluid intelligence in HFA and AD.
Correspondence: *Mika Konishi, Keio University, 35 Shinanomachi Shinjuku-ku, Tokyo 160-8582, Japan. E-mail: mikita1204@ymail.plala.or.jp*

B.C. LEMONDA, S. GOLDMAN & R. HOLTZER. The Relationship Between Executive Functions and Stereotypies in Children with Autism Spectrum Disorders.
Objective: Research concerning the relationship between executive functions (EF) and stereotypies in children with Autism Spectrum Disorders (ASD) has been limited. We examined whether EF was related to stereotypies in children with ASD and in children with other developmental delays. We hypothesized that low EF performance would predict higher frequency and longer durations of stereotypies only in the ASD group.
Participants and Methods: Participants were children diagnosed with ASD at age 3 who participated in a multi-site longitudinal study (n=27, age range=7-9 years, girls=5). Children diagnosed with non-autistic developmental delay (n=27, age range=7-9, girls=5) served as controls. The two groups were matched on key demographic characteristics and non-verbal IQ. Frequency and duration of stereotypies were quantitatively assessed based on videotape observations of structured play. EF measures included the Wisconsin Card Sorting Task (WCST), Stanford-Binet (S-B) matrices, WISC-R mazes.
Results: As expected the frequency ($p<.01$) and duration ($p<.05$) of stereotypies were significantly higher in the ASD group compared to the control group. Separate linear regression models revealed that group status, EF and their interactions were significant predictors of the frequency and duration of stereotypies. The significant interactions indicated that the associations between EF and stereotypies were influenced by group status. Stratified analyses confirmed that low EF predicted more severe stereotypies only in the ASD group. Analyses controlled for age, gender, parental education and current medications.
Conclusions: Low EF performance predicted more severe stereotypies only in children with ASD. This finding suggests that in ASD, EF impairments and stereotypy may be linked to shared brain substrates.
Correspondence: *Brittany C. LeMonda, Ferkauf Graduate School of Psychology, 1165 Morris Park Avenue, Bronx, NY 10461. E-mail: brittany.lemonda@gmail.com*

A.M. LYONS USHER & L.D. STANFORD. Measures of Executive Functioning in Relation to Social Functioning in Youth with Autism Spectrum Disorders (ASD).
Objective: The aim of this study was to examine the relationship between measures of executive functioning (EF) and social functioning in youth with ASD. Both social impairments and executive dysfunction are common in children with ASD, and research demonstrates that EF deficits may contribute to social difficulties. The TEA-Ch and the BRIEF are two measures designed to enhance the ecological validity of EF assessment. It is important to investigate the relation of these measures with functional outcomes given their proposed correspondence to real-world performance.
Participants and Methods: Participants included 39 children with ASD aged 6-16 and their parents. Exclusionary criteria included a FSIQ < 75. Two EF measures (TEA-Ch, BRIEF) and two measures of social functioning (CBCL Social Problems, ADOS Social and Social Communication) were used in analyses.
Results: Regression analyses led to significant EF main effects. Specifically, seven BRIEF subscales (Initiate, Plan/Organize, Organization of

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Materials, Monitor, Inhibit, Shift, Emotional Control) and one subscale of the TEA-Ch (Walk, Don't Walk) were associated with CBCL Social Problems. Both Social and Social Communication subscales of the ADOS were related to the Score! subtest of the TEA-Ch. No subscales of the BRIEF were associated with the ADOS.

Conclusions: Results are consistent with previous studies indicating a relationship between EF and social skills for youth with ASD. The TEA-Ch subscales associated with EF in analyses both require sustained attention, suggesting this type of attention is important during social interactions. Because many BRIEF subscales were associated with the CBCL and none were related to the ADOS, these findings may be a result of the type of assessment method used (i.e., parent report). Thus, further research is necessary.

Correspondence: *Amy M. Lyons Usher, M.A., Loyola University Chicago, 1746 N Sedgwick St. #3, Chicago, IL 60614. E-mail: alyons1@luc.edu*

L.K. MACNEIL, R.F. AHAD, M. ADLER & S.H. MOSTOFSKY. Evidence that Impairments in Praxis, but Not Basic Motor Control, Are Specific to Autism.

Objective: To explore the specificity of impaired praxis and postural knowledge in autism by examining children with ASD, ADHD, and typically developing (TD) children.

Participants and Methods: Twenty-four children in each group, ASD, ADHD, and TD, completed Physical and Neurological Exam for Subtle Signs (PANESS) as an assessment of motor skills, modified version of the Florida Apraxia Battery as an assessment of performance of skilled gestures (tool use, social communication), and Postural Knowledge Test (PKT) as an assessment of recognition of correct hand postures necessary to perform skilled gestures.

Results: Three-way MANOVA revealed a significant multivariate effect of diagnosis for the three motor assessments which was also observed with univariate tests for each of the three motor variables (all with $p<0.01$). Post hoc analyses revealed that children with ASD performed significantly worse than TD children on all three motor assessments (praxis total % correct: $F=31.40$, $p<0.001$; total PANESS: $F=31.60$, $p<0.001$; PKT: $F=9.28$, $p=0.012$). In contrast, children with ADHD performed significantly worse than TD controls on PANESS (total: $F=24.64$, $p<0.001$) but not on praxis or PKT. Furthermore, comparisons of ASD and ADHD groups revealed that the ASD group performed significantly worse than the ADHD group on the praxis examination (total % correct: $F=13.65$, $p=0.003$) and PKT ($F=6.21$, $p=0.048$) but not on the PANESS. P-values were Bonferroni corrected.

Conclusions: Findings suggest that impaired formation of perceptual-motor action models necessary to development of skilled gestures and other goal directed behavior is specific to autism; whereas, impaired basic motor control may be a more generalized finding.

Correspondence: *Lindsey K. MacNeil, LNIR, Kennedy Krieger Institute, 707 N Broadway, Baltimore, MD 21205. E-mail: MacNeil@kennedykrieger.org*

T.P. MECCA, F.T. ORSATI, A.C. BARBOSA, J.S. SCHWARTZMAN & E.C. MACEDO. Executive Functions and Eye Tracking in Autism Spectrum Disorders.

Objective: The literature considers Executive Function deficits a central endophenotype on the Autism Spectrum Disorders (ASD). This view aims to explain the disorder by identifying hereditary traits related to biological factors. Eye tracking analysis is considered an effective assessment for people with ASD due to being an objective measure of psychobiological patterns of behaviors. The present study aim to compare individuals with ASD and control group in both traditional executive function tests and eye tracking executive function measures

Participants and Methods: Sixteen individuals were assessed, eight in each group paired by age, gender and IQ. The following traditional measures were used: WISC-III, Trail Making Test, Complex Rey Figure, and Hanoi Tower. The eye tracking measures included Predictive Saccade (PS) and Anti-Saccade (AS).

Results: Results show that on IQ testing ASD individuals performance's was significantly worse on Comprehension subtest [$F(1,14)=0,91$; $p<0.01$]. On Rey Complex Figure Test significant differences were found for the copy drawing [$F(1,14)=0,07$; $p<0.04$] and the 30 minutes delay drawing [$F(1,14)=10,20$; $p<0.04$], in this case the ASD individuals also did worse than control group. Regarding the eye tracking measures the PS task showed a significant better performance of the control group [$F(1,14)=0,78$; $p<0.03$].

Conclusions: Results show that the ASD individuals have difficulties in comprehending the context around them and take important information from it to be used later; in delayed visual memory involving perceptual organization; in planning and inhibition of responses, as well as in accurate guided saccades which translate in regulation of visual attention.

Correspondence: *Tatiana P. Mecca, Master, Mackenzie University, Vichy Street, number 10, apartment 41, São Paulo 02522100, Brazil. E-mail: tati.mecca@gmail.com*

A. ORINSTEIN, E. TROYB, K. TYSON, M. ROSENTHAL, M. HELT, I. EIGSTI, M. BARTON, E.A. KELLEY, M.C. STEVENS, R.T. SCHULTZ & D. FEIN. Circumscribed Interests in Optimal Outcome Children with a History of Autism Spectrum Disorders.

Objective: A study is currently following children and adolescents who have a history of autism spectrum disorder (ASD), but who no longer meet diagnostic criteria for ASD. These "optimal outcome" (OO) individuals have achieved social and language skills within the average range for their ages and receive little or no school support.

The current study examines circumscribed interests during the preschool and elementary years in OO children and adolescents as compared to typically developing (TD) individuals, and individuals with high-functioning autism (HFA). Given that restricted, repetitive, and stereotyped patterns of behavior, interests, and activities are a poor prognostic feature in ASD, we hypothesized that the OO group would exhibit fewer circumscribed interests.

Participants and Methods: Parents of 16 TD, 18 HFA, and 17 OO age-matched participants completed the Yale Survey of Special Interests to ascertain the presence and type of circumscribed interests in two age periods: preschool and elementary years. The circumscribed interests were then coded based on the system proposed by the authors of the scale (Klin et al. 2007).

Fisher's exact tests were used to compare the presence, type, and unusualness of circumscribed interests across groups (TD, HFA, or OO).

Results: In this preliminary sample, there were no differences in the presence of circumscribed interests between the HFA and OO groups for either age period, but both groups displayed more circumscribed interests than the TD group. Additionally, the type and the unusualness of the interests did not differ between the HFA and OO groups.

Conclusions: Contrary to our hypothesis, the presence, type, and unusualness of circumscribed interests in preschool and elementary years did not differentiate between individuals who went on to achieve optimal outcomes and those who retained their ASD diagnosis in this preliminary sample, and therefore may not be useful for predicting prognosis.

Correspondence: *Alyssa Orinstein, B.S., Psychology, University of Connecticut, 406 Babbidge Road, Storrs, CT 06269. E-mail: alyssa.orinstein@uconn.edu*

J. PANDEY, L.E. BRADSTREET, S. CAYLESS, I.E. GISERMAN, H. KANG & R.T. SCHULTZ. The Assessment of Adaptive Functioning in High- and Low-Functioning Individuals with Autism Spectrum Disorders.

Objective: In addition to deficits in communication, socialization, and repetitive interests, individuals with autism spectrum disorders (ASD) experience difficulties in adaptive functioning. Adaptive functioning, therefore, is often a target of intervention. However, the relationship between adaptive functioning deficits, IQ, and autistic symptomatology remains unclear. For instance, a study by Liss and colleagues (2001)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

divided individuals with ASD into high- and low-functioning groups and found that deficits in adaptive behavior were strongly correlated with autistic symptomatology only in the high-functioning group, but that IQ was strongly predictive of adaptive behavior in the low-functioning group. This study and many others utilized the Vineland Behavior Rating Scales (VABS). This study seeks to clarify these relationships and to compare the new edition of the VABS to another measure, the Adaptive Behavior Assessment System, 2nd Edition (ABAS-II).
Participants and Methods: To date we have studied 51 participants between the ages of six and eighteen (37 males, 14 females; mean age = 11.4 years) with ASD, using gold standard diagnostic measures; with at least 50 more participants anticipated for the final presentation. The study is examining the relationship between adaptive functioning, IQ, and autism symptomatology for individuals with low- and high-functioning ASD using two parent-report measures of adaptive functioning: VABS-II and the ABAS-II.
Results: In doing so, we can describe the relationship between the two measures and their pattern of correlations to clinical symptoms and IQ profiles.
Conclusions: A detailed understanding of these relationships should clarify (a) profiles of adaptive behavior difficulties in ASD; and (b) differences in two commonly used measures.
Correspondence: *Juhi Pandey, Ph.D., Center for Autism Research, Children's Hospital of Philadelphia, 3535 Market Street, 8th Floor, Suite 860, Philadelphia, PA 19104. E-mail: pandeyj@email.chop.edu*

O. REINVALL, A. VOUTILAINEN, T. NIEMINEN-VON WENDT, L. VON WENDT (DECEASED) & M. KORKMAN. Neuropsychological Profile of Adolescents with Asperger Syndrome.
Objective: Although neuropsychological deficits have been reported in individuals with autistic spectrum disorders (ASD), there is a paucity of research focusing on the entire neuropsychological profile indicating relative strengths and weaknesses in individuals with Asperger Syndrome (AS) during adolescence. The aim of this study was to compare the comprehensive neuropsychological profile of adolescents with AS to typically developing adolescents.
Participants and Methods: Participants were 28 adolescents aged 12–16 years and diagnosed with AS and 28 adolescent control participants. The neuropsychological assessment included the WISC-III and 17 subtests of attention and executive functions, memory and learning, language, visuospatial functions, social perception and sensorimotor functions from the NEPSY-II. The control group was derived from the Finnish NEPSY-II standardization sample, which was assessed simultaneously with the AS group.
Results: To adjust for multiple comparisons, alpha was lowered to .01. Adolescents with AS had significantly higher scores than expected due to their age on Verbal-Scale Intelligence Quotient ($p = .000$, one-sample t-test) of the WISC-III. Adolescents with AS had significantly lower scores than the control group (independent samples t-test) on the subtests of Auditory Attention B ($p = .008$), Memory for Faces ($p = .003$) and Visuomotor Precision ($p = .003$) of the NEPSY II.
Conclusions: In our preliminary findings particular strengths were seen in verbal reasoning and weaknesses in auditory attention, facial recognition memory and visuomotor functions in adolescents with AS.
Correspondence: *Outi Reinvall, University of Helsinki, PO Box 9 (Siltavuorenpenger 1 A), Helsinki 00014, Finland. E-mail: outi.reinvall@helsinki.fi*

D.L. ROBINS, T.Z. KING & K.S. LOGGINS. BOLD Activation to Congruent vs. Incongruent Dynamic Audiovisual Emotion Cues Differs Between Individuals with Autism Spectrum Disorders and Neurotypicals.
Objective: Emotion perception skills are critical for successful social interaction and are known to be challenging for individuals with autism spectrum disorders (ASD). Understanding the neurological mechanisms underlying complex emotion perception in ASD and neurotypical (NT) individuals may inform social skills interventions in ASD.
Participants and Methods: Patterns of fMRI BOLD activation were examined during presentation of congruent (i.e., happy face, happy voice) vs. incongruent (i.e., happy face, angry voice) trials using Dynamic Audiovisual Emotion stimuli. Eleven participants with ASD, and 11 NTs matched on age (mean=17.9 years, 3 female, 91% Caucasian), FSIQ, VIQ, and PIQ ($mean_{FSIQ}$=107.3) completed the study. A mixed block/event-related design, in which congruence was pseudorandomized, was administered in a 3T Siemens Scanner.
Results: Group behavioral responses were similar in accuracy to congruent videos. NTs demonstrated increased activation to incongruent versus congruent trials in left fusiform gyrus, parahippocampal gyrus, and lingual gyrus, and increased BOLD to congruent vs. incongruent in superior frontal gyrus (all ps=.001, cluster threshold=50 voxels). In contrast, no significant differences between congruent and incongruent trials were found in the ASD group ($p=.001$).
Conclusions: In the context of comparable behavioral performance, the current findings suggest that separate neural systems were used in NTs when processing congruent versus incongruent facial emotion videos, whereas ASD did not appear to recruit unique neural regions to process these different stimuli. Further analysis of the relationship between these activations, using connectivity analyses and diffusion tensor imaging, may shed light on a network important for incongruence detection, important for processing subtle emotion cues in social situations.
Correspondence: *Diana L. Robins, PhD, Psychology, Georgia State University, PO Box 5010, Atlanta, GA 30302-5010. E-mail: drobins@gsu.edu*

J.M. SCHUH, D. MIRMAN & I. EIGSTI. Perspective Taking in Autism Spectrum Disorder: Relative Contributions of Theory of Mind and Working Memory.
Objective: Pragmatic language impairments in autism spectrum disorders (ASD) are significant, and likely include difficulty in monitoring what information is known between partners in a conversation, termed "common ground" (Clark, 1992). Common ground impairments in ASD could potentially reflect limitations in Theory of Mind (ToM) or working memory (WM). This study assessed: 1) the ability of individuals with ASD to use common ground; and 2) the contributions of ToM and WM to such representations.
Participants and Methods: Adolescents with ASD (n=13) and typical development (TD; n=22) ages 9-16 years completed a problem-solving task with a research assistant "partner" in which some information was "secret" (known only to the participant). Participants' eye movements and behavioral responses were recorded. As a manipulation of WM load, the amount of secret information varied. Task performance was compared to standardized measures of ToM and WM.
Results: Accuracy was high across groups (M= .89 ASD, .93 TD). Eye-movement data indicated that all participants were slower when required to integrate secret information, $p<.001$, and this difficulty increased under high WM demands, $p<.002$. The ASD group was slower to incorporate partner perspective, $p<.05$, as they considered "secret" information longer. Across groups, performance errors were associated with standardized scores of ToM and WM, and (for the ASD group) correlated with symptom severity, all p's$<.05$.
Conclusions: Differences for low/high WM loads suggest that WM modulates the ability to incorporate shared information, with the ASD group particularly susceptible to WM demands. Results are consistent with research suggesting that perspective-taking places significant demands on cognitive processes.
Correspondence: *Jillian M. Schuh, University of Connecticut, 5230 S. Drexel Ave Apt 3SW, Chicago, IL 60615. E-mail: jillian.schuh@gmail.com*

L. VANDENBURG, R. WASSERMAN, M. STEPANSKY, A. DAVIS & J. DORFLINGER. Utilization of Social Cognition Measures to Differentiate Autism Spectrum Disorder and Attention-Deficit/Hyperactivity Disorder.
Objective: The current study examined the predictive diagnostic value of social cognition measures in children with autism spectrum disorders (ASD) in comparison to children with Attention-Deficit/Hyperactivity Disorder (ADHD).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants were 29 children with ASD and 22 children with ADHD (ages 6 to 14). Children with IQ scores lower than 80 were excluded. The following measures were used: Faces from the Children's Memory Scale (CMS), Pragmatic Judgment from the Comprehensive Assessment of Spoken Language (CASL), Affect Recognition from the NEPSY-Second Edition (NEPSY-2), subtests of the Diagnostic Assessment of Nonverbal Affect – Second Edition (DANVA-2), and the Test of Problem Solving (TOPS, Third Edition and Second Edition-Adolescent). Independent samples T-tests examined mean differences between the groups for each measure of social cognition, and hierarchical logistic regressions examined the probability of diagnostic group membership.
Results: There were no differences between the two groups for the CMS, DANVA-2 and NEPSY-2. However, the children with ASD were found to have significantly lower scores on the CASL ($p<.05$) and the TOPS ($p<.05$). Results also indicated that using these two measures in combination was the best way to predict diagnostic group membership (CASL, B = -.063, $p<.05$; TOPS, B = -.106, $p<.05$).
Conclusions: Results indicated that when examining children with IQ scores of 80 and above, several measures of social cognition (including affect recognition and memory for faces) do not differ for children with autism in comparison to children with ADHD. However, the two diagnostic groups differed in their use of language-based social problem solving.
Correspondence: *Mona Stepansky, PhD, Alexian Brothers Neurosciences Institute, 800 Biesterfield Road, Eberle Suite 610, Elk Grove Village, IL 60007. E-mail: mona.stepansky@abbhh.net*

J. SUH, A. ORINSTEIN, I. EIGSTI, M. BARTON, M. HELT, E. TROYB, K. TYSON, R.T. SCHULTZ, M. STEVENS, M. ROSENTHAL, E. KELLEY & D. FEIN. Daily Living Skills In Optimal Outcome Children with a History of Autism Spectrum Disorders.
Objective: A study is currently following children and adolescents who have a history of autism spectrum disorder (ASD), but who no longer meet diagnostic criteria for ASD. These "optimal outcome" (OO) individuals have achieved social and language skills within the average range for their ages and receive little or no school support.
However, it is unclear whether these OO individuals are as self-sufficient as typically developing (TD) individuals in areas of daily living. This study will examine the parent-reported daily functioning of OO individuals and compare this to that of TD individuals and individuals with high functioning autism (HFA). It is hypothesized that OO individuals will be more self-sufficient than HFA individuals but less self-sufficient than TD individuals due to a prior history of developmental delays.
Participants and Methods: Parents of 29 OO, 21 TD, and 26 HFA age-matched participants (ages 8-21) completed the Vineland Adaptive Behavior Scales Interview (Sparrow, Balla, and Cicchetti, 1984), which assesses skills in the Personal domain (i.e. grooming, health care), Domestic domain (i.e. housekeeping, home safety), and Community domain (i.e. obeying rules, money management).
Results: Descriptive statistics and ANOVA tests were conducted to determine whether Personal, Domestic, or Community subdomain scores or overall Daily Living Skills scores differed by group.
In this preliminary sample, overall Daily Living Scale scores did not differ between the OO or TD groups, and both groups scored significantly higher than the HFA group. Specifically, the OO group had stronger Personal and Community skills than the HFA group but there were no significant differences in the Domestic subdomain. The OO group and the TD group did not significantly differ in any subdomains.
Conclusions: In addition to achieving average social and language skills, OO individuals appear to be as self-sufficient as TD individuals in areas of daily living such as self-care, domestic skills, and functioning in the community.
Correspondence: *Joyce Suh, B.A., University of Connecticut, 190 John Olds Drive, Apt 202, Manchester, CT 06042. E-mail: jsuh05@gmail.com*

L.L. THEDE, J. ORAKER, F. GIBSON, L. STANFORD & S. GRAY. Neuropsychological and Social-Emotional Factors Contributing to Quality of Life for Adults with Asperger's Disorder.
Objective: Individuals with Asperger's Disorder are considered to be high functioning, mainly due to their average to superior cognitive and language bilities. Yet, over half of adults with this condition remain dependent upon their parents. They have impairments in pragmatic use of language and associated social skills, difficulty in identifying the emotions of others, negativity and emotional dysregulation, various neuropsychological problems such as executive function deficits, comorbid psychiatric conditions, and limited adaptive skills. The purpose of this study was to identify which neuropsychological and social-emotional factors are most predictive of quality of life and independence in adulthood.
Participants and Methods: A sample of 33 adults (19 males, 14 females), ages 18-59, was diagnosed using the ADOS (24 clinicals; 9 controls), with no significant differences between groups on age, ethnicity, or IQ. Measures included a demographic survey/clinical interview, Interpersonal Behavior Survey, Workplace Skills Survey, Shipley-2, Behavioural Assessment of the Dysexecutive Syndrome (BADS), and the Quality of Life Inventory (QOLI).
Results: Factor analysis was used to create a satisfactory objective measure of quality of life consisting of eight demogrpahic variables. Those neuropsychological and social-emotional variables significantly correlated with either dependent variable were then used in multiple regression analyses. Three social-emotional factors, as well as diagnostic group, were predictive of subjective quality of life, accounting for 50% of the variance. Three neuropsychological and five social-emotional factors were predictive of objective quality of life, accounting for 67% of the variance.
Conclusions: Hypotheses that both neuropsychological and social-emotional factors would be predictive of quality of life in adulthood were supported. Limitations, recommendations for future research, and implications for treatment are discussed.
Correspondence: *Linda L. Thede, PsyD, Psychology, University of the Rockies, 6270 Lehman Drive, Suite 200C, Colorado Springs, CO 80918. E-mail: DrThede@aol.com*

E. TROYB, K. TYSON, A. ORINSTEIN, M. HELT, M. ROSENTHAL, I. EIGSTI, L. NAIGLES, M. BARTON, E. KELLEY, M. STEVENS, R.T. SCHULTZ & D. FEIN. Writing Abilities in Children and Adolescents with ASDs Who Have Achieved Optimal Outcomes.
Objective: A study is currently following children and adolescents who have a history of autism spectrum disorder (ASD), but who no longer meet diagnostic criteria for such a disorder. These children have achieved social and language skills within the average range for their ages and receive little or no school support. This study examines the writing abilities of individuals who were once diagnosed with ASDs and have achieved "optimal outcomes" (OO).
Participants and Methods: Performance of 25 individuals who achieved OO (M(age)=13.7), 19 high functioning individuals with a current ASD diagnosis (HFA, M(age)=13.0), and 19 typically-developing peers (TD, M(age)=13.8) was compared on the spontaneous writing sample of the Test of Written Language, Third Edition (TOWL-3). The groups were matched on age, sex and nonverbal IQ; however, the groups differed significantly on verbal IQ (M(TD)=115.3, M(OO)=113.2, M(HFA)=104.1, $p<.05$).
Results: Individuals in all three groups performed in the average range on the subtests of the TOWL-3. The scores of individuals in the OO and TD groups did not differ on any of the subtests measured. Individuals in the HFA group received significantly lower scores on subtests measuring the mechanics of written language (M(TD)=10.6, M(OO)=12.3, M(HFA)=9.6, $p=<.05$), grammar, sentence structure and vocabulary (M(TD)=12.6, M(OO)=12.5, M(HFA)=10.0, $p<.05$), as well as story construction (M(TD)=11.5, M(OO)=11.4, M(HFA)=9.1, $p<.05$).
Conclusions: Individuals in all three groups performed in the average range on all subtests of the TOWL-3. However, children and adolescents in the OO group demonstrated a higher level of mastery of the arbitrary conventions of written language, appropriate language use and

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

story construction than did individuals who retained their ASD diagnosis. The relative weaknesses in some aspects of writing demonstrated by the HFA group may be part of a larger verbal reasoning deficit that also explains the significantly lower verbal IQ of the HFA group relative to the OO and TD groups.
Correspondence: *Eva Troyb, Department of Psychology, University of Connecticut, 406 Babbidge Road, Unit 1020, Storrs, CT 06269. E-mail: eva.troyb@uconn.edu*

K.E. TYSON, E. TROYB, A. ORINSTEIN, M.S. HELT, M. ROSENTHAL, I. EIGSTI, E. KELLEY, M.C. STEVENS, R.T. SCHULTZ, M. BARTON & D. FEIN. Attentional and Phobic Symptoms in Optimal Outcome Children with a History of ASD.

Objective: A study is currently following children and adolescents who have a history of autism spectrum disorder (ASD), but who no longer meet diagnostic criteria for ASD. These "optimal outcome" (OO) individuals have achieved social and language skills within the average range for their ages and receive little or no school support.
The current study examines rates of psychiatric symptoms and disorders in OO children and adolescents as compared to typically developing (TD) individuals, and individuals with high-functioning autism (HFA).
Participants and Methods: We administered the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime version (K-SADS-PL) to parents of 20 TD, 20 HFA, and 28 OO participants (matched on age and IQ) to ascertain rates of psychopathology (both past and current) across the three groups. Loglinear modeling was used to analyze associations between group (TD, HFA, or OO) and meeting criteria for a disorder in the past or currently.
Results: In this sample, OO individuals displayed somewhat elevated rates of psychopathology, particularly in the attention and anxiety domains, compared to TD individuals, but fewer symptoms overall than HFA individuals. Loglinear modeling showed that meeting criteria for a past specific phobia diagnosis was related to group membership, and OO individuals displayed the highest rate of past specific phobias. The model of ADHD included interactions between meeting criteria for ADHD currently and in the past, and between meeting criteria for an ADHD diagnosis in the past and group. In this case, the OO group had fewer cases of ADHD diagnosis compared to the HFA group.
Conclusions: The fact that the autism symptoms of the OO group have resolved, even as other psychiatric problems persist, suggests that symptoms such as attention and anxiety could be associated with specific subtypes of ASD.
Correspondence: *Katherine E. Tyson, Psychology, University of Connecticut, 406 Babbidge Rd, Unit 1020, Storrs, CT 06269. E-mail: katherine.tyson@uconn.edu*

E. WODKA, M. MAHONE, T. YOSHIOKA, S. HSIAO & S. MOSTOFSKY. Investigating the Neurobehavioral Basis of Abnormal Sensory Response in Autism.

Objective: There is little empirical support for available therapies targeting sensory dysfunction in autism. We examined the relationship between competing pathophysiological models (i.e., sensory perception, sensory behavior, and attention) in children with autism spectrum disorder (ASD) and typically developing (TD) controls.
Participants and Methods: Twenty-five children (8 ASD and 17 TD) ages 8-12 years, completed a novel performance-based measure of tactile perception (roughness perception task: RPT). This task assesses both roughness perception and the impact of distraction (requiring increased attentional focus) on perception through rating sandpaper roughness by touch. Parent-reported sensory behavior was also collected for 22 of these participants (6 ASD and 16 TD) using the Sensory Processing Measure (SPM).
Results: Children with ASD were reported by parents as having significantly more sensory behaviors than controls ($p<.001$). There were no significant group differences on performance-based measures of roughness perception; however, a trend towards children with ASD being more variable in their rating during the distraction condition of the task was observed ($p=.090$).
Conclusions: Parents of children with ASD clearly report differences in their children's behavioral responses to sensory stimulation. While there were no differences noted in roughness perception, under distracter conditions of a roughness perception task (increasing attentional demand) children with ASD may rate similar textures more variably than TD children. Taken together, while there may not be a general "bottom-up" perceptual deficiency in children with ASD, aspects of this system may be vulnerable to inefficiency, particularly under simultaneous processing conditions (e.g., in real life situations where both sensory perception and attentional systems are engaged).
Correspondence: *Ericka Wodka, Ph.D., Center for Autism, Kennedy Krieger Institute, 3901 Greenspring Ave., Baltimore, MD 21211. E-mail: wodka@kennedykrieger.org*

A.P. STEGER, D.G. NEMETH, L.T. WHITTINGTON, T.W. OLIVIER, J.R. HAMILTON & A. GREMILLION. Working Memory vs. Processing Speed Abilities in Asperger's Children.

Objective: Individuals, mostly children, with Asperger's Syndrome (AS) are frequently quite literal and typically slow to respond. As "slow processing speed involves the inability to quickly call up information in order to form an answer or a behavioral response, these difficulties impair both academic and social functioning." (Stewart, 2002, p. 80)
Participants and Methods: Five individuals, two girls and three boys, ages 9 through 19, all with diagnoses of AS, were administered measures of intellectual functioning to determine their Working Memory vs. Processing Speed abilities.
Intelligence measures utilized were the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) and the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III). "These tests standardize intelligence testing via psychometric properties, standardized procedures and research. Most children with a differential diagnosis of AS are able to complete the age-appropriate versions of these scales." (Klin, Volkman, Sparrow, 2000, p. 315)
Results: Results reveal a consistent pattern of Working Memory skills being significantly higher than Processing Speed abilities in all five children across the developmental age span. In general, tasks requiring visual-perceptual speed with motor output appear to be a weakness; whereas, tasks requiring verbal mediation appear to be strengths. This is consistent with the observations of Klin, et. al., 2000. The use of this information to assist in psychopharmacological management, however, has not been well documented.
Conclusions: In order to address their Processing Speed deficiencies, psychopharmacological medication was prescribed. With enhanced Processing Speed abilities, increased academic progress and improved social adjustment were reported.
Correspondence: *Darlyne G. Nemeth, Ph.D., M.P., A.B.M.P., The Neuropsychology Center of Louisiana, LLC, 4611 Bluebonnet Blvd, Ste. B, Baton Rouge, LA 70809. E-mail: dgnemeth@gmail.com*

Emotional Processes

J.R. HAMILTON, K.B. FROMING, W.J. FROMING, D.G. NEMETH & A.P. STEGER. Gender Influence in Early Adolescent Emotion Processing.

Objective: Women have consistently outperformed men in a small yet statistically significant manner on nonverbal emotion processing tasks (Brody, 1985). Gender's influence on emotion processing abilities is more varied and more inconsistent in children. Gender is an important variable to consider in emotion processing development.
The Comprehensive Affect Testing System (CATS) is an assessment tool that can improve the neuropsychological understanding and awareness of emotion. The CATS and its 13 unique subtests assess emotion processing across basic emotion communication channels in three broad domains: facial, prosodic, and lexical processing.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Findings presented at the National Academy of Neuropsychology's 30th Annual Conference found a developmental relationship between intelligence and emotion processing abilities (Hamilton, Froming, Nemeth, & Steger, 2010). Gender influence on emotion processing was not explored. This poster will examine the influence of gender on emotion processing in young adolescents ages 12-13.
Participants and Methods: Fifteen male and fifteen female participants completed the CATS and the Vocabulary and Matrix Reasoning Subtests of the Wechsler Abbreviated Scales of Intelligence (WASI). The 30 participants selected for inclusion in this study were chosen based on an absence of reported psychiatric or developmental issues.
Results: Results support the findings of an emotion processing advantage for adolescent females. Females scored significantly higher than males on 5 CATS measures, including the Emotion Recognition Quotient, which measures overall CATS performance. A significant advantage was also found for identifying the facial emotion of surprise across CATS subtests.
Conclusions: Twelve to thirteen year old females significantly outperformed males in emotion processing tasks as assessed by the CATS.
Correspondence: *Darlyne G. Nemeth, Ph.D., M.P., A.B.M.P., The Neuropsychology Center of Louisiana, LLC, 4611 Bluebonnet Blvd, Ste. B, Baton Rouge, LA 70809. E-mail: dgnemeth@gmail.com*

E.M. BRICENO, S.L. WRIGHT, B.D. HAASE, K.E. HAZLETT, A.C. VEDERMAN, M.T. RANSOM, M. PECINA, M.L. BRINKMAN, L.A. BIELIAUSKAS, M.N. STARKMAN, L.J. RAPPORT, J. ZUBIETA & S.A. LANGENECKER. Hyperactivation of Frontal and Limbic Circuitry During an Affect Perception Task in Women with Major Depressive Disorder.
Objective: Individuals with Major Depressive Disorder (MDD) exhibit alteration of emotion processing circuitry in response to facial emotion recognition paradigms. However, prior research has typically utilized implicit facial emotion recognition (FER) tasks (i.e., those not requiring direct classification of emotional expressions). The lack of explicit categorization is problematic because individuals with MDD are less accurate in recognition of facial emotional expressions, potentially confounding imaging results. The current study utilized an explicit FER task to investigate MDD-related alterations in neural circuitry supporting facial emotion expression categorization in women.
Participants and Methods: Twenty-two women with MDD and 19 healthy controls completed the Facial Emotion Perception Task during fMRI. Participants were shown faces and selected the emotion (happy, sad, angry, fearful) that best described that depicted emotion. The control task consisted of categorization of animal pictures (bird, cat, dog, primate).
Results: Preliminary cognitive data analysis revealed the MDD group was less accurate at identifying happy facial expressions ($p < 0.05$) than controls, whereas no group differences were significant regarding other emotions ($ps > 0.15$). Preliminary fMRI analyses revealed that MDD participants exhibited greater activation than controls in extensive bilateral frontal, parietal, and limbic regions, even after covarying performance.
Conclusions: Women with MDD demonstrated hyperactivation of frontal, parietal, and limbic circuitry in response to categorizing facial emotions. This finding extends prior research by showing that the pattern of hyperactivation is not related to poorer categorization ability. Further research comparing women and men can elucidate gender-specific disruptions in emotion processing in MDD.
Correspondence: *Emily M. Briceno, M.A., Psychology, Wayne State University, 5057 Woodward 7th Floor, Detroit, MI 48202. E-mail: emilybriceno@gmail.com*

S.R. PAZIENZA, W.S. BROWN & L.K. PAUL. Emotional Expressiveness and Somatization in Agenesis of the Corpus Callosum.
Objective: Individuals with agenesis of the corpus callosum (ACC) exhibit cognitive and social deficits, even when FSIQ is in the normal range. Abnormal emotional expressiveness, including alexithymia and somatization, has been observed in individuals with ACC (Brown & Paul, 2000; Turk et al., 2002; Paul et al., 2006), presumably due to the lack of transfer of emotional information between the right and left hemisphere.
Participants and Methods: This study compared emotional expressiveness and somatization in 18 adults with complete ACC and FSIQ > 80, and 16 age and IQ-matched controls using the Toronto Alexithymia Scale (TAS-20), Emotion Approach Coping Scale (EACS), Positive and Negative Affect Schedule (PANAS), Symptom Checklist (SCL-90-R), Symptom Interpretation Questionnaire (SIQ), and Health Symptom Questionnaire (HSQ).
Results: Scores on the EACS, PANAS, SIQ, and HSQ did not differ significantly between the ACC group and the control group ($p > .05$). However, individuals with ACC scored significantly higher on the TAS-20 ($F = 22.31$, $p < .001$; ACC M = 53.43; control M = 37.75) and SCL-90-R ($F = 10.94$, $p < .001$; ACC M = 0.87; control M = 0.36). A post-hoc analysis of the SIQ indicated that individuals with ACC were more likely than controls to attribute physical symptoms to psychological factors ($F = 4.46$, $p < .05$; ACC M = 12.05; control M = 9.63).
Conclusions: Results of this study suggest that while individuals with ACC have a greater tendency towards alexithymia and somatization, they do not differ from controls in emotional coping, reported positive and negative affect, and overall health.
Correspondence: *Warren S. Brown, Ph.D., Fuller Graduate School of Psychology, Travis Research Institute, 180 N. Oakland Ave, Pasadena, CA 91101. E-mail: wsbrown@fuller.edu*

A. AYCICEGI-DINN & C. CALDWELL-HARRIS. Studying Emotion-Language Connections: Jokes in a Second Language Elicit Reduced Physiological Arousal.
Objective: Neuropsychologists are increasingly interested in how emotion processing is connected to other brain systems. We investigated the connections between language and emotional processing using the 'natural experiment' of bilingualism. Bilingual speakers frequently report that their second language (L2) feels less emotional than their first language (L1). Our lab previously verified a physiological basis for this by showing reduced electrodermal responses when hearing or reading childhood reprimands ("Shame on you") or endearments ("I love you"). An explanation is that these familiar phrases have come to have conditioned associations to emotional responses. The current project examined jokes, which generate their emotional arousal conceptually, not through specific learned phrases. A common observation is that jokes are less humorous in L2. This could be due to cultural or translation problems, but may also implicate lack of connections between neural representations of L2 and the brain areas for processing emotion.
Participants and Methods: English foreign language learners (N=91) read jokes in L1-Turkish or L2-English and rated them for humor while skin conductance responses (SCRs) were monitored. The Turkish versions of the jokes had been selected to avoid jokes with puns and culturally specific information, and were translated into English by bilingual researchers. Jokes' syntax and vocabulary were also manipulated.
Results: Students rated the Turkish and English jokes as equally humorous, but Turkish jokes elicited larger SCRs than English jokes. This suggests that neural representations of L1 are more tightly connected to the brain's emotion areas. Jokes with higher humor ratings elicited larger SCRs, indicating that SCRs are sensitive to humor in this paradigm.
Conclusions: One mechanism for achieving this is that words and phrases in L1, compared to those in L2, activate a rich network of associations which include emotion concepts and memories that activate the brain's emotion processing centers.
Correspondence: *Catherine Caldwell-Harris, Ph.D., Psychology, Boston University, 64 Cummington St., Boston, MA 02215. E-mail: charris@bu.edu*

P. CLASEN & C.G. BEEVERS. Coherence of information processing biases in dysphoria: Attention, working memory, and inhibition.
Objective: Cognitive models of depression posit a coherence of mood congruent biases among informational processing systems underlying depression, including attention, working memory, and inhibition (e.g. Clark et al., 1999). A growing body of evidence demonstrates these biases among individual processing components (e.g. Gotlib et al., 2004;

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Bradley et al., 1995; Joormann et al., 2006). However, few studies have examined the coherence of biases between processing components (Koster et al., 2010; Ellis et al., 2010). We have developed a novel task to explore the coherence of mood congruent informational processing biases in depression.
Participants and Methods: Stable dysphoric and non-dysphoric undergraduate students perform the novel task. During each trial, participants view a series of probe stimuli pairs followed by a test stimulus. They are instructed to determine whether the test stimulus was present during the preceding set of probe stimuli pairs. Stimuli consist of neutral and sad faces. Test stimuli can be present (targets) or not present (distracters) in preceding probe pairs. Distracters can be completely novel (no inhibition required) or seen on previous probe sets (inhibition required). Responses to all test stimuli are recorded behaviorally and eye movements are recorded using eye tracking instruments. Working memory accuracy is based on responses to targets. An Inhibition index is based on false positive responses to previously seen distracters. Visual attention is operationalized by fixation duration for each probe stimulus.
Results: Preliminary testing points to the coherence of mood congruent information processing biases across attention, working memory, and inhibition processes among dysphoric individuals.
Conclusions: This novel task offers a new method of assessing the coherence of mood congruent information processing biases in depression.
Correspondence: *Peter Clasen, Psychology, University of Texas at Austin, 1 University Station, A8000, Austin, TX 78712-0187. E-mail: clasen@mail.utexas.edu*

M. ELIADES, I. BLANCHETTE & W. MANSELL. Emotional Contents and the Belief-bias Effect.
Objective: Deductive reasoning is highly influenced by our prior beliefs. Though this belief-bias effect has been robustly documented (Goel & Dolan, 2003), still little is known about how emotional contents affect this tendency to rely on beliefs instead of logic. We hypothesised that belief-bias effects would be more prominent in emotional compared to neutral conclusions.
Participants and Methods: We evaluated the logical validity and emotionality of believable and unbelievable categorical syllogisms in a sample of 64 women in three content categories: neutral, generally emotional and sexual abuse-related.
Results: The hypothesis was supported. Belief-bias effects were more prominent in the two emotional categories compared to the neutral category. Nevertheless, unbelievable items were even less likely to be endorsed when the contents were related to sexual abuse (compared to other contents), especially for logically valid conclusions.
Conclusions: Building on the 'affect-as-information' hypothesis (Schwarz & Clore, 1983), the value of unbelievable items was less emotional in the sexual abuse than the generally emotional category, possibly because of lack of personal experience with sexual abuse. Unbelievable sexual abuse items were associated with more logical fallacies, possibly because they were experienced as less salient.
References
Goel, V., & Dolan, R. J. (2003). Explaining modulation of reasoning by belief. Cognition, 87(1), B11-B22.
Schwarz, N., & Clore, G. L. (1983). Mood, Misattribution, and Judgments of Well- Being - Informative and Directive Functions of Affective States. Journal of Personality and Social Psychology, 45(3), 513-523.
Correspondence: *Marios Eliades, BSc. MRes. in Psychology, School of Psychological Sciences, The University of Manchester, Room H22, Coupland I Building, University of Manchester, Oxford Road, Manchester M13 9PL, United Kingdom. E-mail: Marios.Eliades@postgrad.manchester.ac.uk*

A. ELLIS, M. VANDERLIND & C. BEEVERS. Cognitive Control in Depression: Exploring Its Affect On Memory Processes.
Objective: Executive functioning deficits have been implicated in depression. In particular, depressed individuals have more difficulty inhibiting negative information. Thus, it is hypothesized that depressed individuals have less cognitive control of negatively valenced stimuli. This lack of control is thought to contribute to rumination, worry and other maladaptive thinking styles. The current study sought to explore the cognitive control of depressed individuals using an eye-tracking and free recall paradigm.
Participants and Methods: Depression status is based on clinical diagnoses of a current major depressive episode, according to the SCID interview. Using an eye-tracker, attention is assessed while completing a computer task where two personally relevant words are presented—one positive, one negative and differing in color (one red; one white). Participants are instructed to attend only to the word in RED, and told to IGNORE the word in white. Cognitive control is assessed using mean time attending to words. Following this task, a free recall task is given to assess differences in memory of the target and distractor words.
Results: Results indicate that depressed individuals are recalling more negatively valenced target words (red) and more negatively valenced distractor words (white) than non-depressed individuals. Further, eye-tracking results suggest that these differences are partially due to attention to negative distractors.
Conclusions: Results suggest that depressed individuals have greater difficulty controlling attention for negative material, and thus have better recall.
Correspondence: *Alissa Ellis, M.A., Psychology, University of Texas at Austin, 1 University Station A8000, Austin, TX 78712. E-mail: alissa.ellis@mail.utexas.edu*

A. DARGAN, A. FALCHOOK, J. WILLIAMSON & K. HEILMAN. Understanding Emotional Faces in Parkinson Disease.
Objective: The masked face is a core symptom of Parkinson disease (PD). Patients with PD have impaired ability to image and perceive emotional faces and this deficit correlates with their ability to express emotional faces. We hypothesized that because patient with PD have facial akinesia, they may fail to 'automatically' activate facial mirror neurons when they see an emotional facial expression. This may lead to impaired comprehension of facial emotion expressions in PD.
Participants and Methods: To test this hypothesis, 18 participants with PD were shown 25 pictures of emotional faces taken from the Florida Affective Battery. On some trials, the participants were asked to name the emotional faces while on other trials they were asked to mimic and then name the emotional faces. A test of prosopagnosia was also done to ensure that this was not present to interfere with facial emotional recognition.
Results: The mean number of correctly named emotional faces was 17.5/25 before mimic-name trials and 18.9/25 after mimic-name trials, this approached but did not reach statistical significance, one tailed p value = 0.063.
Conclusions: While these results did not reach statistical significance, they showed a trend that may become significant with a larger sample size. This pilot data suggests that voluntary activation of facial motor neurons may improve facial emotional comprehension in PD, but further research is needed.
Correspondence: *Adam Falchook, University of Florida, UF HSC, Dept of Neurology, Box 100236, Gainesville, FL 32610-0236. E-mail: Adam.Falchook@neurology.ufl.edu*

P. GROSSMAN & C. BRUMBAUGH. The Association Between Dysfunction in Affective Processing and Attachment Patterns in Adults.
Objective: Research has demonstrated an association between attachment patterns and overall affective function (e.g., Fraley et al., 2006). However, it remains unclear which particular affective functions are most strongly linked to attachment anxiety and avoidance and underlie this association. The present study aimed to elucidate the respective contribution of distinct affective functions to each of these attachment dimensions.
Participants and Methods: In addition to attachment style, measures of empathy, alexithymia, emotional intelligence, perception of facial expressions, and theory of mind were assessed in a sample of 475 undergraduates using questionnaires, visual tasks, and the Movie for the Assessment of Social Cognition (Dziobek et al.,2006) respectively.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: A correlation matrix revealed associations between a number of affective processing skills and the two attachment dimensions. Attachment anxiety was significantly correlated ($p<.01$) with higher levels of alexithymia ($r=.34$), lower levels of emotional intelligence ($r=-.42$),and lower levels of cognitive empathy ($r=-.20$). Attachment avoidance was significantly correlated ($p<.01$) with higher levels of alexithymia ($r=.33$), lower levels of emotional intelligence ($r=-.27$), lower levels of cognitive empathy ($r=-.23$), lower levels of affective empathy ($r=-.14$), and lower levels of theory-of-mind capacity ($r=-.13$).
Conclusions: Overall, both high attachment anxiety and high avoidance are linked to poorer affective processing skills. However, while avoidant individuals display lower theory of mind and lower affective empathy, anxious attachment is only associated with lower cognitive empathy rather than lower affective empathy or theory of mind. Integrating these results with previous research on the emotional components of attachment yields valuable insights into the development of affective dysfunction.
Correspondence: *Peryl Grossman, Psychology, Graduate Center, CUNY, Psychology Department Office, Room E318, Science Building, 6530 Kissena Blvd., Flushing, NY 11367. E-mail: perylgrossman@gmail.com*

G. PARK, M.W. VASEY, E. EGAN & J.F. THAYER. Effects of Heart Rate Variability on Top-down and Bottom-Up Processes Involved in Attentional Engagement and Disengagement for Fearful Faces at Broad, High, and Low Spatial Frequency.
Objective: In four different experiments, we examined individual differences indexed by heart rate variability (HRV) in attentional engagement and disengagement for fearful faces at broad, high and low spatial frequency in the spatial cuing task.
Participants and Methods: In each experiment, about 30 female undergraduate students at the Ohio State University were participanted. We used a 2 (HRV levels: high and low) X 3 (types of spatial frequency: broad, high, low) X 2 (cue valence: fearful and neutral) X 2(cue validity: valid and invalid) mixed design.
Results: When cues predicted the future location of targets with 80% accuracy at 300 ms SOAs, participants with low HRV that is associated with hyperactive amygdala activity showed significantly faster attentional engagement to fearful faces at low spatial frequency (LSF) and more delayed attentional disengagement from fearful faces at high spatial frequency (HSF) relative to participants with high HRV which represents highly functional prefrontal activity. However, with longer SOAs, 960 ms, faster attentional engagement to LSF fearful faces by low HRV participants disappeared although the difference between high and low HRV participants in attentional disengagement from HSF fearful faces became even stronger with time. When SOAs were significantly reduced to 100 ms, low HRV individuals demonstrated the inability to distinguish fearful from neutral faces and made undifferentiated responses across different spatial frequency types. By contrast, high HRV participants were faster to detect targets following HSF fearful, but slower after LSF fearful faces, which may indicate that prefrontal regions were reliably activated even at 100 ms SOAs to make situationally adaptive responses.
Conclusions: We proposed that HRV can be an important experimental measure that is highly sensitive to both top-down and bottom-up processes involved in emotional attention (Thayer et al., 2009a; Vuilleumier et al., 2009).
Correspondence: *Gewn hi Park, Ph.D., Psychology, Redeemer University College, 777 Garner Road East, Ancaster, ON L9K 1J4, Canada. E-mail: park.671@gmail.com*

G. PARK, M.W. VASEY & J.F. THAYER. Not All Fear Faces Are Created Equal: HRV Effects on Collicular and Cortical based IOR for Fearful Faces Created at Broad, High and Low Spatial Frequency.
Objective: Using fearful faces at broad, high and low spatial frequency, we examined heart rate variability (HRV) effects on fear-modulated inhibition of return (IOR).
Participants and Methods: Participants were 34 (26 females and 8 males) undergraduate students at the Ohio State University enrolled in Introductory Psychology courses. We used a 2 (HRV levels: high and low) X 3 (types of spatial frequency: broad, high, low) X 2 (cue valence: fearful and neutral) X 2(cue validity: valid and invalid) mixed design. HRV was a between-subjects factor, and types of spatial frequency, cue valence and cue validity were within-subject factors.
Results: Fearful faces at broad spatial frequency did not reduced IOR effects. However, IOR was reduced when fearful face cues were presented at low spatial frequency which is conveyed by the retinotectal pathway to the amygdala. High spatial frequency (HSF) information, associated with the parovocelluar pathway and prefrontal activity, also produced IOR, but fearful cues at HSF did not modulate it. Participants with low HRV which is associated with hyperactive amygdala activity resulting from the lack of prefrontal inhibition failed to demonstrate IOR effects in general (Thayer et al., 2009). Low HRV participants' ability to inhibit was more disruptive when fearful faces were presented at low spatial frequency which taps into the collicular based IOR (Sumner, 2006). By contrast, participants with high HRV which represents highly functional prefrontal inhibitory processes demonstrated a typical IOR effect, slower responses to targets following fearful and neutral cues in valid trials than to those in invalid trials (Thayer et al., 2009). High HRV participants' ability to inhibit fear information was even more pronounced when fear information is presented at high spatial frequency which taps into the cortical based IOR (Sumner, 2006).
Conclusions: HRV can be considered as an important experimental measure of inhibitory control of emotional processes.
Correspondence: *Gewn hi Park, Ph.D., Psychology, Redeemer University College, 777 Garner Road East, Ancaster, ON L9K 1J4, Canada. E-mail: park.671@gmail.com*

L. ISAAC, J. VRIJSEN, P. ELING, I. VAN OOSTROM, A. SPECKENS & E.S. BECKER. Verbal and Facial-Emotional Stroop Tasks Reveal Specific Attentional Biases in Experimentally Induced Dysphoria.
Objective: We investigated attentional processing for socially-salient images; emotional faces, in sad and happy induced moods. Considering the inherent information emotional faces convey concerning interpersonal evaluation, a topic of high relevance to depression, one can immediately fathom why we argue that emotional faces are critical. This study explored affective information processing of emotional and neutral stimuli across both verbal and visual domains.
Participants and Methods: The conventional, verbal-emotional and a novel facial-emotional stroop task were used to evaluate attentional biases in experimentally induced dysphoria. We employed an experimental mood induction technique to investigate differences between sad and happy mood groups in reaction times to mood-congruent (sad/angry), mood-incongruent (positive), and neutral stimuli. The sample consisted of 116 female university students with a mean age of 20.9 years. The age range from 18 to 22 encompassed 91 (78.4%) of the 116 subjects randomly divided into two groups (sad and happy) of 58 each. Mood ratings following induction differed significantly between the two groups at both post-mood induction 1 and 2 ($p = <.001$) with differences in the direction consistent with the mood valence inductions.
Results: Results revealed the sad mood group reacted slower to 4 stimuli: Female Angry Face ($p = .001$), Male Angry Face ($p = .001$), Female Neutral Face ($p = .049$), and Verbal Depressed words ($p = .001$). Verbal emotional processing is selective for self-esteem threatening material (e.g. failure) whereas facial-emotional processing is selective for socially-rejecting and disapproving stimuli (angry faces). Longer reaction times for neutral faces is suggestive of an interpretation bias that neutral faces are not perceived as ambiguous emotional expressions.
Conclusions: With this increased specificity, emotional attentional capture in depression offers greater explanatory value for the maintenance of interpersonal and self-esteem complaints in this affective disorder.
Correspondence: *Linda Isaac, PhD, Radboud University, Montessorilaan 3, Nijmegen 5613 SB, Netherlands. E-mail: L.Isaac@psych.ru.nl*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

M. JERRAM, A. HERNANDEZ-VALLANT, T. SUSMARAS & D. GANSLER. Neural Correlates of Emotional Agency.

Objective: This study investigated the neural correlates of the theoretical construct of emotional agency as a dimension of emotion. Agency, sometimes referred to as dominance or potency, is best described by the perceived sense of control that a stimulus elicits in a certain emotional context. It was hypothesized that high and low agency would be differently related to brain activation.

Participants and Methods: Eight right-handed male control participants were sampled from the community (age range= 20 -35). FMRI scans were acquired in a 3T MRI scanner and each participant underwent three 5-minute runs during which IAPS images chosen based on previously published agency rating (high or low) were presented in a block design format. Analysis was conducted in SPM 8.

Results: There were foci of statistically significant difference between high and low agency conditions. Specifically, when examining the high>low agency contrast, significant clusters were observed in the precuneus (MNI coordinates: -32, -72, 36 and -8, -70, 22) and middle frontal gyrus/frontal pole (MNI coordinates: -42, 14, 54 and -36, 60, 6). No significant clusters were observed for the low>high agency contrasts.

Conclusions: These results support the conception of agency as a dimension of emotion by demonstrating activation of distinct brain regions in response to high agency emotional stimuli. Previous research has suggested that the precuneus is related to self-perception, consciousness and sensory integration and the middle frontal gyrus is related to episodic memory retrieval and contingency awareness. Processes related to both areas are consistent with agency as an assessment of personal control of and within a specific emotional context.

Correspondence: *Matthew Jerram, Ph.D., Psychology, Suffolk University, 41 Temple Street, Boston, MA 02114. E-mail: mjerram@suffolk.edu*

V. LA BUISSONNIÈRE ARIZA, J.R. SÉGUIN, M. PELLETIER, P. RAINVILLE, M. BOIVIN, D.S. PINE, F. LEPORE, R.E. TREMBLAY & F. MAHEU. Harsh Parenting and Neural Fear Circuitry Function in Anxious and Healthy Youths: A Pilot Study.

Objective: Adverse care-giving may increase risk for anxiety disorders that may persist throughout the lifespan (Pine, 2003).This could reflect anomalies in the "fear" circuit, a neural system including the amygdala and subgenual anterior cingulate cortex (sgACC). Fear conditioning and extinction tasks are the most frequently used paradigms to assess fear circuitry function. Recent fMRI studies reported altered patterns of fear circuitry responses during fear conditioning and extinction in adults with anxiety and childhood maltreatment (Milad et al., 2006). We aim to use fMRI fear conditioning and extinction tasks to examine fear circuitry function related to anxiety and adverse rearing in youths.

Participants and Methods: Subjects: 120 youths aged 12-17 split in 4 groups according to anxiety and mother's harsh parenting practices levels.

Tasks: Valid fMRI fear conditioning and extinction tasks.

Data acquisition: Fear responses indexed by subjective ratings of nervousness and skin conductance responses (SCRs). Functional scans acquired with a Siemens TRIO 3-T.

Results: Preliminary analysis were done to examine conditioning and extinction effects. Subjects were more nervous (N=26; T=3.91, p=.0006), had a trend for greater SCRs (N=12; T(4)=1.46, Puncorr.=.09) and showed greater right amygdala activation (N=22; T=4.00,Puncorr < 0.001) to conditioned vs. neutral stimulus during conditioning. During extinction, subjects were overall less nervous (p.<.0001) but still more nervous to conditioned vs. neutral stimulus (T=2.34, p=.03), showed no significant difference in SCRs and had greater left amygdala (T=2.57,Puncorr < 0.01) and right sgACC (T=3.10, Puncorr < 0.01) activation to conditioned vs. neutral stimulus.

Conclusions: These findings show the amygdala's implication in conditioning and extinction and the sgACC's implication in extinction and underline the efficiency of the nervousness ratings and SCRs in successfully indexing fear responses.

Correspondence: *Valérie La Buissonnière Ariza, Psychology, Université de Montréal, C.P. 6128, succursale Centre-Ville, Montréal, QC H2V 2S9, Canada. E-mail: valeja.lba@gmail.com*

R.C. MCINTOSH, J.L. TARTAR, M. ROSSELLI & A.J. NASH. Emotional Dysfunction in Women with HIV: An ERP Analysis.

Objective: The aim of the present study was to investigate self-report measures of functional mood and electrophysiological measures of spontaneous emotional response (SER) in women infected with HIV.

Participants and Methods: Participants (16 asymptomatic/symptomatic HIV+ women and 13 healthy controls) were exposed to 150 neutral and 150 negatively valenced IAPS images. The magnitude of the SER was operationalized as the difference in late positive potential mean amplitude (LPP) between neutral and unpleasant IAPS images. These event related potentials (ERPs) were recorded from the parietal electrode location (Pz). The State and Trait Anxiety Inventory (STAI) and Beck's Depression Inventory (BDI-2) were used to assess mood.

Results: Results indicate that between HIV+ and HIV- women there was a significant difference in levels of depression $F(1,32) = 4.46$, $p<.05$; trait anxiety $F(1,33) = 6.58$, $p<.05$; and spontaneous emotional response $F(1,24) = 19.68$, $p<.001$. During the picture presentation task HIV+ women were observed to rate less IAPS images with negative valence than healthy controls $F(1,23) = 5.94$, $p <.05$; and further indicated a blunted emotional response to graphic material e.g. violent scenes, mutilations. Correlations were not found between the magnitude of SER and self-report measures of anxiety and depression.

Conclusions: This study provides psychophysiological evidence which suggests emotional processing may be dysfunctional in early stages of HIV infection. HIV-positive women face a number of psychological, physical and emotional stressors as a result of living with the disease. The reduction in LPP which was observed may reflect adaptive mechanisms used by HIV-positive women to reduce the intensity of a high-arousal negative material or perhaps be a manifestation of CNS impairment in emotional processing as a result of HIV.

Correspondence: *Roger C. McIntosh, M.S. M.A., Psychology, Florida Atlantic University, 2912 College Ave., Fort Lauderdale, FL 33314. E-mail: rmcinto5@fau.edu*

S.M. MCMANUS, D.L. ROBINS, T.B. ERIN & D.A. WASHBURN. Gaze Fixation Patterns During Emotion Identification and Congruence Tasks.

Objective: During emotion perception, typically developing (TD) individuals look significantly more towards the eyes than towards other parts of the face (Pelphrey et al., 2002; Walker-Smith et al., 1977). In speech perception tasks, in contrast, fixations are significantly closer to the mouth (Buchan et al., 2007). This study contrasted gaze behavior for dynamic audio-visual emotion stimuli during emotion identification and congruence judgment tasks.

Participants and Methods: TD adults (n=51) completed two forced-choice tasks requiring emotion identification or congruence judgments. Fixation duration was examined across two core facial regions (eyes, mouth).

Results: For both congruent and incongruent movies, fixation duration was greater for eyes than mouth, $F(1,50)=22.40$, $p<.001$, $\mu_p^2=.309$ and $F(1,50)=21.32$, $p<.001$, $\mu_p^2=.30$, respectively. The main effect of task was significant for incongruent ($F(1,50)=6.00$, $p=.02$, $\mu_p^2=.11$) but not congruent movies ($p=.92$). There was a significant Task x Region interaction for incongruent movies; greater difference between eye and mouth regions was found during emotion judgments, $F(1,50)=4.11$, $p<.05$, $\mu_p^2=.08$. The interaction was not significant for congruent movies ($p=.33$).

Conclusions: Fixation patterns that emerged during incongruent prosodic information appeared to vary as a function of task instructions. During an emotion judgment task, participants fixated most frequently on the eyes, a region considered to be the most salient visual affective source. In contrast, fixations on eye and mouth regions were compara-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ble when congruence judgments were required. These results expand previous knowledge about emotion perception and the importance of the eyes for reading emotion cues. Additionally, they provide researchers and clinicians a foundation from which to explore social deficits in clinical populations.

Correspondence: *Susan M. McManus, MA, Psychology, Georgia State University, PO Box 5010, Atlanta, GA 30302. E-mail: smcmanus1@student.gsu.edu*

G.G. POTTER, D.R. MCQUOID & D.C. STEFFENS. Heterogeniety in Late Life Depression and Differential Prediction of Neuropsychological Deficits.

Objective: Heterogeneity in the symptoms and etiologies of late-life depression may have differential effects on neuropsychological performance. Single depression measures are inadequate to capture this heterogeneity, and information from multiple sources is needed to identify coherent and neuropsychologically relevant dimensions of depression. The current study examined 3 widely used depression scales (MADRS, Hamilton-17, CES-D) and a subset of items from a validated diagnostic interview in order to better characterize the association between symptom dimensions and neuropsychological deficits in late life depression.

Participants and Methods: Adults age 60+ with a diagnosis of Major Depressive Disorder completed diagnostic and neuropsychological assessments at baseline enrollment in a depression treatment study. Neuropsychological assessment included verbal memory, nonverbal memory, language, praxis, executive functions, and information processing speed.

Results: We identified 2 manifest depression constructs with high internal consistency (functional disability and perceived social support) and 3 latent depression constructs based on factor analysis (sadness/anergia, low positive affect/anhedonia, and sleep disturbance). Neurocognitive deficits were found across multiple domains in association with higher self report of functional disability. Higher sadness/anergia followed a similar pattern predicting multiple neurocognitive deficits, but with smaller effects. The remaining dimensions were weak and inconsistent predictors of neuropsychological performance.

Conclusions: Functional disability (i.e., difficulty completing instrumental daily activities) is an underecognized but essential dimension in the neuropsychological assessment of late life depression. Along with the sadness/anergia dimension, functional disability may reflect a specific subtype or etiology of late life depression, and the association with neuropsychological deficits raises concern about adverse outcomes in the absence of intervention.

Correspondence: *Guy G. Potter, Ph.D., Psychiatry and Behavioral Sciences, Duke University Medical Center, Box 3903, Duke University Medical Center, Durham, NC 27710-3903. E-mail: guy.potter@duke.edu*

J. SALTER, S. SMITH & K. ETHANS. Emotional Decision-Making in Patients with Spinal Cord Injuries.

Objective: The somatic marker hypothesis states that visceral feedback from the body influences cognitive processing in the brain. Indeed, patients with damage to areas receptive to somatic information show impaired performance on emotional tasks such as the Iowa Gambling Task (IGT). However, recent research suggests that performance on this task may reflect deficits in reversal learning rather than in receptivity to afferent somatic feedback. The current research examines this issue by assessing (1) whether complete spinal cord injured (SCI) patients with damage above or below the level of autonomic inputs (T5/T6) show impaired emotional decision-making, and (2) whether the degree of this impairment differs across neuropsychological tasks. [105]

Participants and Methods: Thirty-eight patients with complete injury of the spinal cord (24 patients with SCI damage above T5 and 14 patients with damage below T5) and healthy controls were tested. All participants completed two measures of emotional decision-making: (1) the IGT, which is not sensitive to somatic markers, and (2) the Balloon Analogue Risk Task (BART), a gambling test in which responses are generally made based on a 'gut feeling' (i.e., sensitive to somatic markers). [73]

Results: As predicted, SCI patients and controls did not differ on the Iowa Gambling Task. In contrast, SCI patients showed greater levels of risk-taking on the BART, although the level of spinal injury (above or below T5/T6) did not significantly affect the results. [42]

Conclusions: The current research provides tentative support for the somatic marker hypothesis. These data also demonstrate that different neuropsychological measures of emotional decision-making are more reliant on such markers than others. [30]

Correspondence: *Jennifer Salter, MSc., MD, Physical Medicine and Rehabilitation, University of Manitoba, 266 Aubrey St, Winnipeg, MB R3G2J2, Canada. E-mail: salterje@hotmail.com*

K.R. SAVAGE, T.E. MYERS, E.B. TEAGUE, E.P. MELTZER & J.C. BOROD. He Said, She Said: Sex Differences in Emotional and Cognitive Empathy.

Objective: In accordance with prevailing sex-role stereotypes, research has suggested that women view themselves as more empathic than men, a finding that has been attributed to the demand characteristics of self-report measures. However, empathy is a multi-dimensional construct, composed of both cognitive and emotional aspects, and previous research examining sex differences has not differentiated between these components. This study examines sex differences in empathy using a multi-dimensional measure.

Participants and Methods: Empathy was measured in 56 healthy women (mean age=22.0±6.9) and 31 healthy men (mean age=20.8±4.5) using the Cognitive and Emotional Empathy Questionnaire (CEEQ; Rogers et al., 2008), a self-report questionnaire with two cognitive subscales (Mental State Perception, Perspective Taking) and two emotional subscales (Mirroring, Empathic Concern). The Crowne-Marlowe Scale (CMS) was used to assess sex differences in the endorsement of socially desirable responses. Sex differences were examined using independent samples t-tests.

Results: Results showed that women scored significantly higher than men on the CEEQ emotional subscales (Empathic Concern, p=.003; Mirroring, p=.003). No significant sex differences were observed on cognitive subscales (Mental State Perception, p=.125; Perspective Taking, p=.124) or the CMS (p=.728).

Conclusions: Women scored higher than men on emotional empathy measures, but there were no sex differences on cognitive empathy measures. Sex differences were not observed on the social desirability scale, suggesting that demand bias was not a factor in these findings. Results underscore the importance of multi-dimensional approaches to studying empathy and could have implications for the understanding of brain organization and for the assessment of neuropsychiatric populations with known empathic deficits (e.g., Autism Spectrum Disorders).

Correspondence: *Kimberley R. Savage, M.A., Psychology, Queens College and the Graduate Center of the City University of New York, 65-30 Kissena Blvd., Flushing, NY 11367. E-mail: kim.r.savage@gmail.com*

Z.J. SCHWAB, M.R. WEINER, S.L. RAUCH & W.D. KILLGORE. Cognitive and Emotional Intelligences: Are they Distinct or Related Constructs?

Objective: Emotional intelligence (EI), the ability to accurately perceive, understand, and manage emotional information to guide decision-making, is proposed to be a distinct construct, unrelated to personality or traditional cognitive intelligence (IQ). Despite widespread claims that indices of EI, such as the BarOn Emotional Quotient Inventory (EQ-i) and Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) are unrelated to IQ, there are no published studies correlating EI measures with the gold standard Wechsler scales of intelligence. We hypothesized that 1) EQ-i and MSCEIT would be correlated with one another, 2) EQ-i would correlate with personality but not IQ, and 3) the MSCEIT would correlate with IQ but not personality.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Thirteen healthy adults (7 females) ranging from 19 to 45 completed the MSCEIT, EQ-i, Revised NEO Personality Inventory (NEO), and the Verbal (VIQ), Performance (PIQ), and Full (FSIQ) scales of the Wechsler Abbreviated Scale of Intelligence (WASI). Data were analyzed with bivariate correlation and stepwise linear regression (alpha=.05).
Results: MSCEIT and EQ-i were significantly correlated (r=0.62). The EQ-i correlated with FSIQ (r=0.74), VIQ (r=0.69), PIQ (r=0.72), Neuroticism (NEO-N) (r=-0.83), and Openness (NEO-O) (r=0.64). MSCEIT correlated with FSIQ (r=0.74), VIQ (r=0.67), PIQ (r=0.74), and NEO-O (r=0.71). In the regression analysis, MSCEIT was predicted by PIQ only (R=0.74). The EQ-i was significantly predicted by a linear combination of VIQ and NEO-N (R=0.92).
Conclusions: Contrary to the theoretical claims of EI, we find a significant correlation between measures of EI and IQ. As predicted, however, EQ-i shared significant variance with personality variables, and to a lesser extent, verbal IQ, whereas MSCEIT was most related to performance IQ. The findings clarify our understanding of emotional intelligence, showing that the two major models share significant common variance, but are each predicted by unique combinations of cognitive ability and personality.
Correspondence: *Zachary J. Schwab, BS, Neuroimaging Center, McLean Hospital, 115 Mill St., Belmont, MA 02478. E-mail: zschwab@mclean.harvard.edu*

D.J. CROWLEY, M.J. COVELL, W.D. KILLGORE, Z.J. SCHWAB, M.R. WEINER, D. ACHARYA, I.M. ROSSO & M.M. SILVERI. Differential Influence of Facial Expression on Inhibitory Capacity in Adolescents versus Adults.
Objective: Adolescence is a time of notable alterations in cognitive functioning, including significant gains in behavioral self-control and an improved ability to ascribe emotional significance to stimuli. In the present study, we examined age differences in response inhibition using a Go No Go behavioral paradigm, which required subjects to respond or inhibit responding based on threat or safety cues present in the expression of facial stimuli.
Participants and Methods: Subjects were first required to respond (Go) to safe faces while inhibiting responding (No Go) to threatening faces, and then to respond (Go) to threatening faces and inhibit responding (No Go) to safe faces. Percent accuracy data for Go and No Go trials were acquired from 32 subjects, 19 adolescents aged 13.5 ± 0.9 years and 13 adults aged 33.8 ± 9.4 years.
Results: Adults exhibited significantly better accuracy, on both Go and No Go trials, when safe faces were presented (93% and 92%, respectively) compared to when threatening faces were presented (76% and 81%, respectively). While adolescents also exhibited significantly better accuracy for safe faces than for threatening faces, this pattern was only observed on Go trials (93% for safe faces and 84% for threatening faces). In contrast, adolescents performed significantly worse than adults on No Go trials, regardless of facial expression (61% for safe faces and 56% for threatening faces).
Conclusions: These findings suggest an age-related influence of facial expression on inhibitory capacity. Consistent with previous reports, adolescents in the present study demonstrated worse inhibitory control than adults. These data also indicate that while facial expression does not influence response inhibition in adolescents, the presence of a safe stimulus serves to enhance inhibitory capacity in adults. Thus, developmental changes in the ability to discriminate and utilize social information may contribute to improvements in inhibitory capacity with age. Supported by K01AA014651 & R01AA018153 (MMS).
Correspondence: *Marisa M. Silveri, PhD, Psychiatry/Brain Imaging Center, Harvard Medical School/McLean Hospital, Brain Imaging Center, McLean Hospital, 115 Mill St., Belmont, MA 02478. E-mail: msilveri@mclean.harvard.edu*

C. YAN, R. CHAN, X. CAO, Y. WANG & J. ZONG. Do Individuals with Schizotypal Personality Disorder Reflect Problems on Affective Experience and Motivation? A Preliminary Behavioral Study.
Objective: Affective experience can be separated into two distinct components: anticipation and consummation. Despite substantial studies have shown there is a link between problems of affect and schizotypal personality features, little is known about whether individuals with schizotypal personality disorder (SPD) may have problems on these two affect components. Motivation as a key factor to anticipatory affect is also rarely examined in SPD. The current study was designed to investigate motivation and experience of anticipatory and consummatory affect in SPD, and the potential relationship of these two affect components to schizotypal personality features in these individuals.
Participants and Methods: Forty-eight participants (28 non-SPD and 20 SPD individuals) were administered with the Monetary Incentive Delay task (MID) and a battery of neuropsychological tests. They were also required to complete a checklist predicting their affect before the administration of the MID. Moreover, a set of scales were administered to all the participants in order to evaluate the hedonic capacity and motivation.
Results: Participants with SPD self reported significantly more problems on their affect and motivation than the non-SPD participants. For MID, SPD participants demonstrated higher level of negative affective experience (anticipatory and consummatory) than non-SPD participants in the punishment condition. The high level of negative affect in the punishment condition was significantly related to the elevated level of interpersonal disturbance. However, SPD participants did not demonstrate impairment of motivation in MID task.
Conclusions: These findings suggest that individuals with SPD are sensitive to punishment and support for negative affective disturbance as a potential indicator of SPD.
Correspondence: *Chao Yan, Institute of Psychology, Chinese Academy of Sciences, 4A Datun Road, ChaoYang District, Beijing, China, Beijing 100101, China. E-mail: kiki0478@hotmail.com*

Learning Disabilities/Academic Skills

J.G. ALOIA, K. WARD, S. PASHA, J. RIORDAN & K. VOELLER. Improvements in Rapid Naming Following Intensive Intervention in Phonological Awareness.
Objective: Rapid naming (RN) has been defined as a component of phonological awareness (PA), but has also been defined as an independent skill. We sought to examine whether intervention designed to improve PA would also improve RN.
Participants and Methods: Forty-one subjects (6-24 years) underwent PA and RN testing prior to beginning intensive treatment and again following intervention.
Results: Results of a paired t-test revealed that PA improved from pre- to post-testing (t = -5.128, p =.000), with 93% of participants performing at or above baseline testing. Results of a paired t-test also revealed that RN improved from pre- to post-testing (t=-3.735, p=.001); however, 27% of participants performed below baseline testing. Using a median split to define groups as "improvers" versus "non-improvers", results of a paired t-test indicate that baseline RN scores were significantly different (t = 3.262, p = .003), with "improvers" beginning intervention performing, on average, two standard deviations below the mean, while "non-improvers" performed at the mean on RN.
Conclusions: While results suggest that changes in RN following intervention for PA might be due to regression to the mean, average post-test scores for "improvers" were more than a full standard deviation above pre-test scores. Findings suggest another variable is moderating this improvement. Group comparisons did not reveal significant differences on demographic variables or length of intervention. While this is a clinical case series and findings are limited by lack of inclusion of a control group, results suggest that a moderating variable is contributing to whether RN improves following intervention on PA. Additional studies are underway to examine moderating variables.
Correspondence: *Jill G. Aloia, Ph.D., Western Institute for Neurodevelopmental Studies and Interventions, 2501 Walnut St., Suite 102, Boulder, CO 80302. E-mail: jaloia@winsi.net*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

B. COLEMAN, H. SHROEDER, A. WONG, W. BROWN, L. HUMPHREY, B. SIMON & S.D. MARION. An Investigation of Reading Disability Subtypes in Interhemispheric Function.

Objective: Previous research has shown bimanual coordination to be strongly linked to reading performance in a sample of children with dyslexia. Similarly, interhemispheric transfer time has been shown to be slower in adults with "phonological" dyslexia. The current study investigated the relationship between interhemispheric function and reading across dyslexic readers sub-typed into those with a single or double-deficit (i.e., rapid naming plus phonological deficits). We predicted that bimanual coordination would be more closely related to reading in those with a double-deficit.

Participants and Methods: 30 reading disabled children were grouped into two subtypes—single-deficit (phonological processing or rapid automatized naming) or a double-deficit (displaying both)—based on reading performance. Groups were compared on cBCT performance. Additionally, the relationship between reading and cBCT performance was compared across groups.

Results: Compared on cBCT performance alone, no significant differences were observed between groups. However, the relationship between performance on reading measures and cBCT was found to be significantly different across groups (RAN, $t=2.61$, $p=.01$; GORT Passage, $t=3.78$, $p=.001$; Woodcock-Johnson Letter-Word, $t=2.23$, $p<.05$), with the double-deficit group capturing significantly more variance.

Conclusions: Results indicate that reading performance and bimanual coordination were more closely related in those with both rapid naming and phonological deficits. Thus, the presence of a second deficit was shown to increase the prediction of interhemispheric dysfunction. Although these results inform the debate of whether rapid naming is distinct in reading, the more important finding is that reading performance is tightly linked to the rapid, on-line transfer of information across the hemispheres in children with profound reading deficits.

Correspondence: *Benjamin Coleman, Fuller Theological Seminary, 450 S. Los Robles Ave. #7, Pasadena, CA 91101. E-mail: benpcoleman@gmail.com*

D. COOPER, R. PERNA & A. JACKSON. Early Developmental Delays: Neuropsychological Sequelae and Subsequent Diagnoses.

Objective: Children referred for neuropsychological evaluations may have had motor or language delays as toddlers. Research suggests those early delays increase the risk of subsequent cognitive or academic problems; however, the exact relationship is unclear. Our hypothesis is that children who have suffered early developmental delays in speech acquisition or motor movement will have more impaired cognitive and academic scores and subsequent diagnoses.

Participants and Methods: Children (N =49) completed a neuropsychological evaluation battery and were dichotomized based on documented history of developmental delays (19 had no delays, 30 had delays). The delayed group and non-delayed groups were similar in age (12.4 vs. 10.3), and gender (68% vs. 70% male), but not Full Scale IQ 97.8 (11.9) vs. 86.2 (13.9). Data was coded for current diagnoses; ADHD, Learning Disorders, and presence of a behavioral (ODD, CD, Disruptive Behavioral Disorder) or affective disorder.

Results: ANCOVA (controlling for FSIQ), comparing the groups, found significant differences ($p<.01$) only on CMS visual immediate and delayed (97.0/84.7 and 99.8/81.8). Neither group had any test score < ±1 standard deviation below IQ. Chi-squares found no significant group difference in diagnosis of behavioral or affective problems, LD Reading, LD Math, but significant differences [X^2 (1) =3.69, $p<.05$] in ADHD diagnosis (64% vs. 87%).

Conclusions: Data supports a visual memory weakness and a higher incidence of ADHD in delayed children. In some individuals the delays may result in cerebral dysfunction that manifests differently over time in different children – possibly beginning to generally manifest in early adolescence.

Correspondence: *David Cooper, MA, WestSide NeuroRehabilitation Services, Goodwill Industries of Northern New England, 618 Main St., Lewiston, ME 04240. E-mail: dccooper@gmail.com*

N. CROCKER, E.P. RILEY & S.N. MATTSON. Contribution of Working Memory and Visuospatial Function to Mathematics Achievement in Children with Heavy Prenatal Alcohol Exposure.

Objective: Fetal alcohol spectrum disorders are associated with a range of neurobehavioral consequences including academic difficulties. Mathematics has emerged as a specific area of weakness, though little is known about the nature of these deficits. To evaluate processes that underlie mathematics difficulties, the current study examined the relationship between mathematics, working memory (WM) and visuospatial function (VS) in children with heavy prenatal alcohol exposure (ALC) and controls (CON).

Participants and Methods: 62 children (32 ALC, 30 CON) were administered measures of global mathematics achievement (WRAT-3 Arithmetic & WISC-III Written Arithmetic), WM (WISC-III Digit Span and Spatial Span), and VS (CANTAB Spatial Recognition Memory (SRM) and Pattern Recognition Memory (PRM)). Groups were similar on age, SES, sex, race, ethnicity, and handedness.

Results: The ALC group had lower FSIQ scores (M=87) than the CON group (M=108). WM and VS data were analyzed for each mathematics measure using hierarchical linear regression. WM and VS data were entered on step 1 followed by group on step 2, and the interaction terms on step 3. Model 1 (WM and VS) accounted for a significant amount of variance in mathematics (WRAT-3 $R^2=.503$, $p<.001$; WISC-III $R^2=.613$, $p<.001$), however, model fit improved with the addition of group on step 2 (WRAT-3 $\Delta R^2=.053$, $p=.014$; WISC-III $\Delta R^2=.037$, $p=.018$). The interaction terms did not account for additional explained variance. Significant predictors of mathematics abilities were WISC-III Spatial Span forward and backward and SRM.

Conclusions: These findings suggest that while specific aspects of WM and VS account for mathematics performance in our sample, prenatal alcohol exposure is associated with additional deficits in mathematics achievement. Understanding mechanisms of mathematics difficulties in children with heavy prenatal alcohol exposure will allow for academic interventions tailored specifically for affected individuals.

Supported by NIAAA Grants R01 AA010820 and R01 AA010417.

Correspondence: *Nicole Crocker, MA, Psychology, SDSU/UCSD Joint Doctoral Program in Clinical Psychology, 906 21st Street Apt 7, San Diego, CA 92102. E-mail: ncrocker@projects.sdsu.edu*

N. DAVIS, T. LEVINE, S. RIMRODT & L.E. CUTTING. Reading Intervention for Children with Neurofibromatosis Type 1.

Objective: Children with Neurofibromatosis Type 1 (NF-1) have a high incidence of learning disabilities, including reading disabilities. A central question is whether children with NF-1 with reading disabilities (NF+RD) respond similarly to intervention approaches proven to be effective for those with idiopathic reading disabilities (IRD).

Participants and Methods: To examine this issue, 32 children with reading disabilities (NF+RD, N=11 or IRD, N=21) were randomly assigned to one of two interventions, both of which focused on building word-level skills using systematic alphabetic approaches, but in different ways. Growth in reading skills for the two groups was contrasted with those of skilled readers (Controls, N=25) as well as those with IRD that were placed in a Wait List (IRD-WLC; N=12) group.

Results: Results indicated that both the NF+RD and IRD groups responded to intervention, with both showing statistically significant gains in reading as compared to Controls and IRD-WLC groups ($p<.04$). When growth in reading during tutoring over four timepoints (0, 5, 10, and 15 hours of tutoring) was compared between the NF+RD and IRD groups, results indicated significant growth between timepoints ($p<.001$), but no difference between the groups ($p=.87$).

Conclusions: Findings suggest that children with NF+RD respond to similar types of reading interventions known to be effective with IRD groups. However, the degree to which one intervention approach may be superior to another for NF+RD versus IRD is currently under exploration.

Correspondence: *Nicole Davis, Vanderbilt University, PO Box 330674, Nashville, TN 37203. E-mail: Nikki.Davis@Vanderbilt.edu*

WITHDRAWN

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

B. DIUK & M. FERRONI. Letter Knowledge And Letter Learning In Children From Low-Income Backgrounds.
Objective: Previous studies have shown that low-income children who experience reading difficulties tend have reduced alphabetic knowledge, even when compared to reading level controls (Diuk & Moras, 2009). In this study, letter knowledge and letter learning was explored in children growing in poverty in Argentina at the end of kindergarten.
Participants and Methods: 54 children from two classes in a parrochial school attending children growing in poverty were given tests of phonological sensitivity, rapid naming of objects, visual memory, verbal memory and letter-name and letter-sound recognition and reproduction. An experimental situation was adapted from Levin, Astil-Carmon and Asif-Rave (2006) in order to explore learning of unknown letter names (greek letters with psudonames).
Results: Regression analyses showed that the best predictors of letter knowledge were phonological sensitivity and verbal memory, while letter learning in the experimental situation was predicted by phonological sensitivity and RAN.
Additional analyses were carried out comparing children with high and low letter-knowledge. Several studies have identified Matthew Effects in reading in low-income children, so children with low letter-knowledge before entering school can be considered at-risk for reading difficulties. Statistically significant differences between groups were found for all tasks but effect sizes varied considerably. While tests of letter knowledge displayed effects in a range of .70 - .85, size effects in the rest of the tasks were around .50.
Conclusions: Since letter knowledge is strongly related to educational and home experiences, these results may be pointing to the importance of not only cognitive but also experiential variables in establishing individual differences between children.
Correspondence: *Beatriz Diuk, CONICET - UNSAM, Av Alvarez Jonte 5622, Buenos Aires 1407, Argentina. E-mail: beadiuk@gmail.com*

S. FAN & S. TSENG. Transformation of Spatial Representation Deficits in two Cases with NVLD.
Objective: Nonverbal Learning Disability (NVLD) is a subtype learning disability which the underlying cause of a child's learning difficulties is believed to be a generalized weakness in the ability to cognitively process nonverbal information. Clinical manifestations of NVLD are well known their spatial ability might be difficult in the daily life. However, the neuropsychological of transformation of spatial representation ability is rarely mentioned.
Participants and Methods: Two boys presented with symptoms of memory and attention problem. NVLD was classified by school teacher conducted NVLD symptoms assessment. Cognitive and neuropsychological tests conducted by clinical psychologist, including the Wechsler Intelligence Scale for Children (WISC-IV) and NEPSY-II, respectively, were performed.
Results: On the WISC-IV, two children functioned intellectually in the average range although they both did particularly poor in block design and reasoning requiring perceptual-reasoning ability. The results of the NEPSY-II revealed that the patient had neurocognitive deficits within transformation spatial representation. Especially in processing visuoconstructional skills in two-dimensional and facial expressions related involvement of visual-spatial skills and affective recognition with the revealed clinical observation of problem with visual-spatial and social cognition aspects of daily life events.
Conclusions: Previous literature reported that individuals with NVLD were characterized by a pattern of global deterioration of visual-spatial functioning. However, our study to analysis with NVLD presented with local spatial processing neuropsychological deficits in spatial localization functioning at the beginning of the visual process, suggesting the presence of local processing difficult might be key to the spatial transform of facial expression in individuals with NVLD.
Correspondence: *Shengfen Fan, Master, Physical Medicine and Rehabilitation, Taipei Medical University Hospital, No.252, Wu-Xin street, Taipei 110, Taiwan. E-mail: dexterfan@hotmail.com*

A.F. HERNANDEZ. Identifying Rates of Reading Remediation between Bilingual and Monolingual School-Age Children.
Objective: This study aimed to investigate the differential rates of remediation of reading disorders in children with either a language based or a specific reading learning disability as a function of bilingualism.
Participants and Methods: One hundred and twenty children aged 6 – 12 years from a population-based sample were followed up either as pertaining to a bilingual (Spanish – English) cohort or to a monolingual cohort.
Results: Results showed that bilingual children with either a language based or a specific reading disability had poorer remediation, as measured by the Woodcock-Johnson Achievement Battery, in reading, reading comprehension, and spelling scores in relationship to the monolingual cohort. Race, socioeducational, and socioeconomic factors were controlled for. Further, the bilingual group had significantly poorer rates of remediation when in comparison to the previously established American remediation rates for these disorders.
Conclusions: We interpret these differential rates of improvement as representing deficiencies in both effective early diagnosing and effectiveness of the available reading remediation programs specifically for the bilingual population.
Correspondence: *Amado F. Hernandez, Ph.D., CESTA, 203 Washington St. #141, Salem, MA 01970. E-mail: drfrankhernandez@gmail.com*

R.B. MARTIN, S. CHOMPSKI, P. OGU, A. ABEDI & P.T. CIRINO. The Role of Non-symbolic and Symbolic Estimation and Comparison in Computational Ability in Adults.
Objective: While number sense is studied in children, less research focuses on its role in computation for adults. Our primary goal is to investigate the properties of new tasks of symbolic and non-symbolic estimation and comparison. A secondary goal is to determine the tasks' utility in predicting calculation skills. We expect significant relationships even in the context of cognitive and academic predictors.
Participants and Methods: Participants were college undergraduates (N = 47). Derived measures included accuracy and/or response time variables from computer tasks that assessed non-symbolic estimation and comparison, and symbolic comparison, as well as addition and subtraction fact retrieval. Students completed WJ-III academic measures of math and reading competence and fluency, and cognitive assessments of phonological processing and spatial rotation. Regression analyses examined the contributions of these measures to calculation ability.
Results: Number tasks performance was as expected, with high accuracy but greater variability of response time. The numeric tasks were significantly predictive of WJ-III Calculations, $F(7,38) = 2.72$, $p = .02$, but cognitive variables were not, $F(2,44) = 2.63$, $p = .08$. Measures of math and reading fluency, and word reading, were predictive, $F(3,43) = 6.96$, $p = .001$. When different types of predictors were considered together utilizing backward selection, the final model was strongly predictive of computational skill, $F(5,40) = 7.04$, $p = .0001$, R-square = .47, with significant unique contributions for estimation accuracy, symbolic comparison, elision, and math and reading fluency.
Conclusions: Elemental numeric skills were predictive of math skills in college students, even in the context of known predictors. However, individual correlations with the outcome measure were small. Future studies will elaborate on the interrelationships of these predictors and their relative strength with math outcomes, and in the context of additional neuropsychological predictors.
Correspondence: *Rebecca B. Martin, Neuropsychology, University of Houston, 4505 Cullen, Houston, TX 77030. E-mail: rmartin29@gmail.com*

R.B. MARTIN, P.T. CIRINO, L. EWING-COBBS, M.A. BARNES, L.S. FUCHS & J.M. FLETCHER. Stability of Math Skills in Children Categorically and Continuously.
Objective: Identification of math difficulties (MD) depends in part on the measure(s) used, the cut-off score used to designate low achievement, and whether persistent low achievement is considered. This study

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

evaluated the impact of measure and cut-score on the stability of MD identification. We expected that students with MD would be more likely than typical students to change categorical designation or to show reliable change, and that math performance would be predicted by academic, cognitive, and behavioral characteristics.
Participants and Methods: Participants were students (N=145) who were part of a larger study of math cognition followed from Grades 3 and 4 for two years. We evaluated categorical and continuous reliable change, using WRAT-3 Arithmetic and WJ-III Math Fluency, and employing different severity cutoff rules (< 16th %ile, 16th-32nd %iles) to designate MD. We also administered reading, working memory, and behavioral inattention measures. Chi-square analyses were used to test proportional differences, and regression analyses were used to for predictive relationships.
Results: There were 38% of students with MD who changed diagnostic category over time compared to 10% of the No LD group, $p<.0001$. More students in the No LD group showed reliable declines in math scores over time. There were no change differences between MD severity subgroups. Reading, inattention, and working memory were predictive of WRAT-3 performance at Time 1, $F(4,138)=31.28$, $p<.0001$, and also two years later. Change scores were related to initial academic performance and to inattention, $F(5,137)=11.79$, $p<.0001$. Analyses with WJ-III Math Fluency showed both similarities and differences.
Conclusions: The present study highlights issues associated with MD identification over time, which was affected by multiple factors. Math performance was predictable by both academic skills and attention. Results have implications for identifying students as MD both initially as well as what factors are relevant for consistent identification.
Correspondence: *Rebecca B. Martin, Neuropsychology; University of Houston, 4505 Cullen, Houston, TX 77030. E-mail: rmartin29@gmail.com*

F. MORKEN & T. HELLAND. Computer-Based Writing Processing in Dyslexia.
Objective: Dyslexia research focuses mainly on reading and spelling. However, writing whole utterances is demanding not only orthographically, but also regarding syntactic and semantic encoding, storage and retrieval. This study examined the process from hearing an utterance to recording it into print in a group of dyslexic children and matched controls. In accordance with theories of impaired working memory in dyslexia, we hypothesised that, compared to controls, pupils with dyslexia 1) would need more time writing utterances, and 2) would make more word errors.
Participants and Methods: 14 dyslexic children and 28 controls were tested with a computer-based sentence dictation. The five sentences varied in length (6-12 words) and syntactic complexity. A specially developed software program registered all writing behaviour. Group differences in time usage and word errors (additions, omissions or substitutions) were analysed by t-tests with an alpha level of $p<.05$.
Results: Analyses yielded significantly higher scores in the dyslexia group compared to controls, indicating higher time usage and more word errors. The majority of errors yielded output in the semantic vicinity of the target words. Writing time increased with number of errors and sentence complexity. Using Baddeley's model of working memory, this may tentatively be explained by impairments within the phonological loop, combined with a well-functioning episodic buffer.
Conclusions: Clinically, this should raise awareness that long and complex utterances may be somewhat distorted in the mental storage and retrieval of a recipient with dyslexia, giving rise to possible inaccuracy. This should impact for example teaching methods in schools.
Correspondence: *Frøydis Morken, Department of biological and medical psychology, University of Bergen, Jonas Lies vei 91, Bergen 5009, Norway. E-mail: froydis.morken@psybp.uib.no*

J. OLDS, E. FITZPATRICK, R. MCCRAE, D. SCHRAMM, I. GABOURY, J. WHITTINGHAM & A. DURIEUX-SMITH. Neuropsychological Functioning associated with Pediatric Hearing Loss and Oral Communication.
Objective: Advances in hearing technology, including better hearing aids (HA) and cochlear implants (CI), now provide children with better access to sound and opportunities to learn spoken language. However, there is little information about neuropsychological functioning associated with pediatric hearing loss in children who learn oral language. Given that hearing loss in childhood may be associated with other developmental difficulties, a better understanding of neuropsychological functioning is important. The objective of the present study was to investigate neuropsychological functioning children with hearing loss and who wear either CI or HA and use oral language to communicate.
Participants and Methods: Convenience samples of (1) 21 pediatric CI recipients with severe to profound hearing loss and (2) 20 children who wore HAs with hearing losses in the moderate-severe to severe range were recruited from a single CI centre. Participants were compared on measures of intelligence, language, phonological processing, word and pseudoword reading, and reading comprehension as well as audiologic functioning.
Results: There were no between-group differences on audiological measures, nor in nonverbal intelligence. The performance of HA users was within the average range, and higher than CI users, on receptive vocabulary, language, word-level reading and spelling. Group differences were also noted on measures of phonological memory and reading comprehension but both groups scored below average relative to age norms.
Conclusions: The results of the present study provide information about neuropsychological functioning in children with hearing losses who use oral language to communicate. Further investigation, including examining factors associated with hearing loss and its intervention, is needed.
Correspondence: *Janet Olds, PhD, Psychology, Children's Hospital of Eastern Ontario, 401 Smyth Road, Ottawa, ON K1H 8J6, Canada. E-mail: olds@cheo.on.ca*

D.C. OSMON, E. ANDRESEN, B. GREEN, L. YOUNG & J. BLAISDELL. Are symptom validity tests specific to a population?
Objective: The present study evaluated whether symptom validity tests are specific to a learning disorder sample.
Participants and Methods: A consecutive college sample of 49 individuals referred to the learning disability clinic were given the Word Memory Test (WMT), Word Reading Test (WRT), b Test (bT), and Dot Counting Test (DCT).
Results: Results demonstrated a failure rate of 7/49 (14%), 4/49 (8%), 9/49 (18%), and 0/40 for the WMT, WRT, bT,, and DCT, respectively. Fourteen individuals failed at least one SVT and 5 failed at least two SVTs. Of those 14, four failed two SVTs and only one failed all three SVTs. Of the four individuals failing the WRT two of them failed one other SVT (one failed the WMT; the other failed both the WMT and bT). Of the seven failing the WMT six failed another SVT (three failed the bT; two failed the WRT; one failed both the WRT and bT). Of the nine failing the bT five failed one other SVT (three failed the WMT; one failed the WRT; one failed both the WRT and bT).
Conclusions: In summary, an SVT failure rate of 29% using criterion of one SVT failure and 10% using criterion of two SVT failures was found. The bT appears to be the most sensitive measure in this small learning disabled sample. The WMT seems to overlap most and may relate to a general effort construct while the bT and WRT may relate to an effort construct specific to a learning disabled population.
Correspondence: *David C. Osmon, Ph.D., Psychology; University of Wisconsin-Milwaukee, 2441 E. Hartford Ave, Milwaukee, WI 53211. E-mail: neuropsy@uwm.edu*

H. PARK, L.J. LOMBARDINO & L. ALTMANN. Processing Speed Deficits in Young Adults with Developmental Dyslexia.
Objective: The finding that dyslexic readers have processing speed deficits has led researchers to question whether these speed deficits are domain-general or domain-specific, but to date, no clear evidence exists to address this issue. This study, which is currently underway, is designed to investigate whether processing speed deficits in college students with developmental dyslexia are restricted in speed of linguistic information processing only or are also present in speed of non-linguistic information processing.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Ten dyslexic students were compared with ten age-matched normal readers, all monolingual native speakers of English. In the four types of experimental processing speed tasks created by DirectRT program, English letters as linguistic stimuli and Korean letters as non-linguistic stimuli were used and participants responded to the stimuli using a verbal response (Say the number corresponding to a symbol) or a motor response (Press the button under the correct response). Thus, the study had a 2 stimulus type by 2 response type design.
Results: Results showed that dyslexic readers performed significantly more slowly on all processing speed tasks than peer-matched controls when fluid intelligence was controlled.
Conclusions: These results suggest that dyslexic readers are significantly slower than peer-matched normal readers on both linguistic and nonlinguistic processing speed tasks regardless of whether responses are produced by speech or by motor, supporting the hypothesis that processing speed deficits in dyslexia are domain-general. Findings will be discussed relative to their applicability to reading instruction.
Correspondence: *Heeyoung Park, M.A., Speech, Language, and Hearing Sciences, University of Florida, 2901 SW 13TH ST APT 338, Gainesville, FL 32608-3030. E-mail: heeyoung@ufl.edu*

C.G. WONG & M. STEVENS. The Effects of Stimulant Medication on ADHD Working Memory Functional Connectivity.
Objective: Many ADHD individuals have working memory (WM) impairments, which often improve with psychostimulant medication. Although functional neuroimaging has supported the importance of frontoparietal brain regions to WM, little is known about how stimulant medications affect frontoparietal activation. This fMRI study examined medication-related changes to ADHD frontoparietal functional connectivity (FC).
Participants and Methods: Eighteen ADHD-Combined subtype youth (ages 11-17) twice completed a Sternberg WM fMRI task following 48-hour washout periods in a randomized double-blind, placebo-controlled design. Medications were individualized as patients' standard clinically-effective psychostimulant (e.g., methylphenidate or d-amphetamine) dose. FMRI data were preprocessed using SPM5. FC was characterized using group fMRI independent component analysis (ICA). SPM5 repeated-measures t-tests compared ADHD patients' FC on and off medication.
Results: Five independent components were identified that depicted task-engaged, functionally-connected neural networks comprised of various lateral frontal and parietal lobe regions. Clinically-effective medication increased frontoparietal connectivity in two networks. In the first, right hemisphere dorso/ventrolateral prefrontal and superior parietal lobule regions that typically 'deactivated' during Retrieval became more strongly integrated in the medication condition. Second, FC within right inferior parietal lobe and numerous other posterior brain regions became more greatly functionally-connected during WM Retrieval while medicated in a network comprising integrated activation of bilateral dorsolateral prefrontal and bilateral inferior parietal lobe regions. However, psychostimulants had either no effect or the opposite effect (i.e., diminished FC), in other frontoparietal networks.
Conclusions: Clinically-effective stimulant medication alters ADHD adolescents' frontoparietal FC in a complex fashion in networks engaged for retrieval of information from WM.
Correspondence: *Christina G. Wong, Olin Neuropsychiatry Research Center, 200 Retreat Ave, Hartford, CT 06106. E-mail: cwong@harthosp.org*

Psychopathology/Neuropsychiatry (Other)

R.K. BHALLA, M. BUTTERS & E. LENZE. Neuropsychological functioning pre-and post-treatment in late-life Generalized Anxiety Disorder.
Objective: The causal relationship between generalized anxiety disorder (GAD) and cognitive impairment is unclear. Moreover, there is very little available data on whether neuropsychological function changes with treatment. The purpose of the current study was to assess cognitive functioning prior to and following treatment for GAD.
Participants and Methods: This was a 12-week double-blind randomized controlled trial of escitalopram vs. placebo in adults 60 years and older with a principal diagnosis of GAD. We compared neuropsychological functioning pre- and post-treatment in 66 (30 active treatment, 36 placebo) low-performing (based on pre-treatment cognitive performance) GAD treatment completers group using a repeated measures mixed effect model with random intercept and slope.
Results: There were no significant main effects for treatment group, time, or treatment-by-time interactions for the Stroop Test, RBANS Digit Span, Coding, or the Immediate Memory or Language Index Scores. Time effects revealed working memory, delayed memory and visuospatial ability improved in both groups over the course of the study. There was a significant treatment by time interaction on the DKEFS Sorting Task (Confirmed Correct Sorts) ($F(1,62)=4.06$, $p=0.048$) indicating that the group receiving escitalopram improved in problem-solving, conceptual ability and mental flexibility more than did the group receiving placebo.
Conclusions: Analyses suggested that among GAD participants with poor cognitive performance at baseline, multiple domains showed improvement during the course of the clinical trial. This suggests that treatment of anxiety is associated with improvements in poor cognitive performance. The data is more equivocal with regards to whether escitalopram treatment is associated with greater cognitive improvement than placebo.
Correspondence: *Rishi K. Bhalla, Ph.D., Psychiatry, University of British Columbia, 855 W. 12th Avenue, Room 570 CP, Vancouver, BC V5Z 1M9, Canada. E-mail: Rishi.Bhalla@vch.ca*

M. CHAURET, M. PELLETIER, D. SAINT-AMOUR, P. RAINVILLE, D.S. PINE & F.S. MAHEU. Fear circuitry function in anxious youths, youths at familial risk for anxiety disorders and healthy youths.
Objective: Children of parents with anxiety disorders are at elevated risk for anxiety compared to children without such familial histories (Hirshfeld-Becker & al., 2008). The fear circuit (FC), which includes the amygdala and prefrontal cortex, has been linked with anxiety and risk for the disorder. Recent fMRI studies reported altered patterns of FC responses during fear conditioning and extinction in adults with anxiety or at risk for anxiety disorders compared to controls (Milad et al., 2006). We aim to use fMRI fear conditioning and extinction tasks to examine fear circuitry function related to anxiety and risk for the disorder.
Participants and Methods: Three groups of 30 youths, aged between 10-17 years, will be recruited: (1) youths with current anxiety disorder, (2) offspring without past or current anxiety disorder but at high risk for anxiety because of their parents' past or current anxiety disorders, (3) psychiatrically healthy offspring of psychiatrically healthy parents. FC will be evaluated using fMRI fear conditioning and extinction tasks.
Results: Preliminary analyses were performed in 10 anxious youths, 7 at-risk youths and 9 control youths. All subjects were grouped to determine the main effects of fear conditioning and extinction (n/group being too small). Preliminary results show right amygdala activation (p uncor=.035, xyz: 18,4,-18mm) during the conditioning and right amygdala (p uncor=.05, xyz: 30,0,20mm) and left sgACC activation (p uncor=.05; BA32, xyz: -6,48,4mm) during extinction. These findings show the efficiency of our tasks in probing the amygdala during conditioning and extinction and the sgACC during extinction.
Conclusions: Understanding the links between fear circuitry, anxiety and risk for the disorder in youths is crucial as this could provide key insights on the developmental neurobiology of anxiety disorders, and could lead to the implementation of interventions that would effectively interrupt a developmental trajectory early in its course, before anxiety becomes chronic.
Correspondence: *Mélissa Chauret, PhD student, Université du Québec à Montréal, 5157 rue Garnier, Montréal, QC H2J3T3, Canada. E-mail: melis.chauret@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

E. DAWSON, P.K. SHEAR, S.M. STRAKOWSKI & S.R. HOWE. Clinical and Cognitive Predictors of Time to Reach Euthymia Among Mixed and Manic Adults with Bipolar Disorder.

Objective: Individuals with bipolar disorder demonstrate variable treatment trajectories. This study identified clinical and cognitive predictors of time to reach euthymia following hospitalization for mania.

Participants and Methods: Participants were 94 adult inpatients (60 manic; 34 mixed). Baseline symptom severity was assessed using the Young Mania Rating Scale and Montgomery Asberg Depression Rating Scale. The Stop Signal Task, Degraded Stimulus Continuous Performance Task, Delayed Response Task, and Barratt Impulsiveness Scale measured baseline impulsivity. Participants were followed monthly after discharge. The principal outcome measure for this study was time to reach euthymia.

Results: Age, education, ethnicity, and IQ were comparable between mixed and manic groups. Mixed participants were more likely to have greater depressive symptoms, report greater impulsiveness, and have earlier illness onset and longer illness duration than manic participants. Group performances were comparable on all laboratory measures of impulsivity. Survival analysis revealed a trend towards slower recovery for mixed than manic participants. For the total sample, longer time to euthymia was significantly associated with greater depressive symptoms, longer illness duration, poorer delay tolerance, and greater perceived impulsiveness at baseline; earlier age of illness onset and lower IQ approached significance. Self-reported impulsivity made a significant independent contribution to outcome.

Conclusions: This study identified several factors, measureable during mania, that influence time to reach euthymia. In addition to the clinical variables, cognitive measures of impulsivity were significant predictors of symptomatic recovery. Self-reported impulsivity was a significant independent predictor of time to euthymia, even after accounting for the other intellectual, cognitive, and clinical variables.

Acknowledgement: 5 R01 MH066626-04 (PI: Strakowski)

Correspondence: *Erica Dawson, MA, Psychology, University of Cincinnati, 2600 Clifton Ave, ML 0376, Cincinnati, OH 45221. E-mail: dawsonel@gmail.com*

J. HASSELBALCH, A. GADE, U. KNORR & L.V. KESSING. Cognitive Impairment in Remitted Depression is Associated with the Number and Duration of Prior Episodes.

Objective: To study (i) whether cognitive impairment is present in remitted depression, and if so (ii) its possible determinants

Participants and Methods: Via Danish registers we identified individuals between forty and eighty years of age: 1) Patients with a diagnosis of unipolar disorder at their first discharge from a psychiatric hospital in the period 1994-2002, and 2) gender and age matched control individuals. We used a psychiatric research interview to confirm that patients were in a remitted state and to provide estimates of the number, duration and the subtype of each depressive episode using the Schedules of Clinical Assessment in Neuropsychiatry interview and information from case-notes. 88 patients and 50 controls fulfilled the selection criteria and were included in the study. Cognitive function of the participants was assessed with the Cambridge Cognitive Examination (CAMCOG) and neuropsychological tests. Only the CAMCOG-data has been analyzed at the time of submission.

Results: Cognitive function was found to be significantly worse in patients (mean score 96.1, SD 4.5) compared to control individuals (mean score 98.4, SD 2.9) on the CAMCOG ($z = -3.32$, $p = 0.001$). When adjusting for premorbid intelligence (DART), age, subsyndromal depressive symptoms and medication, the duration of depressive episodes ($B = -0.12$, 95% CI: –0.20, -0.04, $p=0.004$) and the number of episodes ($B = -0.41$, 95% CI: –0.78, -0.04, $p = 0.03$) were associated with cognitive decline.

Conclusions: Our findings suggest that cognitive dysfunction is present in the remitted state of unipolar disorder and that cognitive decline may be negatively associated with the cumulated number and duration of prior depressive episodes.

Correspondence: *Anders Gade, Psychology, Copenhagen University, O.Farimagsgade 2A, Copenhagen 1353, Denmark. E-mail: Anders.Gade@psy.ku.dk*

D. GARRISON & R.W. ROBILLARD. PTSD, harm avoidance, and performance on tasks of EF and fluid reasoning in pediatric inpatient psychiatric residents.

Objective: Explore EF, memory, fluid reasoning, and anxiety in pediatric PTSD.

Participants and Methods: Participants (43) were diagnosed with PTSD with comorbid abuse (i.e., physical, sexual, and/or neglect). Each completed the MR subtest of the WASI, selected subtests from the TOMAL-2, Trails A, Trails B, WCST, and the MASC. Analyses included one sample T-tests, Pearson correlation, and multiple regression.

Results: MFS, MFS-delay, WSR, Trails A, and Trails B were significant; MR, WSR-delay, and AVM were not. MASC measures of physical symptoms, performance anxiety, separation anxiety, and total anxiety were significantly elevated. Harm avoidance was not significant. Perfectionism was significantly lower than expected. Harm avoidance negatively correlated with WSR-delay, but positively with MR, WCST-total errors, and Trails B. Perfectionism positively correlated with MFS-delay and Trails A, but negatively with WSR-delay. Separation anxiety correlated with poorer AVM and Trails B performance. Total Anxiety correlated positively with poorer Trails B performance. EF did not predict harm avoidance or perfectionism.

Conclusions: Self-reported ratings for harm avoidance were not significant and perfectionism was significant in the non-expected direction. EF, fluid reasoning and verbal memory were lower than expected. Auditory memory and learning were lower than expected, inconsistent with previous findings. Results suggest the need for further examination and modeling of the interaction among anxiety, EF, and memory, as well as exploration of the effect of gender and developmental period of (and time since) maltreatment trauma on EF and memory.

Correspondence: *Daniel Garrison, M.A., Educational Psychology, University of Texas at Austin, 303 Moore Blvd, Austin, TX 78705. E-mail: danielgarrison@gmail.com*

K.E. GOLDSTEIN, D.R. LABELLE, B.G. SHAPERO, J. BELLAND, L. MATT, C. WAGNER, S.K. BLACK, J.Y. CHOI, L.B. ALLOY & L.Y. ABRAMSON. Is Maternal Psychopathology Associated With Child Attention Difficulties?

Objective: Despite research showing that early-life psychosocial stressors may negatively impact child cognitive abilities (Fishbein et al 2009), little work has investigated the potential effect of maternal psychopathology, as an early-life stressor, on child cognitive skills. Here we recruited a sample of 170 children (ages 12-13) and 170 mothers (ages 20-63) to examine the relationship between maternal externalizing disorders (history of attention-deficit-hyperactivity disorder, oppositional defiant disorder, and/or conduct disorder) and child attentional abilities.

Participants and Methods: The Kiddie Schedule for Affective Disorders (K-SADS; Kaufman et al 1997) was used to assess child psychopathology; SADS-Lifetime (Endicott & Spitzer, 1978) was used to assess maternal psychopathology. Each child was administered the WAIS-IV Digit Span subtest to examine attention and mental control and the Test of Everyday Attention for Children Sky Search subtest (Manly et al 2001) to assess selective attention. Logistic regression analysis was conducted; maternal mental health status (history of externalizing disorder versus no history of externalizing disorder) was entered as a predictor, controlling for child's age and child presence/history of externalizing disorder.

Results: Maternal externalizing disorders were significantly related to lower child attentional ability on Digit Span ($\geq = -0.21$, $p=0.03$) and Sky Search ($\geq = -0.18$, $p=0.04$). Findings across two different tests of attention suggest a relationship between maternal externalizing disorders and child attentional difficulties.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results are promising in their ability to inform complex transactional models of child neuropsychological difficulties. Further research is needed to understand the relation between maternal psychopathology and child cognitive functioning, including the potential mediating role of parenting style, genetic and/or neurobiological factors.
Correspondence: *Kim E. Goldstein, MA, Psychology, Temple University, Weiss Hall 1701 North 13th Street, Philadelphia, PA 19122. E-mail: kim.goldstein@temple.edu*

C. GOPIN, K. BURDICK, P. DEROSSE, T. GOLDBERG & A. MALHOTRA. Emotion Based Inhibition in Stable Patients with Bipolar I Disorder: A Comparison with Healthy and Schizophrenic Subjects.
Objective: Bipolar I disorder (BD) has been associated with impairment in affective processing during depressive and manic states; however, there are limited data as to whether this population also exhibits such difficulty during stable periods. We examined the pattern of affective processing in stable BD patients and compared their profile to that of healthy controls (HC). Additionally, to assess the diagnostic specificity of the patterns of performance, we compared BD patients' performance with that of patients diagnosed with schizophrenia (SZ).
Participants and Methods: An Affective Go/No-Go test was used to evaluate inhibitory response to negatively-valenced, positively-valenced, and neutral stimuli in the three diagnostic groups [BD (n=44); SZ (n=133); HC (nc=144]. Accuracy (d'), response bias (≥), and median reaction time served as dependent variables.
Results: A series of MANCOVAs revealed that during the positive condition, the d'-accuracy of BD patients was similar to that of the SZ group, with significantly increased reaction times as compared with HC participants ($p<.05$). When evaluating performance on negatively-valenced trials, BD patients demonstrated a significantly greater ≥-response bias than both the HC and SZ groups ($p<.01$).
Conclusions: The affective processing impairment evident in BD patients is a feature of the disorder that is present even during stable periods. In the search to identify cognitive deficits that are specific to BD, prior studies comparing BD with SZ have highlighted clear quantitative but not consistent qualitative differences. Our data suggest that a response bias associated with negative stimuli may be a critical and relatively specific feature of BD.
Correspondence: *Chaya Gopin, Ph.D., NSLIJ, 75-59 263rd Street, Glen Oaks, NY 11004. E-mail: cgopin@gmail.com*

E. HANEY-CARON, R. PARIKH & M.C. STEVENS. Atypical Frontal Lobe Activity to Emotional Visual Stimuli in Adolescents with Conduct Disorder.
Objective: Previous neuroimaging studies of Conduct Disorder (CD) youth comorbid with ADHD found abnormal prefrontal and limbic activation to negative, but not positive emotionally-valenced stimuli. We examined a pure CD sample on a task requiring recognition decisions about emotional information held in working memory to determine whether CD activation abnormalities in the service of goal-directed behavior were likewise affect-specific.
Participants and Methods: 19 CD adolescents and 19 controls (ages 13-18) performed an fMRI Sternberg-variant working memory task with positive, neutral, and negative IAPS pictures. Data preprocessing and mixed-GLM analyses to compare study groups used SPM5.
Results: CD had slower ($p<.008$) and more variable ($p<.002$) recognition reaction time, particularly to emotionally-laden stimuli ($p<.034$). During negative and neutral (but not positive) stimulus encoding, CD more greatly activated lateral/medial orbitofrontal cortex and medial prefrontal/rostral cingulate cortex. Recognizing positive and negative stimuli held in working memory not only required more processing time for both groups, but also were associated with different CD activation abnormalities. In addition to generally lower CD lateral prefrontal activity, medial frontal gyrus activity differentiated valence – CD over-activity to positive, CD under-activity to neutral, and no group difference to negative stimuli. Amygdala activity only differed between groups to never-before-seen neutral recognition foils (e.g., CD over-activation).
Conclusions: Prefrontal regions involved in affective processing were abnormal in pure CD and depended both upon emotional valence as well as decision-making context (correct versus novel recognition decisions). Executive processing of emotional information is abnormal in CD and appears related to medial and orbitofrontal activation abnormality.
Correspondence: *Emily Haney-Caron, Olin Neuropsychiatry Research Center, Hartford Hospital - Institute of Living, 200 Retreat Ave., Hartford, CT 06106. E-mail: ehcaron@harthosp.org*

E. HEIDEMAN, K. WEINBERGER, A. GERDES & J. KOOP. Maternal Parenting Behavior, Parenting Stress, and Parenting Efficacy as Predictors of Internalizing and Externalizing Outcomes in Children Referred for Neuropsychological Evaluations.
Objective: There is significant variability in outcomes among children who have been referred for neuropsychological evaluations. Several factors have been suggested in previous literature such as severity of disease/injury, time since onset, developmental level of the child, and social and family factors (Yeates, Ris, & Taylor, 2009). Family factors, such as parenting behavior, parenting stress, and parenting efficacy may impact the course and treatment of childhood neurological disorders. Little work has examined the combined influences of these parenting variables on outcomes in children. This study examines the influence of maternal parenting behavior, parenting stress, and parenting efficacy on outcomes in children referred for a neuropsychological evaluation. It was predicted that these parental factors would predict both internalizing and externalizing behavioral/emotional outcomes.
Participants and Methods: Participants were 111 mothers whose children were referred for neuropsychological evaluations. Mothers completed measures examining parenting behavior, affect, and cognitions, as well as child psychopathology.
Results: Linear regression analyses revealed that maternal parenting factors were significant in predicting child outcomes, accounting for 33% and 36% of the variance in internalizing and externalizing behaviors, respectively. More specifically, parenting stress (≥=.61, $p<.01$) and parenting efficacy (≥=.34, $p<.01$) predicted internalizing problems, while hostile parenting (≥=.21, $p=.01$) and parenting stress (≥=.53, $p<.01$) predicted externalizing problems.
Conclusions: Results support the prediction that a combination of maternal parenting factors influence outcomes in a pediatric neuropsychological population. These findings may have important implications for including consideration of family factors in standard neuropsychological evaluations for children, especially for treatment planning purposes (e.g., Noggle & Pierson, 2010).
Correspondence: *Elizabeth Heideman, M.S., Marquette University, 507 W. Oakdale Ave. #607, Chicago, IL 60657. E-mail: elizabeth.heideman@mu.edu*

L. KERWIN, G. HELLEMANN & J.D. FEUSNER. Global-Local Processing in Body Dysmorphic Disorder (BDD).
Objective: Among the many themes underlying the broad spectrum of obsessive-compulsive spectrum disorders is a sensory or perceptual acuity, and attention to detail. The aim of this study was to use a global-local task to investigate early visuospatial processing and functional hemispheric asymmetries of divided visual attention in BDD individuals.
Participants and Methods: Sixteen medication naïve BDD individuals were compared to 16 age-, gender- and education-matched non-clinical controls on a global-local task utilizing incongruent visual stimuli comprised of a large letter (global level) made up of small letters (local level). Participants underwent clinically relevant psychometric assessments.
Results: Linear mixed models and a logistic link function were used to analyze reaction time (RT) and error rate, respectively. At the global level, RT was not significantly different between groups, but the BDD group had a higher error rate (÷=.015). At the local level, the BDD group performed significantly slower than controls (÷=.001), but error rate

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

did not significantly differ. Relative to controls, the BDD group shifted attention more slowly between hierarchical levels (÷=.001) and their shifting was slowest from global-to-local (÷=.000). At the local level, lower insight was related to slower RT (÷=.018) and higher error rates (÷=.02).
Conclusions: BDD individuals may have deficits in global and local processing. These may be due to local interference effects coupled with impairment in shifting attentional resources between hemispheres. This may contribute to symptoms of imbalanced detail vs. holistic processing of appearance. These individuals may therefore benefit from visuospatial training to improve flexibility of global and local processing.
Correspondence: *Lauren Kerwin, Psychiatry & Biobehavioral Sciences, UCLA Semel Institute, 300 Medical Plza, Los Angeles, CA 90025. E-mail: laurenkerwin@gmail.com*

W.D. KILLGORE, J.C. BRITTON, I.M. ROSSO, Z.J. SCHWAB, M.R. WEINER & S.L. RAUCH. Similarities and Differences in Cortico-Limbic Responses to Masked Affect Probes Across Anxiety Disorders.
Objective: Neuroimaging research has identified interconnected brain networks that respond to threatening stimuli, and which respond differently in patients with anxiety disorders vs. healthy controls. It is not known whether various anxiety disorders share a common pattern of responsiveness within the threat assessment system or whether these disorders can be distinguished based on differential responsiveness of this system to affective stimuli. We compared brain activation patterns across 3 anxiety disorder groups, including post-traumatic stress disorder (PTSD), panic disorder (PD), specific animal phobia (SP), and healthy controls (HC) during functional magnetic resonance imaging (fMRI) of masked fear face perception.
Participants and Methods: Fifty-five adults (15 PTSD; 12 PD; 11 animal phobia; 17 non-psychiatric controls) underwent fMRI while engaged in a backward masked fear vs. neutral face perception task. Masked Fear and Neutral conditions were contrasted with one another. Diagnostic groups were compared using a one-way ANOVA, followed by planned comparisons (e.g., HC vs. all anxiety groups). All data were evaluated at a whole brain level, p<.005, with a cluster size of 5 contiguous voxels.
Results: Relative to the HC group, the combined anxiety disorder sample (SP + PTSD + PD) showed significantly reduced activation within the ventromedial prefrontal cortex (VMPFC) and greater activation within the left amygdala and insula. Post-hoc comparisons showed that the PTSD and PD groups were similar to one another in the responsiveness of these brain regions, but differed from healthy (HC) and psychiatric (SP) control groups, which were generally similar in responsiveness.
Conclusions: Anxiety disorders were distinguishable from HCs by a common pattern of reduced VMPFC and increased limbic/paralimbic activation, but individual disorders were also distinguishable from one another based on the magnitude of these responses to general (disorder non-specific) threat stimuli.
Correspondence: *William D. Killgore, Ph.D., Psychiatry, Harvard Medical School, Brain Imaging Center, McLean Hospital, 115 Mill Street, Belmont, MA 02478. E-mail: killgore@mclean.harvard.edu*

L.M. KINOSHITA, E. LUTHER, A. NODA, R. COOPER, B. HERNANDEZ & J.A. YESAVAGE. PTSD, Sleep Disordered Breathing, APOE e4 and Cognitive Functioning on the RAVLT.
Objective: Cognitive impairments are associated with PTSD, sleep disordered breathing (SDB) and the APOE e4 allele. APOE e4 predicts faster cognitive decline in individuals with Alzheimer's disease compared to non-e4 carriers. We found that the co-occurrence of PTSD and SDB in older veterans is high (83%). Individuals with chronic PTSD show impairments in attention, episodic memory and executive functioning. Although impairments in SDB are mild, the most consistently reported deficits include attention, vigilance and executive functioning. However, we do not know the relationship of PTSD, SDB, APOE e4 and cognitive functioning.
Participants and Methods: Participants were 103 male PTSD veterans enrolled in a study at the VA Palo Alto Health Care System. All participants met criteria for PTSD using the Clinician Administered PTSD Scale (CAPS). Average duration of PTSD symptoms was 35 years. Mean age was 60.5 (SD: 4.2). Mean educational level was 14.4 years (SD: 2.4). Most participants were Caucasian (71%). Twenty five percent were APOE e4 carriers. The RAVLT and other cognitive measures were administered at baseline. Overnight polysomnography (PSG) was used to assess SDB. Data was scored by a certified sleep technician. SDB was defined as an apnea-hypopnea index, AHI □ 5. Statistical analyses include descriptive statistics and multiple regression.
Results: A significant association was found for RAVLT trial 1 (p=0.03) and LOT score (p=0.04).
Conclusions: The results suggest that individuals who have PTSD, SDB and APOE e4 learn less efficiently over five learning trials compared to those who are non-APOE e4 carriers. The individuals who have APOE e4 performed better on trial 1 compared to their non-APOE e4 counterparts, suggesting that the e4 carriers may use attentional skills during initial acquisition. However, this learning style used by the APOE e4 carriers does not help retention of newly learned auditory information over five trials. The present study was funded by VA Merit Review (YES000048).
Correspondence: *Lisa M. Kinoshita, Ph.D., Psychology Service, VA Palo Alto Health Care System/Stanford University, 3801 Miranda Ave (151-Y), Palo Alto, CA 94304. E-mail: lisakino@stanford.edu*

A.M. NAVE, A. CAPRIHAN & M.C. STEVENS. White Matter Abnormalities in Adolescents with Major Depressive Disorder.
Objective: The purpose of this study was to identify areas of abnormal white matter microstructure in adolescents with Major depressive disorder (MDD) using diffusion tensor imaging (DTI). Although several DTI studies have examined adult and elderly MDD patients, it is not yet understood in what way white matter abnormalities might contribute to early life onset MDD.
Participants and Methods: Fractional anisotropy (FA) values representing preferential diffusivity along major tracts were examined using tract-based spatial statistics (TBSS) across the whole brain in adolescents ages 12-19 with MDD (n=30) compared with demographically-matched healthy controls (n=30). We not only examined frontal lobe tracts that have been most frequently identified as abnormal in previous DTI studies of older depressed patients, but also the whole brain to determine if adolescent depression was related to any other regional white matter abnormality.
Results: MDD adolescents had lower FA in 17 distinct tracts. In the anterior brain, this included left corpus callosum (genu), cingulum bundle, and right uncinate fasciculus. There also was strong evidence for lower FA in bilateral anterior/posterior limbs of the internal capsule, as well as corticospinal tracts.
Conclusions: Consistent with previous findings in older samples, the current study also found abnormal frontal lobe microstructure in adolescents, suggesting these frontal connective media are important to depression regardless of when it is expressed across the lifetime. There also was strong evidence for basal ganglia microstructural deficits, notable for both their magnitude and relative absence from previous reports. These abnormalities might represent important markers of early onset depression.
Correspondence: *Andrea M. Nave, B.S., Olin Neuropsychiatry Research Center, Institute of Living, Hartford Hospital, 200 Retreat Ave, Hartford, CT 06106. E-mail: anave@harthosp.org*

B. NELSON, C. SARAPAS & S. SHANKMAN. The Effects of a Comorbid Anxiety Disorder on Measures of Executive Functioning in Depression.
Objective: Research suggests that depression is associated with impaired performance on measures of executive functioning (Veiel, 1997; Zakzanis et al., 1998). However, some studies have found inconsistent results in the degree of impairment (Basso & Bornstein, 1999; Christensen

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

et al., 1997), possibly due to the heterogeneity of depression. One way to parse the heterogeneity of depression is to examine the effects of comorbid anxiety. Therefore, the goal of the present study was to compare controls and depressed individuals with and without a comorbid anxiety disorder on two measures of executive functioning.
Participants and Methods: Participants included healthy controls (N=36) and depressed individuals with (N=30) and without (N=41) a lifetime diagnosis of a comorbid anxiety disorder. Diagnoses were made with the SCID and participants were recruited from the community. Executive functioning was measured with the Controlled Oral Word Association Test and Design Fluency (Jones-Gotman & Milner, 1977). Analyses were conducted using ANOVA.
Results: Participants with comorbid depression and anxiety produced fewer novel designs compared to depressed only and control participants, who did not differ. In addition, the results were not due to greater depression severity by the comorbid participants. Groups did not differ in phonemic or semantic verbal fluency.
Conclusions: Our results support comorbid anxiety as an important factor that may identify subtypes of depression with executive dysfunction. Theoretical models of anxiety have postulated cerebral dysfunction in right frontal regions (i.e., Davidson, 2000), coinciding with our finding of impaired design fluency. We will further discuss implications of our findings on research examining executive dysfunction in depression.
Correspondence: *Brady Nelson, M.A., Psychology, University of Illinois-Chicago, 1007 W Harrison St. (Room 1009), Chicago, IL 60657. E-mail: bradynelson103@gmail.com*

G.N. SAVLA, S.E. DAWES & B.W. PALMER. Utility of Rey Tangled Lines Test in Detecting Cognitive Deficits of Bipolar Disorder.
Objective: There have been suggestions of differential executive and verbal memory deficits in bipolar disorder (BiP). Most of the employed executive tests have verbal components, confounding executive and verbal skills. Rey's Tangled Lines Test (RTLT) is a little used non-verbal executive task. Our goal was to determine the sensitivity of RTLT to cognitive deficits in BiP relative to other cognitive measures.
Participants and Methods: Participants include 32 BiP patients and 45 normal comparison subjects (NCs). Measures included RTLT, three D-KEFS subtests (Trail Making, Verbal Fluency, and Color-Word Interference), and several non-executive function measures (WRAT-IV Reading, WAIS-III Letter Number Sequencing and Digit Symbol, and HVLT-R). Magnitude of deficits was evaluated with Cohen's d effect size.
Results: Effect size differences (invariably in the direction of BiP worse than NC) for the cognitive tests were as follows (in order of magnitude): Digit Symbol (d=0.998), Color-Word Inhibition (d=0.811), Trail Making Number Sequencing (d=0.775), Color-Word Inhibition/Switching (d=0.663), Verbal Fluency Category Switching (d=0.445), WRAT-IV Reading (d=0.392), RTLT (d=0.385), HVLT-R (d=0.357), Trail Making Number-Letter Switching (d=0.238), Category Fluency [Category Fluency] (d=0.204), Letter Number Sequencing (d=0.180).
Conclusions: The RTLT was associated with a small effect size decrement among BiP relative to NCs, but that difference was stronger than that for several other executive function tasks. On the other hand, the largest effect size was for a task of psychomotor speed (Digit Symbol). The influence of psychomotor speed on tests of other abilities in BiP warrants further consideration.
Correspondence: *Gauri N. Savla, Ph.D., Psychiatry, University of California, San Diego, 3350 La Jolla Village Drive, 0603-V, San Diego, CA 92161. E-mail: gnayak@ucsd.edu*

E.A. SULLIVAN, M. BROOKS, K. KIEHL & D. KOSSON. Error-monitoring in psychopaths: A physiological study of attentional processes in an affective flanker paradigm.
Objective: The literature on psychopathy has focused on attentional and affective processes as potential etiological mechanisms for explaining the core traits that make up the disorder (Hiatt & Newman, 2006; Patrick et al., 1993). Most recently a deficient error-monitoring (DEM) hypothesis has emerged to explain these deficits, hypothesizing that reduced error-related negativity (ERN) in psychopaths may reflect either reduced attention to errors, reduced emotional salience of the errors, or both (Brazil et al., 2009; Munro et al., 2007).
Participants and Methods: The current study was designed to test the deficient error-monitoring hypothesis by comparing ERN amplitudes in psychopathic and nonpsychopathic jail inmates (N = 15; 7 psychopathic and 8 nonpsychopathic). Participants completed an affective flanker paradigm while response-locked EEG data was collected for error and correct trials, and averaged to create event-related potentials.
Results: Consistent with the DEM hypothesis, the psychopathic group demonstrated smaller ERN peak amplitudes for error trials than the nonpsychopathic group ($t(13) = 2.69$, $p < .05$, $d = 1.43$). However the psychopaths also demonstrated decreased correct-response negativity (CRN) peak amplitudes in comparison to the nonpsychopaths ($t(13) = 2.40$, $p < .05$, $d = 1.24$), suggesting that rather than a specific error-monitoring deficit, psychopaths may have a broader response-monitoring deficit.
Conclusions: Discussion will focus on the importance of the anterior cingulate gyrus (ACC), as the generator of the ERN and CRN, for integrating attention and affective information, and the possible implications of a response-monitoring deficit for reconciling the competing hypotheses of cognitive and affective deficits in psychopaths.
Correspondence: *Elizabeth A. Sullivan, Ph.D., BHCL Neuropsychology Service, New Mexico VA Healthcare System, 1501 San Pedro Dr. SE, Albuquerque, NM 87108. E-mail: elizabeth.sullivan3@va.gov*

T.M. SUSMARAS. Exploration of Regional Brain Volume and a 2- and 3-factor Structure within Levenson's Self Report Psychopathy Scale.
Objective: Levenson's Self Report Psychopathy Scale is comprised of 2 factors: Antisocial Traits and Callousness. A third factor, Egocentrism, has been reported. This study sought to explore the psychometric properties of this scale within our sample.
Participants and Methods: Exploratory factor analysis was conducted on our sample (12 healthy males; mean age = 27.6, mean education = 16.8). Based on those findings, VBM was used to examine correlates of the 2- and 3-factor structure with brain volume in regions commonly associated with emotion regulation, reward/punishment sensitivity, and social cue interpretation.
Results: We found the 3-factor structure accounted for more variance (59. 7%)than the 2-factor structure (45.1%). Examining the 3-factor structure, three significant gray matter foci in the left and right cerebellum correlated positively with the antisocial factor. Examining the 2-factor structure, two significant gray matter foci in the left parahippocampal gyrus correlated positively with antisocial factor. Despite relying on two distinct factor structures, each analysis found increased gray matter in association with antisocial traits.
Conclusions: Evidence implicates the cerebellum in emotion processing and fear conditioning through connection with limbic structures. Support has been shown for an increase in parahippocampal and cerebellar gray matter in boys with conduct disorder and also for increased cerebellar gray matter in violent offenders. Thus, it is seems likely that a deficient or atypical neurodevelopmental processes that increases gray matter volume is associated with increased antisocial types of behavior.
Correspondence: *Teresa M. Susmaras, M.A., Psychology, Suffolk University, 45 Westland Ave, Apt 11, Boston, MA 02115. E-mail: tmsusmaras@suffolk.edu*

A. VEDERMAN, K. HAZLETT, B. HAASE, S.L. WRIGHT, J. ZUBIETA, M. MCINNIS & S. LANGENECKER. Neuropsychological and Neuroimaging Evidence of Impaired Affect Processing in Bipolar Disorder.
Objective: Emotion processing disruptions in bipolar disorder (BD) are emerging as cognitive endophenotypes with potential diagnostic or

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

prognostic importance. Disruptions in affective regulation may account for some of the variability in the phenotypic expression of BD. The combination of neuroimaging and neuropsychological studies present an opportunity for the more detailed study of mechanisms underlying abnormal emotion processing in BD.
Participants and Methods: All participants were administered a facial emotion processing task (FEPT) comprised of happy, sad, fearful, angry, and neutral stimuli. The sample included 66 healthy controls (HC) and 129 BD. Functional imaging (fMRI BOLD) data on a subset of participants was also obtained with 3 Tesla GE Signa scanner. Eight females with BD in the depressed phase of illness and eight healthy control (HC) females also completed the FEPT while undergoing fMRI.
Results: BD performed worse than HC in fear $F(1, 193) = 5.35$, $p=.022$ and sad $F(1, 193) = 4.90$, $p=.028$ accuracy. Imaging data for all faces (vs animals) suggested that HC had greater activation in bilateral hippocampus, and posterior globus pallidus relative to BD. BD demonstrated greater activation in anterior cingulate gyrus, putamen, and caudate. Future analyses will examine performance accuracy for individual emotions.
Conclusions: BD patients during the depressed phase of illness exhibit emotion processing deficits, relative to HC. Data suggest that sad and fearful facial processing deficits may represent a specific cognitive endophenotype in BD.
Correspondence: *Aaron Vederman, University of Michigan, 2101 Commonwealth Blvd, Ann Arbor, MI 48108. E-mail: avederman@gmail.com*

Psychopathology/Neuropsychiatry (Schizophrenia)

S.D. ALL, J. JAEGER & S.M. SILVERSTEIN. Cohort Effects in the Relationship between Measures of Cognition and Social Functioning in Schizophrenia.
Objective: Silverstein et al. (2010) recently reported correlations between scores on the UCSD Performance-Based Skills Assessment (UPSA), a performance-based scale of social functioning, and scores on two cognitive test batteries (MATRICS Consensus Cognitive Battery and IntegNeuro) that were lower than those reported in past studies. The large sample size of that 4-site study (155 patients with schizophrenia) allowed for a reanalysis of the data to explore the reasons for the discrepancy and also allowed for identical comparisons using a measure of real-world social functioning, the Multidimensional Scale of Independent Functioning (MSIF).
Participants and Methods: Pearson r and Spearman rho correlations coefficients were used to examine whether the cognition-UPSA correlation values previously obtained and the newly examined cognition-MSIF correlations were affected by site differences, patient level of functioning, and range restriction.
Results: The overall lower cognition-UPSA correlations were found to be a function of a single site with unusually low correlations. Furthermore, the low correlations at this site appeared to reflect range restriction on the cognitive batteries and the UPSA, as well as greater cognitive impairment and a more homogenous patient group as the result of recruitment strategy. On the other hand, MSIF scores were only correlated with cognitive measures at this one site with low cognition-UPSA correlations.
Conclusions: This data suggest that the relationship between performance measures of social functioning may relate to cognition differently than real-world measures of social functioning and that both are subject to cohort effects.
Correspondence: *Sherrie D. All, Ph.D., University Behavioral Healthcare, University of Medicine & Dentistry of New Jersey, 151 Centennial Ave., Piscataway, NJ 08854. E-mail: dr.sherrie.all@gmail.com*

M. FANNING, C. SETER, B.C. CIAUDELLI, R. KESSLER, B. BETTCHER, M.C. IAMPIETRO & T. GIOVANNETTI. Everyday Error Monitoring in Schizophrenia: Impaired Detection with Preserved Correction.
Objective: To evaluate everyday error monitoring in schizophrenia (SZ). Error-detection and correction were characterized in SZ and compared to healthy controls and people with dementia (DM).
Participants and Methods: Participants with SZ (n=38) or DM (n=53) and controls (n=25) performed three everyday tasks. Monitoring behaviors were coded: Detection - proportion of errors that were followed by verbal or gestural acknowledgement, Correction-proportion of detected errors that were remedied, and correction time frames (e.g., Preemptive – corrected before completion, Immediate- corrected in next action, Delayed- corrected after intervening action).
Results: The groups significantly differed on Detection [MSZ= 30%, MDM= 32%, Mcontrol= 53%; $F(2, 112) = 8.17$, $p < .01$], with SZ and DM groups detecting significantly fewer errors than controls ($p < .01$ for both). The groups also differed on Correction [MSZ = 96%, MDM= 76%, Mcontrol= 95%; $F(2, 102) = 12.06$, $p < .01$], with both SZ and controls correcting significantly more than DM participants ($p< .01$ for both). SZ participants corrected errors at a rate comparable to controls, but DM participants made significantly more delayed corrections than SZ and control groups (Msz = 15%, MDM = 29%, Mcontrol = 17%, $p < .05$ for both). Among SZ participants, Detection and Correction scores were not significantly related ($r = -.20$, $p>.05$) and each showed differential relations with tests of executive functioning. Only Correction significantly correlated with perseverative errors on verbal fluency ($r = -.48$, $p < .01$).
Conclusions: Everyday error monitoring in SZ is multidimensional with detection and correction reflecting dissociable processes that are each related to different neurocognitive processes. In SZ, monitoring is impaired at the level of detection; error correction remained relatively preserved and fast. Thus, interventions that target error detection may have the greatest impact for improving everyday functioning and quality of life in this population.
Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

A.L. GOODING, A. SAPERSTEIN, M. RIVERA MINDT & A. MEDALIA. Insight Into Neuropsychological Impairment in Individuals With Schizophrenia Who Attend Cognitive Remediation.
Objective: The goal of this study was to examine the relationship between objective and subjective neuropsychological (NP) dysfunction in a community sample of individuals with schizophrenia who are enrolled in a cognitive remediation (CR) program.
Participants and Methods: Participants included 39 individuals with either schizophrenia or schizoaffective disorder who were enrolled in a CR program. All participants completed a NP battery and the MIC-SR (Measure of Insight into Cognitive Dysfunction – Self Report), a questionnaire designed to assess a participant's awareness of cognitive dysfunction. Global NP functioning was calculated using the average T-score from all NP tests.
Results: Global NP functioning for the entire sample averaged -1.5 SD below the mean for healthy controls, and awareness of cognitive impairment was low (X=14.10) suggesting that individuals in this sample evidenced cognitive impairment, but only reported occasional cognitive problems. For the entire sample, there was an insignificant correlation between objective global NP impairment and subjective reports of cognitive dysfunction ($r=.084$, $p=.609$). The correlations between all objective and subjective measures of impairment were insignificant.
Conclusions: People with schizophrenia who are receiving CR show poor awareness of their cognitive impairment. These results are consistent with literature on insight into psychiatric symptoms, which indicate that insight remains poor even after clinical stabilization, and may be reflective of a more global deficit in this population. More thorough psychoeducation in CR groups might ensure that individuals fully appreciate the value of these programs, the nature of their cognitive dysfunction, and how active engagement can maximize functional recovery.
Correspondence: *Amanda L. Gooding, MA, Clinical Psychology, Fordham University, 227 Mulberry St., Apt. 5E, New York, NY 10012. E-mail: AmandaLGooding@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

M. KIM, S. OH & D. CHOI. Relationships between neuropsychological deficits and schizotypic symptom dimensions in female college students with schizotypal traits.

Objective: This study investigated the relationships between neuropsychological functioning and schizotypic symptom dimensions in nonclinical individuals with psychometrically defined schizotypal traits

Participants and Methods: 1) Participants: The schizotypal trait group (n=28) was composed of college students who obtained more than 36 scores on Schizotypal Personality Questionnaire (SPQ), and control group (n=31) consisted of those who obtained average scores.

2) Neuropsychological tests: The Rey-Osterrieth Complex Figure test, California Verbal Learning Test, Wisconsin Card Sorting Test (WCST), Trail-Making Test and d2 test were administered.

3) Clinical tests: SPQ, Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) were administered.

Results: 1) Demographic characteristics: The schizotypal trait group showed significantly higher scores on SPQ ($F(1,57)=349.00$, $p<.0001$), BDI ($F(1,57)=9.37$, $p<.01$) and BAI ($F(1,57)=19.98$, $p<.0001$).

2) Neuropsychological tests: The results of MANCOVA showed significant differences between schizotypal and control groups on WCST. The schizotypal trait group showed more total errors ($F(1,55)=4.83$, $p<.05$), perseverative errors ($F(1,55)=4.85$, $p<.05$) and completed fewer categories ($F(1,55)=5.56$, $p<.05$).

3) Correlations between schizotypic symptoms and performance on neuropsychological tests: The schizotypal group showed significant associations between negative symptoms and total errors ($r=.477$, $p<.01$), perseverative errors ($r=.417$, $p<.05$) and categories completed ($r=-.419$, $p<.05$) on WCST.

Conclusions: These results indicate that nonclinical individuals with schizotypal traits have impaired executive function and experience behavioral deficits including social isolation and constricted affect. These results also indicate that cognitive deficits and the relationships between these deficits and negative symptoms observed in schizophrenia seem to characterize even nonclinical individuals with schizotypal traits

Correspondence: *Myung-Sun Kim, Ph.D, Psychology, Sungshin Women's University, Dongsun 3ga Sungbukgu, Seoul 136-742, Republic of Korea. E-mail: kimms@sungshin.ac.kr*

B.A. MARCOPULOS, C.M. BAILEY, C.M. TUSSEY, J. KENT & A.H. GROVE. Prevalence of Failed TOMM Performance in Consecutive Neuropsychology Referrals in a Psychiatric Hospital.

Objective: This study examines the demographic, clinical and forensic status correlates of TOMM performance in psychiatric in-patients.

Participants and Methods: 498 consecutive referrals (36% forensic) to a neuropsychology service at a state psychiatric hospital completed the TOMM as part of a standard clinical test battery. We created a 2 x 2 table with TOMM pass/fail (415/83) and secondary gain present/absent (206/292) to examine base rates and patient characteristics for the four groups.

Results: Of the 83 failed TOMMs, 50 had secondary gain defined as active criminal legal charges (49) or seeking disability (1). Mean scores were significantly lower in this group (Trial1M=27.06, SD=9.04; Trial2 M= 29.00, SD=10.32) compared with the 33 failed TOMMs with no secondary gain (Trial1 M=32.55, SD=8.19, Trial2 M= 34.28, SD=9.5). The patients with secondary gain who failed the TOMM tended to be younger (M=35.71 years) and have a shorter duration of psychiatric illness (M=8.15 years) than patients who failed the TOMM without secondary gain (M age=48.42; M duration 17.76). Twenty-five percent of the failed TOMM with secondary gain patients had a schizophrenia spectrum diagnosis versus 48% who failed without secondary gain.

Conclusions: Most patients passed the TOMM, but those who failed were more likely to be facing criminal charges. However, a significant number of individuals failed the TOMM with no apparent secondary gain. They were older and had a schizophrenia-spectrum diagnosis. Their low TOMM scores may reflect negative symptoms.

Correspondence: *Bernice A. Marcopulos, Ph.D., Neuropsychology, Univ. of Virginia/Western State Hospital, Box 2500, Staunton, VA 24402-2500. E-mail: bam8v@virginia.edu*

N. OJEDA, J. PENA, R. SEGARRA, E. BENGOETXEA, A. GARCIA, I. EGUILUZ, J. GARCIA & M. GUTIERREZ. Cognitive Predictors of Outcome in First-episode Schizophrenia and Non-Schizophrenia Syndromes: a Two-year Follow-up Study.

Objective: The aim of this prospective longitudinal study was to identify the best baseline predictors of functional outcome in a two-year follow-up of first-episode psychosis (FEP). We additionally tested whether the same factors predict functional outcomes in two different subsamples of FEP patients: schizophrenia and non-schizophrenia.

Participants and Methods: Ninety-seven patients with FEP underwent a full clinical evaluation (i.e., PANSS, Mania, Depression and Insight). Functional outcome measurements included the WHO Disability Assessment Schedule (DAS-WHO), Global Assessment of Functioning (GAF) and Clinical Global Impression (CGI). Estimation of cognition was obtained by a neuropsychological battery which included attention, processing speed, language, memory and executive functioning provided estimates of cognition.

Results: Greater severity of visual memory predicted poorer functional outcome as measured by the three functional scales (GAF, CGI and DAS-WHO) in the pooled FEP sample ($r2 = 14\%$, 8% and 10%, respectively). Negative symptoms also effectively contributed to predict GAF scores ($r2 = 6\%$). However, we obtained different predictive values after differentiating sample diagnoses. Processing speed significantly predicted functional outcomes in patients with schizophrenia, whereas visual memory was the only significant predictor of functional outcomes in the non-schizophrenia subgroup.

Conclusions: Our results suggest that processing speed, visual memory and negative symptoms significantly (but differentially) predict outcomes in patients with FEP, depending on their clinical progression. For patients without a schizophrenia diagnosis, visual memory was the better predictor of functional outcome. The decline of speed (both mental and motor) seemed to be a key factor in more severe syndromes.

Correspondence: *NATALIA OJEDA, PhD, of Psychology, Universidad de Deusto, Apartado 1,, Bilbao 48080, Spain. E-mail: nojeda@deusto.es*

N. OJEDA, J. PENA, S. PEDRO, E. BENGOETXEA, G. ACEBO, E. ELIZAGARATE, J. EZCURRA & M. GUTIERREZ. The Interaction Among Processing Speed Effect and Other Neuropsychological Domains in Schizophrenia.

Objective: Processing speed (PS) is considered a key feature of schizophrenia. One primary theoretical question with respect to PS and Sz concerns to the specific contribution of PS as a independent factor compared to its influence as a partial component in other cognitive abilities, such as attention or memory. Recent methods focusing on partitioning illness-related variance have indicated that large proportions of the illness-related effects on individual speed variables are shared with illness-related effects on other variables (Shalthouse, 2000).

Participants and Methods: One-hundred patients with schizophrenia were assessed in terms of sociodemographic, clinical and cognitive variables. Fifty three healthy control participants (NC) were recruited and did not differed from patients in terms of age, gender and completed years of education. Neuropsychological evaluation included domains of processing speed, attention, working and verbal memory and executive function.

Results: Confirmatory factor analysis supported a 5-factor cognitive structure replicated in both samples. Patients showed a significant degree of impairment in all cognitive factors. After covary for PS, the differences significantly decreased and working memory was no longer significant compared to NC. After, we controlled the effect of PS on other cognitive factors using the standardized residuals. Results demonstrated that it is PS that mostly accounts for the differences found between with schizophrenia and NC with greater effect on basic cognitive proceses (attention and working memory) and a smaller effect (but still significant effect) on higher cognitive process (p.e., executive functioning).

Conclusions: Our results emphasize the role of PS in Sz and add comprehension to the interactions among cognitive domains in healthy and unhealthy humans.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *NATALIA OJEDA, PhD, of Psychology, Universidad de Deusto, Apartado 1,, Bilbao 48080, Spain. E-mail: nojeda@deusto.es*

D. RACKHAM, S. BALDWIN & M. LARSON. Performance Monitoring Abilities in Schizophrenia: A Meta-Analysis.
Objective: Existing literature suggests that symptoms of schizophrenia are related to a reduced capacity to monitor performance. One reflection of these performance monitoring abilities is the error related negativity (ERN) component of the event related potential (ERP). Studies of the ERN in individuals with schizophrenia are mixed, but generally show attenuated ERN amplitude, suggesting a deficiency in performance monitoring skills. The current meta-analysis was designed to determine the average effect size of ERN amplitude attenuation for individuals with schizophrenia relative to healthy controls.
Participants and Methods: A thorough search of the literature yielded 101 studies; nine met all inclusion criteria. A total of 148 individuals with schizophrenia and 131 controls were included. Cohen's d was calculated as a measure of effect size comparing the mean (+SD) of correct-trial and error-trial ERN amplitude. Average effect size was calculated using a random effects model. Heterogeneity, influence and publication bias analyses were conducted.
Results: Tests of heterogeneity and publication bias were non-significant. The random effects model showed a moderate effect size (d = .67) for attenuation of ERN amplitude. Potential moderators, including age, symptom severity, experimental paradigm and electrode location were not significant.
Conclusions: Results indicate a moderate effect size for reduction of ERN amplitude, an index of performance monitoring, in individuals with schizophrenia. Future research specifically examining performance monitoring abilities as a function of schizophrenia subtype is warranted.
Correspondence: *David Rackham, Brigham Young University, 272 Barney Hawkin Road, Mickleton, NJ 08056. E-mail: ddrackham@gmail.com*

S. SELIGMAN, F. IRANI, V. KAMATH & R.C. GUR. The Relationship Between Emotion Perception and Functional Outcome in Schizophrenia: A Meta-Analysis.
Objective: Existing research has indicated a relationship between emotion perception abilities and functional outcome in individuals with schizophrenia. However, no meta-analytic reviews have quantitatively examined the specific relationship between difficulties in perceiving emotion and level of functioning. Given the pervasive nature of social dysfunction in schizophrenia, the aim of the current meta-analysis was to examine the magnitude of this effect across studies.
Participants and Methods: A Quality of Reporting of Meta-analysis standard was used after conducting a search of the literature using PubMed and PsycINFO. Studies reporting correlations between measures of emotion perception (identification and discrimination) and functional outcome in patients with schizophrenia spectrum disorders were selected. Subsequent analysis was performed using the Comprehensive Meta-Analysis-2.0 software package. Potential methodological (study setting, diagnostic measures used), demographic (sex, age, education, marital status) and clinical (symptoms, medication status) moderators were analyzed.
Results: Twenty-six studies (1177 patients) met inclusion criteria. Overall, a moderate effect of emotion perception difficulty on functional outcome was revealed (d=0.38). There was significant heterogeneity among study effect sizes and several significant moderators were identified.
Conclusions: Emotion identification and discrimination abilities are moderately associated with functional outcomes in individuals with schizophrenia spectrum disorders. This finding has implications for remediation efforts. The importance of considering demographic and clinical moderators in future studies is highlighted.
Correspondence: *Sarah C. Seligman, Psychiatry, University of Pennsylvania, 3400 Spruce Street, 10th floor Gates, Philadelphia, PA 19146. E-mail: sarc@upenn.edu*

G. GERNER, T.D. VANNORSDALL, A.S. BUCHHOLTZ & D.J. SCHRETLEN. The Contribution of Processing Speed to Neurocognitive Deficits Associated with Schizophrenia.
Objective: Processing speed is a neurocognitive domain that is often depressed across the most subtle to the most severe psychiatric illnesses, neurodegenerative diseases, and neurodevelopmental disabilities. Schizophrenia is one such condition in which deficits in processing speed are particularly salient even in the face of global neurocognitive deficits. Here we sought to determine whether the distinct pattern of neurocognitive deficits seen in schizophrenia remains after parceling out the effects of processing speed.
Participants and Methods: Using a series of binary logistic regression analyses we compared 284 unaffected adults and 98 adults with schizophrenia across five cognitive factors: attention, executive function, fluency, visual memory, and verbal memory (Chronbach's alphas = 0.75 – 0.89). All models included age, sex, race, and education in the first block. The processing speed factor was forced into the second block of each of the five analyses before entering the cognitive factor score of interest into the third block.
Results: As expected, when compared to normal controls, the schizophrenia group performed more poorly across all cognitive domains and controlling for processing speed attenuated these associations. In four of the models, processing speed was a stronger discriminator of group status than the cognitive factor of interest. Verbal memory was the only domain that predicted group status better than processing speed.
Conclusions: These findings suggest that individual differences in processing speed underlie a significant proportion of the cognitive deficits seen in schizophrenia. One notable exception was for verbal memory, which emerged as the strongest cognitive predictor of schizophrenia.
Correspondence: *Tracy D. Vannorsdall, Ph.D., Psychiatry, Johns Hopkins University School of Medicine, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21224. E-mail: TVannor1@jhmi.edu*

TBI (Adult)

B.J. HUFFORD, M.K. WILLIAMS, J.F. MALEC & D. CRAVOTTA. Use of Behavioral Contracting to Increase Compliance with Rehabilitation Treatments on an Inpatient Brain Injury Unit: A Case Study.
Objective: Patients with traumatic brain injury (TBI) often display behavioral difficulties in the acute phase of their rehabilitation, including poor compliance with treatment efforts. The purpose of this systematic, single-subject case study was to investigate the usefulness of behavioral contracting in increasing compliance and decreasing problematic behaviors in an adult with a severe TBI.
Participants and Methods: The subject was a 37-year old male with a severe traumatic brain injury who exhibited agitation and poor compliance with rehabilitation treatment on an inpatient traumatic brain injury unit. Attempts to address presumed awareness issues were unsuccessful. Medication trials also failed to produce an observable response in the patient's behavior. A behavioral contract was presented by staff that specified positive behaviors the patient needed to demonstrate in order to reach his goal of being discharged from the hospital. Nursing staff tracked agitation over time using the Agitated Behavior Scale (Corrigan, 1989).
Results: Patient agitation ratings immediately decreased and soon normalized. Statistical analysis of single subject times series data using the method of Nonoverlap of all Pairs results in a ratio of .875, indicating a moderate effect size for the intervention. The patient was able to comply with all requests, and, with supports, was able to be safely discharged from the hospital ahead of schedule.
Conclusions: The immediate increase in compliance and decrease in agitation is suggestive that the behavioral contract was the primary agent of change, but other factors (e.g., delayed effect of medication adjustments, spontaneous recovery) may have contributed as well. The exact mechanism by which change was effected is not clear, but may involve an increase in awareness, an increase in the therapeutic alliance between patient and staff, or other factors.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Bradley J. Hufford, Ph.D., Rehabilitation Hospital of Indiana, 4141 Shore Drive, Indianapolis, IN 46254. E-mail: bhufford@rhin.com*

Paper Session 1: Brain Behavior Relationships

Moderator: Duke Han

5:00–6:45 p.m.

S.D. HAN, L.M. GUIDOTTI, J.M. ZUKERMAN, J.N. HOOK, M. BROOK, V. DINH, G.T. STEBBINS & S.A. GREGORY. Diffusion Tensor Imaging and Cognitive Functioning of Older Adults Undergoing Chemotherapy.

Objective: Older adults are among the largest proportion of newly diagnosed cancer patients and may be at particular risk for neurological compromise following chemotherapy. The present study examined cognitive functioning and the integrity of white matter in older adult cancer patients undergoing chemotherapy. It was hypothesized that older adults undergoing chemotherapy treatment would have worse cognitive functioning and white matter integrity compared to healthy peers.

Participants and Methods: We evaluated twelve cancer patients treated with chemotherapy and eight demographically-matched control participants by using a comprehensive neuropsychological battery and diffusion-tensor imaging (DTI). For the DTI analyses, we compared fractional anisotropy (FA) findings in whole brain.

Results: On a word list-learning test, older adults undergoing chemotherapy had poorer delayed recall as compared to healthy peers ($F(1,15) = 4.76$, $p < .05$). DTI results revealed a significant ($p < .01$) decrease in FA in the right parahippocampal gyrus and genu of the corpus callosum. There was also a significant ($p < .01$) increase in FA in the anterior cingulum. Along with the increase in FA is a nearly significant ($p = .06$) increase in the axial diffusivity in the cancer patients, suggesting a loss of complexity in the cingulum bundle. Correlational analyses between FA and delayed recall performance yielded positive correlations between temporal, frontal, and parietal regions.

Conclusions: Memory outcomes appear to be negatively affected in older adults undergoing chemotherapy treatment for cancer. White matter integrity may also be compromised in older adults undergoing chemotherapy treatment for cancer. Regions that show FA differences are associated with memory performance, suggesting subjective memory complaints during or following chemotherapy may have a neurobiological correlate.

Correspondence: *S. D. Han, PhD, Behavioral Sciences, Rush University Medical Center, 1653 W. Congress Parkway, Chicago, IL 60612. E-mail: Duke_Han@rush.edu*

M. HARCIAREK, B. BIEDUNKIEWICZ, M. LICHODZIEJEWSKA-NIEMIERKO, A. DEBSKA-SLIZIEN & B. RUTKOWSKI. The effects of kidney transplant on cognitive performance of dialyzed patients: a longitudinal controlled study.

Objective: Dialyzed patients with end-stage renal disease (ESRD) often present with impaired neuropsychological performance. It remains unclear, however, whether cognitive deficits associated with ESRD and/or dialysis are reversible after successful kidney transplantation. Thus, the main purpose of this study was to longitudinally compare the cognitive performance of adequately dialyzed patients before, shortly after, and 1 year following successful kidney transplantation.

Participants and Methods: Twenty-seven dialyzed patients with ESRD who subsequently received kidney transplant, 18 dialyzed patients who were medically qualified and awaiting kidney transplant but did not receive it, and 30 matched controls were the participants for this study. All individuals completed a battery of standardized neuropsychological tests on the following longitudinal schedule: baseline, 8, and 20 months.

Results: Overall, the results of a series of repeated measures ANOVA, with significance level set at $p < .002$, demonstrated that a successful kidney transplant leads to improved neuropsychological performance. Shortly after the surgery, a statistically significant improvement was seen predominantly on measures of psychomotor speed/executive function and abstract reasoning. A marked improvement on most memory tests was, however, noted only during the 2nd follow-up. Importantly, the early beneficial effects of graft surgery were still present one-year following transplantation. Also, cognitive performance of dialyzed patients without kidney transplant was often below that of individuals without ESRD and declined slowly over time.

Conclusions: Kidney transplantation leads to a significant and relatively long-lasting improvement of cognitive performance of dialyzed patients. Additionally, the cognitive performance of patients remaining on adequate dialysis tends to decline over a time period of approximately 20 months.

Correspondence: *Michal Harciarek, Ph.D., Psychology, University of Gdansk, Bazynskiego 4, Gdansk 80-952, Poland. E-mail: mharciarek@yahoo.com*

R.C. HILSABECK, S. NARAYANA, C. FRANKLIN, A.L. WEBB, I. POY, O. ALI, S.L. STERN, P.T. FOX & S.K. AHUJA. Brain Glucose Metabolism and Cognitive Performance after 12 weeks of Interferon-alpha Therapy.

Objective: Interferon-alpha (IFN-×), a pro-inflammatory cytokine, has been associated with cognitive dysfunction in humans and animals, but little is known about what regions of the brain it affects or how such regional changes relate to cognitive performance.

Participants and Methods: In this study nine patients with chronic hepatitis C (CHC) aged 51 to 62 years (89% men) underwent 18(F)deoxyglucose positron emission tomography (FDG-PET) of whole brain and cognitive assessment at baseline and after 12 weeks of treatment with peginterferon-×, a synthetic form of IFN-×, and ribavirin, an antiviral agent. Five matched controls (100% men) were also studied.

Results: Relative to baseline and different from controls, CHC patients showed significantly ($p<.0001$) increased glucose metabolism in the insula and posterior cingulate, and significantly decreased metabolism in the inferior frontal cortex, middle temporal gyrus, and cuneus. Greater cognitive dysfunction in CHC patients was significantly ($r>0.8$, $p<0.001$) associated with hypometabolism in the superior and middle frontal gyri at baseline; hypometabolism in these regions became more extensive after 12 weeks of treatment. Greater cognitive dysfunction also was associated with hypermetabolism in the cingulate and parietal association areas at baseline and after treatment, as well as in the thalamus, putamen and frontal white matter tracts bilaterally at treatment week 12.

Conclusions: Although these findings need to be evaluated cautiously in view of the small number of subjects, they are consistent with our hypothesis that higher levels of IFN-× and possibly other pro-inflammatory cytokines are associated with abnormalities in frontal white and subcortical white and gray matter.

Correspondence: *Robin C. Hilsabeck, Ph.D., Psychology Service (116B), South Texas Veterans Health Care System, 7400 Merton Minter Blvd., San Antonio, TX 78229. E-mail: Hilsabeck@uthscsa.edu*

D. SABSEVITZ, M. EULER, C. STEWART, J. BINDER & S. SWANSON. Co-Lateralization of Wada Language and Memory Performance Is Associated With Better Verbal Memory Encoding In Left Temporal Lobe Epilepsy Patients (LTLE).

Objective: The purpose of the present study was to test the hypothesis that verbal memory depends on efficient interaction between language and memory systems. We predicted poorer verbal memory in patients whose language and memory are in opposite hemispheres.

Participants and Methods: From a consecutive series of 131 LTLE patients, we identified three groups based on Wada test performance: Group LL) 30 patients with left hemisphere language (Wada LI ≥ 20) and good memory capacity on the left (Memory Score ≥ 4/8); Group

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

RR) 13 patients with right hemisphere language (Wada LI < -20) and poor memory on the left (Object Memory Score of Λ2); Group LR) 19 patients with left language and poor memory on the left. All patients had good right hemisphere Wada memory capacity (Memory Score □ 4), FSIQ scores > 69, and completed verbal memory testing with the Selective Reminding Test (SRT) prior to left temporal lobectomy.
Results: Results of an ANCOVA using FSIQ as a covariate revealed significant group differences (p = .019) on the SRT. Estimated marginal means (standard error) for SRT were: Group LL = 35.5 (1.9), Group RR = 31.7 (3.4), Group LR= 25.6 (2.8). Post-hoc LSD showed significant differences between Group LL (left language/left memory) and LR (left language/right memory).
Conclusions: Verbal memory performance is better when language and memory are co-lateralized to the same hemisphere even when both language and memory are on the right. We propose that co-lateralization optimizes interactivity between the language network and the hippocampal memory system, and that this interactivity is critical for efficient verbal memory encoding.
Correspondence: *David Sabsevitz, Ph.D., Medical College of Wisconsin, 9200 W. Wisconsin Ave, Milwaukee, WI WI. E-mail: dsabsevitz@mcw.edu*

A. GALLAGHER, N. TANAKA, N. SUZUKI, H. LIU, E.A. THIELE & S.M. STUFFLEBEAM. Language Representation in Patients with Tuberous Sclerosis Complex (TSC) using MEG and fMRI.
Objective: Cognitive impairments, such language deficits, are reported in 50% of patients with TSC and are thought to results from tubers, seizures, or both. This study aims to investigate language representation in patients with TSC, and the relationship between language patterns and tuber location or history of seizures.
Participants and Methods: Fifteen patients with TSC and 31 healthy subjects performed a language task during MEG and fMRI recordings. Dynamic statistical parametric maps (dSPMs) were computed on MEG data allowing identification of cortical generators of language evoked fields (LEF). Laterality indices (LI) were computed based on a dipole counting method extracted from Broca and Wernicke's areas with their right homologous regions between 250 and 550ms. MEG and fMRI data were compared and anatomical MRI were reviewed for tuber location.
Results: Typically, LEF started in the fusiform gyrus (visual word recognition), followed by middle and superior temporal gyri as well as inferoparietal and supramarginal responses, ending with an inferior frontal activation. Similar activations were recorded in TSC patients compared to healthy controls, although the latter present an earlier activation pattern. As also found with fMRI, 13 patients had left language lateralization on MEG results, whereas LI showed one right and one bilateral language patterns in two TSC patients, who have history of epilepsy or cerebral lesions in language areas.
Conclusions: This neuroimaging study is the first to investigate language patterns in patients with TSC and show a 100% concordance between MEG and fMRI results. Cerebral abnormalities in TSC patients may have contributed to latter appearance of language activation compared to healthy controls, and to the occurrence of cerebral language reorganization in some patients with TSC.
Correspondence: *Anne Gallagher, Ph.D., Neurology, Harvard Medical School, Massachusetts General Hospital, Martinos Center for Biomedical Imaging, 175 Cambridge St. Suite 340, Boston, MA 02114. E-mail: anneg@nmr.mgh.harvard.edu*

D.W. MOORE, D.A. GANSLER, T.M. SUSMARAS, M.W. JERRAM, J. SOUSA & K.M. HEILMAN. Cortical Morphology of Visual Creativity.
Objective: Since the volume of cortical tissue devoted to a function often influences the quality of a person's ability to perform that function we wanted to learn if the creative visuospatial performance on the drawing portion of the Torrance Test of Creative Thinking (TTCT) is associated with measurements of cerebral volume. It was posited that TCTT would correlate positively with specific gray matter regions, including the right parietal lobe, anterior cingulate gyrus, and the inferior frontal gyri bilaterally.
Participants and Methods: Eighteen male healthy control participants (age range: 25-52, mean age=40.78, SD=7.74; 15 right-handers; college-educated) were sampled from the community via advertisement. High-resolution MRI scans were acquired on a 1.5 Tesla MRI scanner. Using voxel-based morphometry regression analyses of TTCT to cortical volume were restrained within the anatomic regions identified.
Results: One significant positive focus of association with TTCT emerged within the right parietal lobe (MNI coordinates: 44, -24, 63; 276 voxels).
Conclusions: Up to now only white matter correlates of creativity have been reported. Based on theories of parietal lobe function and the requirements of the TCTT, the area observed may be related due to its role in global aspects of attention and visuospatial processing including the capacity for manipulating spatial representations.
Correspondence: *Kenneth M. Heilman, MD, Neurology, University of Florida, Dept Neurology, Box 1000236, Gainesville, FL 32610. E-mail: heilman@neurology.ufl.edu*

P. MATTIS, C. TANG, N. GERBER, V. DHAWAN & D. EIDELBERG. Relationship Between Catechol-O-methyltransferase (COMT) Genotype, Neuropsychological Functioning, and Metabolic Network Activity in Parkinson's Disease.
Objective: To determine whether metabolic network activity and cognitive functioning in Parkinson's disease is associated with polymorphisms of the COMT gene. COMT is an enzyme that inactivates dopamine through O-methylation. In healthy subjects, the presence of the methionine (met) allele at codon 158 has been linked to larger dopamine pools in prefrontal cortex (PFC).
Participants and Methods: We studied 20 PD patients (16 men, 4 women; age 56.3 ± 8.0) who performed a verbal learning test and also underwent resting state FDG PET imaging. These individuals were genotyped for the COMT met158val allele (7 were val/val, 9 were val/met, and 4 were met/met). In all subjects, we quantified the expression of cognitive-related and motor-related spatial covariance patterns (PDRP and PDCP, respectively). PDRP and PDCP scores were compared across COMT haplotypes using ANOVA with post-hoc comparisons.
Results: For PDCP, there was a significant effect of genotype [$F(2,25)=3.33$; $p=0.05$], with met/met patients exhibiting higher pattern expression than those with val/met ($p=0.039$) and val/val ($p=0.02$). Further, there was a significant effect of genotype on verbal learning [$F(2,17)=3.58$, $p=0.05$], with the val/val patients exhibiting better performance than those with val/met ($p=0.036$) and met/met ($p=0.036$). There was no effect of genotype on PDRP expression ($p>0.05$).
Conclusions: This study indicates that in PD, cognitive functioning and PDCP expression are associated with COMT polymorphisms. Consistent with prior study of PD patients, the met (low activity) allele was associated with lower performance. This study further supports the importance of dopaminergic status to cognitive functioning in PD.
Correspondence: *Paul Mattis, Ph.D., Neurology, North Shore University Hospital, 865 Northern Blvd., suite 201, Great Neck, NY 11021. E-mail: pmattis@nshs.edu*

Paper Session 2: Predictors of Brain Health and Decline in Aging

Moderator: Adam Brickman

5:00–6:45 p.m.

P.H. LU, G.J. LEE, E.P. RAVEN, T. KHOO, K. TINGUS, J. LEE, J. MINTZ, P.M. THOMPSON & G. BARTZOKIS. Myelin Integrity Mediates Age-Related Slowing in Cognitive Processing Speed in a Sample of Healthy Elderly Males.
Objective: To assess the hypothesis that in a healthy elderly population, age-related slowing in cognitive processing speed is mediated by myelin breakdown in regions that myelinate later in brain development (late-myelinating white matter; LMwm) and are highly vulnerable to the effects of aging.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: An in vivo MRI biomarker of myelin integrity (transverse relaxation rate; R2) for LMwm (composite of prefrontal lobe white matter and genu of the corpus callosum) was obtained for 35 healthy elderly men (mean age=66.8 years; sd=5.8; range=55-76). Cognitive processing speed (SPEED) was measured using the Trail-making Test. Data analysis aimed to determine how much of the association between age and SPEED was accounted for by the posited mediator, LMwm R2. The paths were estimated using regression and multiple regression analyses. Mediation models were tested for significance using bootstrapping to estimate the standard error.
Results: Regression analyses demonstrated a significant relationship between age and LMwm R2 (beta=-.052, se=.012, p<.0001) and between age and SPEED (beta=-.062, se=.026, p=.02). The association between LMwm R2 and SPEED was significant even when controlling for age (beta=.831, se=.358, p=.027), but the effect of age on SPEED was not significant when controlling for LMwm R2 (p=.54). Direct testing of multiplicative paths demonstrated that the path from age to LMwm R2 to SPEED was statistically significant (p<.01), confirming that the relationship between age and SPEED was mediated by LMwm R2.
Conclusions: Breakdown of brain myelin integrity in highly vulnerable late-myelinating regions may be one biological mechanism underlying the age-related slowing in processing speed.
Correspondence: *Grace J. Lee, PhD, Neurology, UCLA, 10911 Weyburn Ave. #200, Los Angeles, CA 90095. E-mail: GJLee@mednet.ucla.edu*

J. SMITH, M.D. VERBER, K.A. NIELSON, P. ANTUONO, R.J. HANSON, A.J. MATTES, A.M. BUTTS & N.C. HANTKE. Effects of Walking Exercise on White Matter Integrity in Amnestic Mild Cognitive Impairment.
Objective: Alzheimer's disease (AD) and amestic mild cognitive impairment (aMCI) are associated with reduced white matter (WM) tract integrity, especially among intracortical projecting fiber tracts from occipital/parietal cortex to medial temporal and frontal lobe structures (Bosch et al., 2010). While cross-sectional evidence indicates physical activity is associated with greater WM integrity in healthy older adults (Marks et al., 2010), it is unknown if exercise training prospectively alters WM integrity in people diagnosed with MCI. The purpose of this study was to examine the effects of a 12-week walking exercise intervention on WM tract integrity in aMCI.
Participants and Methods: Diagnosis of amnestic MCI was confirmed using the Petersen criteria in 9 older adults. The 12-week intervention consisted of supervised treadmill walking (30 min/day, 4 days/week) at a moderate intensity (60-70% heart rate reserve). Before and after the intervention, diffusion tensor imaging (DTI) was used at 3T (3 runs) to measure whole brain fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (DA), and radial diffusivity (DR). A voxelwise analysis was performed to determine significant changes over time.
Results: After exercise training, MD and DA were significantly decreased ($p < .01$) in right posterior portions of the inferior fronto-occipital, inferior longitudinal, and superior longitudinal fasciculi.
Conclusions: These data indicate 12-weeks of walking exercise in aMCI may improve indices of WM microstructural integrity along tracts with direct or indirect connections to medial temporal and frontal lobe structures. Further work is needed to compare these effects to an active control condition, and determine if these changes impact conversion to AD.
Correspondence: *J Carson Smith, Ph.D., University of Wisconsin-Milwaukee, PO Box 413, Milwaukee, WI 53201. E-mail: jcarson@uwm.edu*

A.J. JAK, A. MCCAULEY, J. GRAVANO, S. JURICK & M. BONDI. Impact of a Walking Intervention on Executive Functioning in Older Adults.
Objective: Physically active older adults have improved cognitive functioning compared to sedentary individuals and physical activity is protective against cognitive decline with age. The amount of activity required to achieve cognitive benefits is unclear and clinical trials investigating the impact of exercise on cognition in older adults have been limited. We investigated the impact of a walking intervention on neuropsychological test performance in sedentary older adults.
Participants and Methods: Fifteen sedentary but otherwise healthy older adults (ages 65-80) participated in a 12-week trial in which half progressively increased their daily step counts and half did not. Changes in neuropsychological performance from baseline between the walking and control groups were examined at four time points via t-tests. There were no differences between groups on baseline average step counts, age, education, or health variables such as blood pressure, pulse, weight, or BMI (all p's>.32).
Results: Compared to the control group, the walking group had significant increases on tests of executive functioning after one month and three months from baseline and were maintained three months after the intervention ceased (all p's <.10). Average daily step change over the duration of the intervention was also related to increased weight loss (r=.52, p = .06), and reduction in BMI, (r=.47, p= .11).
Conclusions: Results suggest that even small increases in physical activity lead to improvements in executive functioning in healthy older adults and lay the foundation for future studies examining whether using increased activity levels as an intervention for low-activity adults protects against or delays the onset of cognitive decline.
Correspondence: *Amy J. Jak, Ph.D., VA Healthcare System, San Diego/UCSD, 3350 La Jolla Village Dr., 151B, San Diego, CA 92161. E-mail: ajak@ucsd.edu*

A.M. WEINSTEIN, K.I. ERICKSON, B.P. SUTTON, R.S. PRAKASH, M.W. VOSS, L. CHADDOCK, A. SZABO, E. MAILEY, S.M. WHITE, T.R. WOJCICKI, E. MCAULEY & A.F. KRAMER. The Effect of Aerobic Fitness on N-Acetylaspartate and Memory in Neurologically Healthy Older Adults.
Objective: Aerobic exercise is a promising treatment for cognitive decline; however, little is known about the molecular mechanisms by which exercise impacts the human brain. In the current study, we examined the relationship between cardiorespiratory fitness and n-acetylaspartate (NAA), a central nervous system metabolite found predominantly in neuronal cell bodies and that aids in myelin turnover and bioenergetics. NAA concentrations decline with normal aging, Alzheimer's disease, and stroke, indicating reduced neuronal viability and/or neuron number in these states. We hypothesized that higher fitness levels would offset age-related declines in NAA and that increased NAA levels would be associated with better working memory performance.
Participants and Methods: Aerobic fitness (VO2 max), NAA concentration in the frontal cortex via magnetic resonance spectroscopy, and cognitive function including tests of digit span and spatial memory performance were obtained on one hundred forty-four neurologically healthy older participants (mean age = 66.10; SD = 5.45).
Results: Consistent with our predictions, we found that higher aerobic fitness levels were associated with higher NAA concentrations (beta = .198; t =2.282; $p < .05$). Importantly, higher aerobic fitness levels offset an age-related decline in NAA (Age x Fitness interaction beta = 2.08; t = 2.535; $p < .01$). NAA levels were associated with better performance on the backward digit span (beta = -.213; t = -2.346; $p < .05$), whereas there was no relationship between NAA levels and forward digit span or spatial memory performance.
Conclusions: These results indicate that aerobic fitness may offset age-related declines in neuronal viability that attenuate decline in working memory capacity.
Correspondence: *Andrea M. Weinstein, BA, University of Pittsburgh, 3137 Sennott Square, 210 S. Bouquet St, Pittsburgh, PA 15260. E-mail: andrea.weinstein@gmail.com*

I.B. MEIER, J.J. MANLY, F.A. PROVENZANO, J. HECTOR, B.T. WASSERMAN, K. LOUIE, E. ALLOCCO & A.M. BRICKMAN. White matter predictors of cognitive functioning in older adults.
Objective: Recent studies show the importance of white matter integrity in cognitive aging. High resolution magnetic resonance imaging can be used to visualize and quantify micro- and macro-structural abnormalities in the aging brain. Few studies, however, have employed multiple

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

imaging modalities to examine cognitive correlates of white matter integrity. We examined the utility of white matter hyperintensities (WMH), lesions reflecting small vessel cerebrovascular disease, and diffusion tensor imaging-derived fractional anisotropy (FA), reflecting white matter integrity, to predict cognitive functioning among older adults.
Participants and Methods: To date, quantitative MRI and neuropsychological evaluations were performed in 51 neurologically healthy older participants from an ongoing study of cognition and genetics of Alzheimer's disease in African Americans (age=71.59+/-7.04, education=14.25+/-3.06, 82% women). Total WMH volume was determined with in-house developed software. Fractional anisotropy was derived in multiple regions of interest using standard techniques, which were subjected to principal component analysis to derive a single FA measurement. Controlling for age and education, we examined the association of WMH and FA with cognitive test scores with multiple regression analysis.
Results: Increased WMH was consistently associated with poorer delayed memory performance, but not with other cognitive functions. Fractional anisotropy did not emerge as a significant predictor of neuropsychological test performance. Higher age and less education were consistently associated with lower test scores. White matter hyperintensity volume and FA were not related to each other.
Conclusions: These preliminary results highlight the importance of small vessel cerebrovascular disease in memory performance among older adults. Fractional anisotropy and WMH appear to reflect different aspects of white matter integrity.
Correspondence: *Adam M. Brickman, Ph.D., Taub Institute, Columbia University, 630 West 168th Street, New York, NY 10032. E-mail: amb2139@columbia.edu*

G. CHAPMAN, A. GENTILE, N. CANTWELL, U. NAHAR, V. WILLIAMS, D. SALAT & A.L. JEFFERSON. White Matter Integrity in the Entorhinal Cortex & Parahippocampal Region is Associated with Memory Performances in Individuals with Mild Cognitive Impairment.
Objective: White matter within the entorhinal cortex and parahippocampal region, structures implicated early in Alzheimer's disease (AD), is compromised in individuals with pre-clinical AD (i.e., mild cognitive impairment; MCI) compared to cognitively normal controls. The current study examines entorhinal and parahippocampal white matter integrity, as measured by diffusion tensor imaging (DTI), and memory performances among a small cohort of individuals with MCI.
Participants and Methods: 19 MCI participants (41% female, 75±7 years) underwent 3T DTI acquisition and episodic memory assessment, including California Verbal Learning Test-II (CVLT-II) and Biber Figure Learning Test (BFLT). Fractional anisotropy (FA) and radial diffusivity (RD) were measured using FreeSurfer and FSL tract-based spatial statistic tools.
Results: ANCOVAs adjusting for age, sex, and education yielded significant associations between left entorhinal RD and CVLT-II long delay free recall (p=0.04) and total parahippocampal FA and BFLT long delay free recall (p=0.03).
Conclusions: Our preliminary results suggest bilateral white matter integrity in the parahippocampal region is associated with nonverbal, visuospatial memory performance while white matter integrity lateralized to the left entorhinal cortex is associated with verbal memory performance.
Correspondence: *Angela L. Jefferson, PhD, Boston University School of Medicine, 72 East Concord Street, B-7800, Boston, MA 02118. E-mail: angelaj@bu.edu*

K.J. BANGEN, K. RESTOM, T.T. LIU, C.E. WIERENGA, A.J. JAK & M.W. BONDI. Assessment of Alzheimer's Disease Risk with Functional Magnetic Resonance Imaging: An Arterial Spin Labeling Study.
Objective: The apolipoprotein E (APOE) ε4 allele and mild cognitive impairment (MCI) are risk factors for the development of Alzheimer's disease (AD). Using arterial spin labeling (ASL) MRI, we examined the influence of AD risk on resting cerebral blood flow (CBF) as well as CBF and blood oxygenation level dependent (BOLD) signal response to memory encoding in the medial temporal lobes (MTL).
Participants and Methods: T1-weighted and ASL scans at rest and during picture encoding were acquired for 43 older adults. Twenty-nine individuals were classified as cognitively normal and 14 met criteria for MCI. Twenty individuals were APOE ε4 carriers whereas 23 were non-ε4 carriers. Risk groups were equivalent in terms of age, education, and MTL volumes.
Results: APOE e4 carriers demonstrated increased resting state CBF relative to their non-ε4 counterparts. In contrast, the MCI group showed decreased resting CBF relative to their cognitively normal peers. There were no significant main effects based on AD risk in terms of BOLD signal to memory encoding. However, there was a trend toward a cognitive status by genotype interaction for percent change CBF. In the cognitively normal group there was no difference in percent change CBF based on APOE genotype. In contrast, in the MCI group, APOE ε4 carriers demonstrated greater activation relative to non-ε4 carriers.
Conclusions: Findings provide support for the notion that ASL may provide a sensitive technique for identifying individuals at risk for AD, monitoring changes in neural activity due to developing AD neuropathology, and assessing effectiveness of disease-modifying treatments.
Correspondence: *Katherine J. Bangen, Ph.D., Psychiatry, University of California, San Diego, 9500 Gilman Drive, mc 0664, La Jolla, CA 92093-0664. E-mail: kbangen@ucsd.edu*

Benton Award Lecture: Childhood Brain Disorders as a Window on the Developing Social Brain: An Essay in Honor of Arthur Benton

5:45–6:45 p.m.

K. YEATES. Childhood Brain Disorders as a Window on the Developing Social Brain: An Essay in Honor of Arthur Benton.
Arthur Benton was a pioneer in the study of childhood brain disorders and their behavioral consequences. His work in this area foreshadowed the advent of developmental social neuroscience as a field of research that focuses on the "social brain" and its development from infancy to adulthood. Social development has significant implications for children's functioning at home, in school, and in the community. Despite advances in our understanding of the social brain and its development, however, surprisingly little is known about the nature, basis, and consequences of the social problems associated with childhood brain disorders. This talk will highlight recent research on the social outcomes of childhood brain disorders and how it provides a valuable window on the developing social brain. A heuristic model of the social outcomes of childhood brain disorders will be presented that draws on theories and methods from both the emerging field of social neuroscience and the study of social competence in developmental psychology/psychopathology. The model characterizes the relationships between social adjustment, peer interactions and relationships, social problem-solving and communication, social-affective and cognitive-executive processes, and their neural substrates. The model will be illustrated by current research on a variety of childhood brain disorders. The presentation will conclude with an acknowledgment of Dr. Benton's foresight in anticipating more general directions in the field of child neuropsychology and a discussion of their potential implications for future studies of the developing social brain.
Correspondence: *Keith Yeates, Nationwide Children's Hospital, 700 Children's Dr., Columbus, OH 43205. E-mail: keith.yeates@nationwidechildrens.org*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

THURSDAY MORNING, FEBRUARY 3, 2011

Invited Address: Order and Disorder in the Emotional Brain

Speaker: Richard Davidson

9:00–10:00 a.m.

R. DAVIDSON. Order and Disorder in the Emotional Brain.
Emotions are at the core of human personality, they define each person's uniqueness and they shape resilience and vulnerability to adversity. Perhaps the single most salient characteristic of emotion is the variability across individuals in how each responds to emotional cues and challenges. This variability is termed "affective style." Different parameters of affective style can be objectively measured and are instantiated in different underlying neural circuits. Activation patterns assessed with neuroimaging, particularly those involving interactions between sectors of the prefrontal cortex and subcortical structures implicated in emotion, are related to different parameters of affective style and are consistent over time within individuals. Specific patterns of brain activity are related to vulnerability to particular types of disorders. Moreover, patterns of central brain function are related to peripheral biological systems that play a role in physical health and illness. Despite their consistency over time within individuals, these patterns of neural activity are not immutable to change but rather can be transformed through systematic mental training such as meditation. The literature on neuroplasticity provides a framework for understanding these changes. This latter body of evidence supports the view that happiness, well-being and emotional balance are best regarded as the product of trainable skills.
Correspondence: *Richard J Davidson, PhD, University of Wisconsin - Madison, 1500 Highland Ave, Madison, WI 53705. E-mail: rjdavids@wisc.edu*

Symposium 2: We Use Them, But Should We? Psychometric Properties of the VA TBI Screening Tool, NSI, and Combat Experiences Scale

Chair: MIna Dunnam

Discussant: Rodney D. Vanderploeg

9:00–10:30 a.m.

M. DUNNAM, R.D. VANDERPLOEG, K. DONNELLY, J.P. DONNELLY, P.R. KING & W.M. GUYKER. We Use Them, But Should We? Psychometric Properties of the VA TBI Screening Tool, NSI, and Combat Experiences Scale.
Symposium Description: Comprehensive assessment of veterans presenting with reports of combat-related head injuries is key to accurate diagnosis, good care, rehabilitation of function, and improvement in quality of life. TBI surveillance, diagnosis, and differentiation from other neurobehavioral conditions with similar and overlapping symptom profiles pose numerous challenges for clinicians in military, veterans, and community healthcare settings. This symposium presents an overview of a large 4-year multi-site prospective cohort study of combat-related TBI in Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans; describes recent findings on the effectiveness of three measures commonly used to assess TBI and PTSD; and explores the current state of science and practice in the assessment of TBI, post-concussion syndrome (PCS), and polytrauma. The first paper provides a short description of the parent research project and its ongoing study of 500 OEF/OIF veterans. The second paper describes the first formal study on the reliability and validity of an important screening tool for TBI identification, developed and selected for nationwide use by the Veterans Healthcare System in 2007. The third paper presents original research on a factor analytic study of the Neurobehavioral Symptom Inventory (NSI), a survey tool of symptoms associated with TBI and post-concussion syndrome (PCS), also selected for nationwide use by Veterans Healthcare System in 2007. The fourth paper presents original research exploring the validity of the Combat Experiences Scale (CES), a self-report measure that assesses exposure to combat. A discussant outside the study team critiques the project and comments on current issues in the assessment of TBI, PCS, and polytrauma.
Correspondence: *MIna Dunnam, Ph.D., Behavioral Health, VA Medical Center, 113 Holland Avenue, Albany, NY 12208. E-mail: mina.dunnam@va.gov*

M. DUNNAM. Cognitive Assessment of Veterans after Traumatic Brain Injury.
Objective: Traumatic Brain Injury TBI has been identified as the signature injury of the wars in Iraq and Afghanistan. Available data also suggest that significant numbers of service members who were not classified as wounded during their service in Iraq or Afghanistan have been found to have signs of brain injuries. Relationships among mild TBI (mTBI), Post-traumatic Stress Disorder (PTSD), post-deployment stress, depression, and physical symptoms in veterans returning from Iraq are significant, and create diagnostic, treatment, and management challenges for care providers. The purpose of the present study is to describe cognitive, affective, and substance abuse symptoms associated with deployment and TBI in OEF/OIF veterans.
Participants and Methods: In this large multisite study, a cohort of 500 OEF/OIF veterans is being followed in 4 serial neuropsychological exams conducted at 6-month intervals. Overall objectives of the study are to: (1) describe self-reported, war-related cognitive and affective symptoms in OEF/OIF veterans with and without TBI; (2) construct cognitive profiles of OEF/OIF veterans who have and have not experienced TBI's during their deployments; (3) describe the relationship between affective symptoms and the cognitive profiles of OEF/OIF veterans; (4) explain the relationships among brain injury, cognitive symptoms, patient outcomes, and health services outcomes, controlling for patient and deployment characteristics; and (5) examine changes in cognitive and affective symptoms and patient outcomes over time.
Results: The project is at the mid-point in data collection.
Conclusions: Reliability and validity studies on three of the measures employed are reported.
Correspondence: *Mina Dunnam, VA Medical Center, 113 Holland Avenue, Albany, NY 12208. E-mail: mina.dunnam@va.gov*

K. DONNELLY. Reliability and Validity of the VA TBI Screening Tool.
Objective: In 2007, the VA Healthcare System began screening all returning war veterans for TBI. The measure implemented had face validity but had not been subjected to psychometric scrutiny. This study provides item analyses, estimates of temporal reliability and internal consistency, and examination of the sensitivity and specificity of the screening instrument.
Participants and Methods: Five hundred veterans of the wars in Iraq and Afghanistan enrolled in the study, as part of a larger four-year, multisite prospective cohort study of returning veterans.
Results: Three hundred twenty (64%) participants screened positive, with 219 (43.8%) confirmed to have sustained a TBI, based on a structured interview. The screening tool appeared to have high internal consistency (.77) and test-reliability (.80), high sensitivity (.94), and moderate specificity (.59). Diagnostic odds ratios for the screening tool ranged from 12.6 for the total sample to 24, when veterans with probable post traumatic stress disorder were excluded from analysis.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The VA TBI Screening Tool appears to be a reliable and valid instrument. The presence of significant post traumatic stress disorder symptoms, however, reduced the specificity of the measure and highlights the need for careful clinical follow-up of positive screens.
Correspondence: *Kerry Donnelly, VA Medical Center, 3495 Bailey Avenue, Buffalo, NY 14215. E-mail: kerry.donnelly@va.gov*

P.R. KING. A Psychometric Study of the Neurobehavioral Symptom Inventory.
Objective: Given the increased incidence of traumatic brain injury associated with modern combat, there is a pressing need for effective screening practices to identify TBI and symptoms of post-concussion syndrome (PCS) in the veteran population. This study explores the reliability, sensitivity, and specificity of the Neurobehavioral Symptom Inventory (NSI).
Participants and Methods: Data were obtained from a federally-funded study of the experiences of combat veterans (VA HSR&D SDR 06-162). Participants included 494 OEF/OIF veterans, of whom 219 experienced at least one TBI. Each completed a comprehensive interview, multiple self-reports, and neuropsychological testing.
Results: Estimates of the NSI's internal consistency varied: ratings for the complete measure (× = .95) and the cognitive and affective subscales (× = .92 for each) were outstanding; ratings for the somatic subscale (× = .84 to .87) were excellent; and ratings for the sensory subscale were acceptable (× = .70 to .72). Multiple receiver operating characteristic (ROC) curve analyses based on the prevalence of TBI in the sample detailed the sensitivity and specificity of NSI subscales and total score. Area under the curve (AUC) estimates ranged from .67 to .75. Somatic symptom endorsements yielded the greatest AUC estimates (AUC =.73 to .75), followed by the NSI total (AUC = .73).
Conclusions: Based on these findings, the NSI is viewed as a marginally valuable metric of PCS symptoms. Recommendations for clinical usage are offered.
Correspondence: *Paul R. King, VA Medical Center, 3495 Bailey Avenue, Buffalo, NY 14215. E-mail: paulking@buffalo.edu*

W.M. GUYKER. Dimensionality and Validity of a Measure of Combat Experience.
Objective: By and large, the history of measurement of combat experience, including recent history, has been at the macro level (e.g., in terms of number of injuries, casualties, exposure to combat). However, with the recognition of new kinds of combat and resulting psychological sequelae, there is a need for more subjective measures at the level of the individual. The current conflicts in Afghanistan and Iraq pose unique experiences of combat trauma. The Combat Experiences Scale (CES) is a 33-item measure that assesses exposure to combat. Compared to previous measures of combat exposure, its breadth and depth are promising. However, the psychometrics of this measure are not yet known. The purpose of this study is to examine aspects of the internal and external validity of the CES.
Participants and Methods: Data were collected from participants in a study of brain injuries related to the conflicts in Iraq and Afghanistan across five VA medical centers in upstate New York (N=500).
Results: An exploratory factor analysis suggested that three factors represented the scale well: exposure to combat environment, physical engagement, and proximity to serious injury and death. The CES also showed adequate reliability. Finally, evidence of construct validity was evaluated to estimate convergent and discriminant validity of the Combat Experience scales by examination of correlations with demographic and war experience scales as well as cognitive, affective and behavioral measures.
Conclusions: The CES dimensions appear to advance our understanding of combat experience; in particular, that deployment-related experiences ought to be conceptualized broadly and encompass experiences above and beyond direct combat alone.
Correspondence: *Wendy M. Guyker, VA Medical Center, 3495 Bailey Avenue, Buffalo, NY 14215. E-mail: wmguyker@buffalo.edu*

Symposium 3: Preventing Cognitive Decline in Aging and Neurologic Disease

Chair: James F. Sumowski

Discussant: Yaakov Stern

9:00–10:30 a.m.

J.F. SUMOWSKI, Y. STERN, F. GÓMEZ-PINILLA, K.I. ERICKSON, J.F. SUMOWSKI & A.M. BRICKMAN. Preventing Cognitive Decline in Aging and Neurologic Disease.
Symposium Description: Aging and neurologic disease are associated with cognitive decline; however, this symposium will highlight several modifiable lifestyle factors associated with successful cognitive aging, and protection from disease-related cognitive decline. Fernando Gómez-Pinilla, Ph.D. from UCLA will discuss the beneficial effects of nutrition on brain health and cognition. Specifically, Dr. Gómez-Pinilla will discuss the benefits of omega-3 fatty acids and the curry spice curcumin, as well as the interaction between nutrition and exercise. Kirk I. Erickson, Ph.D. of the University of Pittsburgh will present research on the benefits of aerobic exercise, including the results of a randomized controlled exercise intervention. Dr. Erickson has linked aerobic fitness to increased brain volume and greater functional connectivity, resulting in preserved cognition during aging. Regarding neurologic disease, James F. Sumowski, Ph.D. of the Kessler Foundation will show that premorbid aerobic exercise protects against brain atrophy in persons with multiple sclerosis (MS), resulting in preserved cognition. Dr. Sumowski will also show that premorbid cognitive leisure protects MS patients from cognitive decline. Adam M. Brickman, Ph.D. of Columbia University will discuss the contributions of diet, aerobic exercise, vascular factors (e.g., diabetes) and cognitive activity to successful cognitive aging among elders. Dr. Brickman will highlight implications of these modifiable lifestyle factors on risk for Alzheimer's dementia. Finally, Yaakov Stern, Ph.D. of Columbia University will lead a discussion on the contribution of lifestyle factors to 'cognitive reserve' against dementia / cognitive impairment. Dr. Stern will discuss implications for treatment protocols aimed at bolstering cognitive reserve in elderly and diseased populations.
Correspondence: *James F. Sumowski, Ph.D., Neuropsychology & Neuroscience Laboratory, Kessler Foundation Research Center, 300 Executive Drive, Suite 10, West Orange, NJ 07042. E-mail: jsumowski@kesslerfoundation.org*

F. GÓMEZ-PINILLA. Diet and exercise therapy to enhance cognitive development.
Objective: We are starting to understand the action of nutrients on higher order brain centres, with the capacity to maintain mental health.
Participants and Methods: I will discuss how the interaction among select dietary factors can influence brain function and cognitive abilities.
Results: In particular, omega-3 fatty acids can support cognitive function and confers protection against neurological disorders by acting on plasma membranes and molecular systems underlying synaptic plasticity. In turn, the curry spice curcumin, which possesses a long history as medicinal drug in India, can regulate cell energy metabolism and synaptic plasticity, and can complement the action of omega-3 fatty acids on learning and memory. Exercise is an excellent therapy to reduce mood disorders and maintain cognitive function across several conditions and ages. I will discuss how exercise can interact with dietary factors and benefit brain function and plasticity. According to our research, exercise has the capacity to counteract the action of poor diets, enhance the capacity of the omega-3 fatty acid DHA to support plasma membranes and synaptic plasticity, and enhance the power of curcumin on managing cellular energy metabolism and synaptic function.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: We believe that diet and exercise management can increase resilience of the brain to insults, and has long-term benefits for optimal brain operations and cognitive function. In addition, based on the outstanding safety profiles of diet and exercise interventions, information derived from animal studies can be readily translatable into human treatment.

Correspondence: *Fernando Gómez-Pinilla, 621 Charles E. Young Drive, Box 951527, Los Angeles, CA, CA 90095. E-mail: fgomezpi@mednet.ucla.edu*

K.I. ERICKSON. Aging, Exercise, and Brain Function.

Objective: Brain tissue decays in late adulthood, leading to impaired memory function and increased risk for dementia. With escalating health care costs and an increased proportion of people over 65, it is imperative that low-cost, accessible preventions and treatments for brain tissue loss are discovered.

Participants and Methods: In this talk, I will present data from a one-year randomized controlled trial of moderate intensity exercise.

Results: Moderate intensity exercise increases the volume of certain brain regions including the hippocampus, and that increased volume leads to improvements in memory. We also demonstrate that increased hippocampal volume is associated with greater levels of brain-derived neurotrophic factor, a putative mediator of neurogenesis in the dentate gyrus of the hippocampus. Finally, we demonstrate that exercise enhances brain function by influencing the connectivity between regions.

Conclusions: These results reveal the importance of fitness and exercise on brain morphology and suggest that aerobic exercise is protective against hippocampal decay and may even reverse manifest deficits that increase the risk for dementia. Greater connectivity within several brain networks enhances the communication between brain areas and is related to better cognitive function. In sum, we claim that neurocognitive function is enhanced by aerobic exercise interventions and that this provides evidence for brain plasticity in old age.

Correspondence: *Kirk I. Erickson, 405 N. Mathews Ave, Urbana, IL 61801. E-mail: kiericks@pitt.edu*

J.F. SUMOWSKI, G.R. WYLIE, V.M. LEAVITT, N. CHIARAVALLOTI & J. DELUCA. Benefits of early life cognitive leisure activity and aerobic exercise in multiple sclerosis.

Objective: Persons with multiple sclerosis (MS) suffer cognitive decline, but little is known about modifiable lifestyle factors which may slow the progression of MS disease, or moderate / reduce the negative effect of MS disease progression on cognition. We investigated the protective effects of early life cognitive leisure activity and aerobic exercise.

Participants and Methods: Thirty-six persons with MS retrospectively reported on cognitive leisure activity (e.g., reading, hobbies, etc.) and aerobic exercise (e.g., running, swimming, etc.) during their early 20's before the onset of MS. Patients also reported non-aerobic exercise (e.g., walking, weightlifting, etc.). Current cognitive status was assessed with neuropsychological tasks (memory, processing speed), and brain atrophy was measured from high resolution MRIs.

Results: Greater early life cognitive leisure activity protected MS patients from current cognitive decline, even when controlling for premorbid intelligence. Early life aerobic exercise was associated with less brain atrophy, and, through reduced brain atrophy, less cognitive decline. Non-aerobic exercise was not associated with brain atrophy or current cognitive status.

Conclusions: Premorbid cognitive leisure activity and aerobic exercise protect MS patients from disease-related cognitive decline. Cognitive leisure activity appears to build cognitive reserve, which helps MS patients cope with disease progression (i.e., atrophy). Aerobic exercise has a direct beneficial effect on disease progression itself (i.e., reduced brain atrophy), which results in preserved cognition. Implications for intellectual enrichment and aerobic exercise interventions will be discussed.

Correspondence: *James F. Sumowski, 300 Executive Drive, Suite 10, West Orange, NJ 07052. E-mail: jsumowski@kesslerfoundation.org*

A.M. BRICKMAN. Integrating neuropsychology and neuroimaging to identify treatment targets for age-related cognitive decline and Alzheimer's disease.

Objective: As older adults comprise an increasingly large segment of the population, there has been a recent focus on identifying pathways to successful cognitive aging. Observational and quasi-experimental research efforts that integrate neuropsychology and neuroimaging have been particularly fruitful in identifying preventative and intervention targets for normal age-related cognitive decline and Alzheimer's disease.

Participants and Methods: Recent studies from our group have used advanced neuroimaging techniques to identify the structural and functional brain changes that occur with aging and how these changes predict individual differences in cognition among older adults. By defining the potential mechanisms through which age impacts brain structure and function as well as the moderating variables that alter relationships between age-associated brain changes and cognition, we can identify modifiable factors that can be leveraged for intervention or prevention trials.

Results: Our work has highlighted the importance of vascular factors (e.g., hypertension, fluctuating blood pressure, diabetes), lifestyle factors (e.g., diet, aerobic activity), and psychosocial factors (e.g., educational and occupational exposure) in mediating and moderating these associations. In the current presentation, I will review these recent findings, focusing on blood pressure, diabetes/insulin resistance, and adherence to a Mediterranean diet as factors that impact age-associated brain structure and function.

Conclusions: I will discuss how factors that reflect exposure to cognitively stimulating activity throughout the lifespan and quality of physical development may mitigate the impact of brain pathology on cognition in old age.

Correspondence: *Adam M. Brickman, 630 West 168th St, P&S 16, New York, NY 10032. E-mail: amb2139@columbia.edu*

Poster Session 2: Cognitive Neuroscience, Epilepsy, Executive Functions, Imaging, Memory

9:00–10:30 a.m.

Cognitive Neuroscience

M.T. ACOSTA, P. KARDEL, K.S. WALSH, A.J. SILVA, J.N. VAN DEN ANKER, S.J. SOLDIN, G.A. GIOIA & R.J. PACKER. The Neurocognitive and Metabolic Impact of Lovastatin in Treatment of Cognitive Deficiencies in Children with Neurofibromatosis Type 1 (NF1).

Objective: Lovastatin has been demonstrated to produce positive changes in memory and spatial impairments in mouse-models of neurofibromatosis type 1 (NF1). This drug's effect in children with NF1 has yet to be evaluated. Study aims were to examine the safety, tolerability, and efficacy of lovastatin in this clinical population.

Participants and Methods: This was a phase I study of escalating dose lovastatin (20-40 mg) over 12 weeks assessing safety and tolerability. Secondary objectives included assessing the effect of lovastatin on neuropsychological performance. Twenty-four NF1 children aged 10 to 17 years were included. Neuropsychological assessment was performed pre and post treatment. Cholesterol levels were collected, and a subset of patients underwent PK analysis. T-tests and reliable change index (RCI) analysis were used to evaluate neurocognitive change.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Lovastatin was well tolerated and produced minimal side effects. Significant variability was noted in cholesterol levels and drug absorption. Significant improvements were demonstrated on measures of memory, attention, and efficiency. Meaningful improvements in memory continued to be demonstrated in 30-40% of patients with RCI, particularly in those whose baseline performance was below expectations.
Conclusions: This study indicated good tolerability and safety of Lovastatin in children. There was preliminary evidence of positive effects on aspects of neurocognitive functioning, particularly in children with lower baseline levels. Additional studies are necessary to corroborate these findings, with a particular focus on reliable change over time.
Correspondence: *Maria T. Acosta, MD, CNMC, 111 Michigan Ave NW, Washington DC, DC 20010. E-mail: macosta@cnmc.org*

M.T. ACOSTA, P. KARDEL, K.S. WALSH, J.W. VAN METER, M.L. KALBFLEISCH, W.D. GAILLARD & R.J. PACKER. Changes in Executive Function Pre and Post Lovastatin Treatment: fMRI Study in Neurofibromatosis type 1 (NF1) Children.
Objective: Learning impairments are common in children with NF1, most notably involving executive functioning. Animal models and a phase 1 study have shown positive effects of lovastatin on some aspects of neurocognition. It is unclear how lovastatin specifically affects brain chemistry in NF1 children, and this studies aims to explore those mechanisms through functional imaging.
Participants and Methods: Eight children with NF1 participated in this trial, undergoing fMRI at baseline and following 3 months on lovastatin. In scanner tasks included the NNAT-Flanker and a Go-No-Go task. Data was analyzed using SPM5, and functional maps for each subject were calculated at $p < .001$ and subjected to quality control.
Results: A statistically significant improvement was seen in performance accuracy on the NNAT-Flanker task. Pre-treatment imaging indicated less organized activation, while there were strong trends in increased and more organized activation of medial frontal gyrus, superior frontal gyrus, superior temporal gyrus, and putamen. Similar trends were observed on the Go-No-Go task.
Conclusions: Increased frontal and organized activation patterns were demonstrated from baseline to post-treatment, indicating a more mature and expected neural signature for this task encompassing areas that support cognitive control and also visual processing related to the matrix format of the stimuli. This pattern may be indicative of a mechanism for cognitive improvement with the treatment of lovastatin in children with NF1.
Correspondence: *Maria T. Acosta, MD, CNMC, 111 Michigan Ave NW, Washington DC, DC 20010. E-mail: macosta@cnmc.org*

L.M. BAKER, C. MAHLER, R. PAUL, D. TATE, J. HEAPS & E. LANE. Relationship Between Cognitive and Physical Activity Levels and Brain Integrity.
Objective: Evidence suggests that engagement in both cognitive and physical activities supports healthy cognitive function in older age and may reduce the risk of dementia. However, limited information is known about the magnitude of benefit derived from both cognitive and physical activity in a single sample of healthy older participants.
Participants and Methods: The present study addressed this question among 109 healthy adults. All participants underwent a neuropsychological evaluation and completed questionnaires regarding self-reported frequency of involvement in cognitive and physical activities. Participants were subdivided into high activity and low activity groups according to the frequency of engagement in both forms of activity. Neuropsychological testing included the RBANS total score, and performance on Grooved Pegboard, Trail Making A and B, DKEFS Interference, and Letter Number Sequencing. Whole brain volume (WBV) was also determined using 3T structural MRI.
Results: Results revealed no significant differences in performance on any measures between the individuals in the high (n=48) vs. low (n=38) cognitive activity groups. By contrast, a strong trend ($p = .06$) was noted on the RBANS total score (M= 92.79 and M=99.61) when the high (n=85) physical exercise group was compared to the low (n=14) group. No differences were noted between groups on WBV.
Conclusions: In conclusion, the results reveal no convincing evidence of relationships between engagement in physical or cognitive activities and neuropsychological status or brain imaging in this healthy group of older adults. Future studies are needed that capture engagement in these activities in more comprehensive detail than available in the present study.
Correspondence: *Laurie M. Baker, University of Missouri- St. Louis, 1705 Marshall Ct., Florissant, MO 63031. E-mail: lmbtyd@mail.umsl.edu*

J. DIETZ, M. BRADLEY, M. OKUN & D. BOWERS. Divergent effects of emotional arousal on physiology and behavior in Parkinson's disease.
Objective: Previous studies have shown that when healthy adults view emotional pictures, their pupils dilate more and number of visual fixations increase. These findings presumably reflect increased arousal (pupil dilation) and interest associated with emotional stimuli. The aim of the current study was to investigate whether Parkinson Disease (PD) patients would show similar autonomic (pupil dilation) and behavioral (voluntary visual fixations) correlates of emotional processing,. Based on previous observations, we hypothesized that PD patients would demonstrate reduced emotional reactivity.
Participants and Methods: 14 nondemented PD patients and 12 age-matched controls viewed standard ized set of 44 emotional and neutral pictures (IAPS) that were balanced for luminosity. Pupil diameter and eye movements were recorded (Applied Science Laboratory Eyetracking System). PD patients were tested "on" dopa medication (LED 737.1 SD 537.9),had Hoehn-Yahr staging of 2-4, and were not depressed.
Results: Mixed MANOVAs were conducted to test for group and/or valence effects on pupil dilation and visual fixations. Pupil dilation was significantly greater when viewing emotional, compared to neutral pictures for both PD and controls. With respect to fixations, PD patients made fewer fixations during pleasant and neutral picture types, but there was no significant difference between the groups in number of fixations during unpleasant pictures.
Conclusions: Our hypothesis was not supported. Instead, these results demonstrate a disjunction between PD patients' intrinsic arousal response to affective stimuli (normal) and their behavioral correlates of emotional arousal (abnormal). PD patients showed pupil dilation similar to controls in response to pleasant pictures; however, they made significantly fewer voluntary fixations while viewing these stimuli. Results will be discussed in terms of anhedonic behavioral tendencies among patients with PD.
Correspondence: *Jenna Dietz, M.S., University of Florida, PO Box 100165, Gainesville, FL 32605. E-mail: jdietz@phhp.ufl.edu*

M.K. FLAKS, S.M. MALTA, P.P. ALMEIDA, M.C. PUPO, S.B. ANDREOLI, M.F. MELLO, A.L. LACERDA, J.J. MARI & R.A. BRESSAN. Neuropsychological Evaluation Of Brazilian Victims Of Urban Violence With And Without Post-traumatic Stress Disorder.
Objective: Subjects exposed to traumatic life experiences resulting in post-traumatic stress disorder (PTSD) have shown disruption in cognitive functions such as attention, memory, and executive function. This study aimed at exploring which cognitive dimensions are capable of discriminating PTSD subjects in a sample of Brazilian adults, victims of urban violence.
Participants and Methods: Sample was recruited from an epidemiologic survey composed of subjects exposed to traumatic life experiences resulting in PTSD (55 females: mean age 36.29±10.48 years; 10.71±2.26 years of education) and 70 victims without PTSD (50 females: 38.69±12 years; 10.53±2.63 years of education), by means of Clinician Administered PTSD Scale interview (CAPS) and DSM-IV criteria, matched by

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

gender, age and years of education. Neuropsychological battery: Vocabulary and Block Design (WAIS-III); Digit Span, Spatial Span and Visual Reproduction (WMS-III), Mesulan Cancellation Test, Rey Auditory Verbal Learning Test (RAVLT), Stroop Test, Wisconsin Card Sorting Test, International Affective Picture System (IAPS). A logistic regression model was adjusted and used to investigate which cognitive functions discriminate between groups.
Results: PTSD group has better results in recognition of interference stimuli during a learning process in RAVLT (p-value=0.0333). They also evoked more emotional negative stimuli compared to the non-PTSD group in IAPS (p-value=0.0096).
Conclusions: These data emerge the question if PTSD patients might have such an overstimulated attention and an impaired executive functioning that compromises the ability to discriminate which information is important to be memorized. Similarly, this executive impairment might directly interfere with emotional memory emphasizing the focus of attention to negative stimuli.
Correspondence: *Mariana K. Flaks, PhD., Psychiatry, UNIFESP, Rua Botucatu, 431, São Paulo 04023-061, Brazil. E-mail: mariflaks@hotmail.com*

L.J. GRANDE, R. MOAYER, M. ESTERMAN, J. DEGUTIS & R. MCGLINCHEY. Increased Distractibility Associated with Post-traumatic Stress Disorder Symptom Severity.
Objective: Post-traumatic stress disorder (PTSD) is a disorder that can develop after exposure to a terrifying event during which grave physical harm occurred or was threatened. Individuals with PTSD experience persistent, frightening, and intrusive thoughts and memories of their experience. Many of the cognitive symptoms of PTSD suggest a disruption of selective attention abilities, which normally act to enhance processing of task-relevant stimuli and inhibit/ignore processing of task-irrelevant stimuli. Lavie (1995) has proposed a model of visual selective attention that argues susceptibility to distraction decreases when perceptual or attentional processing demands of a primary task are high. The current study investigates selective attention and distractor processing in returning veterans with symptoms of PTSD.
Participants and Methods: Employing a modification of Lavie's original perceptual load paradigm, participants completed a target identification task under both low- and high-perceptual load conditions. Flanking, irrelevant distractors were either congruent or incongruent with the target. Performance (both response latency and accuracy) was examined relative to self-reported symptoms of PTSD.
Results: All participants demonstrated distractor congruency effects under the low load condition, independent of PTSD symptom severity. Under high-load conditions, distractor congruency effects were correlated with PTSD symptomatology. Correlational analyses revealed that PTSD severity was positively correlated with distractability (r-= .79, p= .32) in the high perceptual load condition but not in the low-perceptual load condition (r-= .25, p= .061).
Conclusions: These findings suggest that there may be an alteration in the attentional capacity of patients who have relatively more severe PTSD symptoms; information that is normally ignored or suppressed actively interferes with ongoing perceptual processing.
Correspondence: *Laura J. Grande, Ph.D., Psychology, VA Boston Healthcare System, 116 Psychology Svc, 150 S. Huntington Ave, Boston, MA 02130. E-mail: laura.grande@va.gov*

D.A. KAUFMAN, I. MOLNAR-SZAKACS & R.M. BILDER. Cognitive Control, Empathy, and Gender.
Objective: Empathy has been associated with prefrontal cortex function, and observed gender differences in the neural correlates of empathy indicate that males and females may rely on divergent strategies when engaged in empathic processing. The current study explores the relationship between empathy and cognitive control in males and females in order to determine if gender influences the associations between empathy and cognition.
Participants and Methods: One hundred and fifty-two adult participants (92 female) completed the interpersonal reactivity index (IRI), along with experimental tasks requiring executive control of attention (flanker task) and verbal working memory (WM). Multiple linear regression models were used to examine the relationships between IRI subscales and cognitive task performance.
Results: In females, IRI subscales significantly predicted mean response time (RT) for incongruent trials on the flanker task, but were not associated with WM performance. Among females, the perspective-taking scale was positively associated with incongruent RT. In males, IRI subscales predicted scores on a verbal WM manipulation task, but were not associated with performance on the flanker or WM maintenance tasks. Among males, the perspective-taking and empathic concern subscales were associated with WM manipulation performance.
Conclusions: Empathy was found to be associated with cognitive control sub-processes in different ways for males and females. This dissociation highlights the importance of taking gender into account when measuring empathy and related constructs. While the neural processes underlying this gender effect were not examined in the current study, these findings support the notion that empathic processing may utilize different neural mechanisms in males and females.
Correspondence: *David A. Kaufman, Ph.D., Semel Institute for Neuroscience and Human Behavior, UCLA, 760 Westwood Plaza, Los Angeles, CA 90095. E-mail: dskaufman@mednet.ucla.edu*

W.D. KILLGORE, T.A. CONRAD, N.L. GRUGLE & T.J. BALKIN. Baseline Executive Function Abilities Correlate with Risky Behavior Following Sleep Deprivation.
Objective: Individuals with greater activation/functioning of the prefrontal cortex at rested baseline may be more resistant to the effects of sleep deprivation on alertness. Whether this holds true for risk-taking behavior is not known. We examined whether baseline executive function capabilities are predictive of change in risk-taking behavior on the Balloon Analog Risk Task (BART) after 24 hours of sleep loss.
Participants and Methods: Fifty-four (29 men) healthy individuals completed a battery of neurocognitive tests at rested baseline. The BART was completed at rested baseline and again following 24 hours of wakefulness. On the BART, participants pressed a key to inflate a virtual balloon, earning money for each pump, unless the balloon popped. Risk-taking was defined as the number of pumps made for unexploded balloons that were successfully redeemed (i.e., Adjusted Number of Pumps; AnP). Change in risk-taking was defined as the difference between the sleep deprived AnP and baseline AnP (i.e., CHANGE = AnP2 – AnP1). Neurocognitive test scores were used to predict CHANGE using Pearson correlations.
Results: CHANGE was significantly predicted by baseline performance on prefrontal executive tasks including Letter-Number Sequencing (r=-.39, p=.003), Color Trails Part 2 (r=.37, p=.006), and phonemic verbal fluency (r=-.33, p=.02), but not for demographic factors such as age (r=.12), handedness (r=.00), education (r=.03), or cognitive variables such as full-scale intelligence (r=-.23), judgment of line orientation correct (r=-.25), or performance on the Stroop word (r=-.04), color (r=-.04), or color-word conditions (r=-.16).
Conclusions: Greater risk-taking following a night of sleep deprivation was predicted by lower executive function capacities at rested baseline, particularly those involving working memory, mental set shifting, and cognitive manipulation. Findings support an emerging perspective that baseline executive function capacities may be protective against the adverse effects of sleep loss on cognition.
Correspondence: *William D. Killgore, Ph.D., Psychiatry, Harvard Medical School, Brain Imaging Center, McLean Hospital, 115 Mill Street, Belmont, MA 02478. E-mail: killgore@mclean.harvard.edu*

W.D. KILLGORE, N.L. GRUGLE, D.B. KILLGORE & T.J. BALKIN. Resistance to Sleep Loss and Decision Making During Sleep Deprivation.
Objective: Some aspects of executive functioning, such as decision-making on the Iowa Gambling Task, appear to be sensitive to sleep depri-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

vation. Evidence suggests that some individuals show trait-like vulnerability or resistance to the effects of sleep loss on simple tasks involving alertness and vigilance. Here, we classified individuals as either "resistant" or "vulnerable" based on their sleep deprived performance on a psychomotor vigilance test (PVT) and examined whether this trait-like resistance also extends to emotion-guided decision-making capacities on the IGT.

Participants and Methods: From a larger sample of healthy subjects, 13 (8 men; mean age = 23.1 years) were classified as "resistant" and 13 (7 men; mean age = 23.8 years) were classified as "vulnerable" to sleep deprivation based on scoring in the upper or lower quartile of PVT performance during 41 hours of sleep deprivation. During sleep deprivation, subjects were administered the Iowa Gambling Task (IGT) at rested baseline (following an 8 hour overnight sleep period) and again following 23 hours of wakefulness. Performances on the 5 blocks of the IGT were compared between vulnerable and resistant groups and between baseline and sleep deprived conditions.

Results: A significant block by group by session interaction was found ($p=.04$). While both groups learned the task similarly at baseline, only the "resistant" group showed significant improvement in decision-making during sleep deprivation. The decision-making capabilities of the "vulnerable" group, in contrast, were relatively suppressed during sleep deprivation ($p<.05$)

Conclusions: Individuals classified as "resistant" to sleep deprivation based on PVT performance performed similar to vulnerable individuals on the IGT at baseline, but outperformed "vulnerable" individuals on the IGT during sleep deprivation. Trait-like differences in vulnerability to vigilance decrements during sleep loss also extend to emotion-guided decision-making capacities.

Correspondence: *William D. Killgore, Ph.D., Psychiatry, Harvard Medical School, Brain Imaging Center, McLean Hospital, 115 Mill Street, Belmont, MA 02478. E-mail: killgore@mclean.harvard.edu*

Y. KOSEKI, A. ITO, N. ABE, A. UENO, A. HAYASHI, E. MORI, Y. SUNG, Y. MATUE & T. FUJII. Dissociating areas for novelty detection and for episodic encoding within the human medial temporal lobe.

Objective: Many neuroimaging studies have reported that the "new-old effect" and the "subsequent memory effect" are detected in the medial temporal lobe (MTL). However, no study has yet to dissociate areas related to these two effects. In this functional magnetic resonance imaging (fMRI) study, we searched for the areas involved in novelty detection and in episodic encoding within the MTL.

Participants and Methods: Thirty-two healthy volunteers (17 males, age range 20-27, mean age 21.6 years) were paid for their participation in this study. Before fMRI, participants were shown a set of color pictures (List A) and were asked to make an animacy judgment. During 3.0-tesla fMRI, participants were shown both the studied pictures (list A, targets) and novel pictures that had not been presented during the study phase (list B, foils). They were asked to indicate whether they had seen the picture or not in the animacy judgment task (test 1). After fMRI scanning, a surprise recognition memory test was administered (test 2). During this test, participants were shown the pictures presented as unstudied foils during the test 1 (list B, targets) and novel pictures that had not been presented earlier during the experiment (list C, foils). They were asked to indicate whether they had seen the picture or not at any time during the experiment. Data preprocessing and statistical analysis were performed using SPM 8 (Wellcome Department of Imaging Neuroscience, London, UK).

Results: The "new-old effect", activity for stimuli correctly judged to be "new" compared with those correctly judged to be "old", was found in the posterior part of the MTL. The subsequent memory effect, activations for stimuli later recognized compared with those later forgotten in the surprise recognition memory test, were found in bilateral anterior to middle parts of the MTL.

Conclusions: These results indicate that the pattern of MTL activity differs depending on the effects of the "new-old" and the "subsequent memory".

Correspondence: *Yuta Koseki, Behavioral neurology and cognitiove neuroscience, Tohoku university graduate school of medicine, 2-1, Seiryo-machi, Aoba-ku, Sendai 980-8575, Japan. E-mail: koseki@med.tohoku.ac.jp*

T. LAKE, C. JICHA, L. VALISETTY & M. SPIERS. Estrogenic Influence on Risk-taking and Reward Dependent Behaviors.

Objective: The dopaminergic system of the brain plays an integral role in behaviors related to risk and reward. Estradiol (E2) interacts with this system and may positively affect dopamine (DA) neurotransmission. Therefore, this study seeks to investigate the effect that a woman's estradiol (E2) level may have on reward and risk-taking behaviors as neurons become more sensitive to DA when E2 is high. It was hypothesized that participants would demonstrate decreased performance on both the IGT and BART during the late follicular phase of their cycle indicating higher risk-taking and reward dependent behavior when E2 levels were high.

Participants and Methods: This study evaluates the influence of E2 on reward dependence [Iowa Gambling Task (IGT) modified using a food reward] and risk taking [Balloon Analog Risk Task (BART)] behaviors by comparing performance during menses (M) (i.e. low E2) and the late follicular (LF) phase (i.e. high E2) in five women.

Results: A one-way within subjects repeated measures ANOVA showed a significant effect of cycle phase $F(3,2) = 17.53$, $p=.05$ for the BART with decreased performance during LF (M=29.8, SD=8.3; M=6.2. SD=1.6) when compared with menses (M= 18.1 SD=8.4; M=4.2, SD=2.1). Pilot results also show a trend towards decreased performance during the LF phase on the IGT, $F(1.00,4.00) = 4.75$, $p=.095$ with 4 out of 5 people making a greater number of choices from 'bad' decks (M=-.32, SD=3.3) when compared with menses (M=1.6, SD=2.4).

Conclusions: These results have important implications for understanding the role of E2 and it's effect on reward and risk-taking behaviors.

Correspondence: *Tiffany Lake, B.S., Psychology, Drexel University, 3141 Chestnut St., Philadelphia, PA 19104. E-mail: tiffanymlake@gmail.com*

E.M. LANE, T.E. CONTURO, D.F. TATE, J. PRICE, A.R. MCMICHAEL, D. ROMO, T.D. FLETCHER, J. HEAPS & R.H. PAUL. A Latent Variable Model of Cognitive Reserve and the Relationship to White Matter and Executive Function.

Objective: Previous research reports that multiple factors are involved in the construct of cognitive reserve (CR), such as education, IQ, and leisure activities; however, a model for incorporating these variables has not been developed. The purpose of the present study is to build a model of CR, and determine if individuals with age-related reductions in frontal white matter volume perform better on measures of executive function if they have a higher CR value.

Participants and Methods: Fifty-five healthy individuals aged 51 to 85 (mean=63.52, SD=8.01) underwent 3T MRI and executive function tests (Trails B, Letter-Number Sequencing, RBANS Digit Span, and DKEFS Stroop). CR variables included education, months retired, travel frequency, social activities, and Shipley and WRAT estimated IQ. Model fit and latent variable scores for CR and executive function were developed using confirmatory factor analysis.

Results: Overall, the CFA indicated that the model was near optimal fit $\alpha^2(53, N=55)=62.03$, $p=0.19$, RMSEA=0.056. The regression between frontal white matter and executive function was significant $F(1, 53)=7.61$; $p=.01$. The regression remained significant when the CR latent score was added as a moderator $F(3, 51)=14.47$, $p=.00$.

Conclusions: The results indicate that this combination of CR measures is a good model. This is important since previous research suggests that several factors contribute to CR, and this method makes it possible to create a single variable for an individual. Additionally, the CR score served as a moderator between the relationship of frontal white matter and executive function.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Elizabeth M. Lane, Psychology M.A., Behavioral Neuroscience, University of Missouri - St. Louis, 815 Leland Avenue 1S, Saint Louis, MO 63130. E-mail: emlane@umsl.edu*

B. MACDONALD WER, A. BERNARD, R. BOADA, B.F. PENNINGTON, P. FILIPEK, C. FILLEY, J.C. DEFRIES & R.K. OLSON. The gray/white (GM/WM) matter ratio as a marker of brain development.

Objective: It is known that individual differences in brain volume are related to individual cognitive differences, but little is known about how developmental differences in brain volume relate to developmental differences in cognition. Since the volume of gray matter (GM) decreases across development due to synaptic pruning, while the volume of white matter (WM) increases via myelination, we reasoned that the GM/WM ratio would be a sensitive index of brain development related to developmental cognitive differences.

Participants and Methods: Our sample consisted of 290 participants, age 11 to 25, including 131 twin pairs (MZ= 69, DZ= 62), 20 siblings, and 8 singletons. Cognitive measures included the Wechsler IQ Scale and processing speed tasks, as part of a larger study. Morphometric analysis of a structural brain MRI yielded GM and WM volume data.

Results: A quadratic regression model, with age and gender predicting the GM/WM ratio, was statistically significant overall ($R2 = .32$, $F = 45.28$, $p < .001$), but only age and age2 were significant predictors; gender was not. GM/WM ratio tracked developmental differences in raw cognitive scores, but was not related to individual cognitive differences once age was covaried, unlike GM or WM volumes. Finally, using Falconer's method, the GM/WM ratio was found to be heritable ($h2 = .51$).

Conclusions: The GM/WM ratio is a developmental marker of brain development that does not appear to be associated with gender or individual differences in cognition. Much like gray and white matter volumes, the GM/WM ratio is heritable. This ratio may be useful to track developmental changes.

Correspondence: *Beatriz MacDonald Wer, Dept. of Psychology, University of Denver, 2155 South Race Street, Denver, CO 80208. E-mail: tish.macdonaldwer@du.edu*

L. RACE, M. KEANE & M. VERFAELLIE. Episodic Future Thought in Amnesia: Retrieval of Episodic Details Versus Personal Facts.

Objective: While the role of the medial temporal lobes (MTL) in episodic memory is well established, it has recently been suggested that the MTL also supports episodic future thought. Evidence for this hypothesis has primarily come from functional neuroimaging data demonstrating MTL activity when subjects imagine future scenarios. Relatively little research has addressed this question in patients with MTL damage, and such work is based almost exclusively on single case studies. The goal of the present study was to examine episodic future thought in a group of patients with MTL amnesia and to evaluate whether amnesics' impairment in envisioning future episodes is specific to retrieving episodic details or also encompasses retrieval of personal facts.

Participants and Methods: The current study tested 5 patients with MTL damage and 7 healthy controls. Patients and controls generated descriptions of ten future scenarios and the number and nature of semantic and episodic details produced for each description was scored.

Results: As predicted, patients generated significantly fewer episodic details compared to controls. In addition, patients generated fewer personal semantic details. Parallel impairments in episodic future thought were present in descriptions of both distant and close future scenarios.

Conclusions: These results demonstrate that the contribution of the MTL to episodic future thought extends beyond retrieval of episodic details and includes retrieval of personal facts.

Correspondence: *Liz Race, PhD, Boston University, Memory Disorders Research Center, 150 South Huntington Avenue, Boston, MA 02130. E-mail: race@bu.edu*

D.E. WARREN, M.C. DUFF, M.D. CASSELL & D. TRANEL. Long-term Neuropsychological and Neuroanatomical Outcomes of Amnesia Subsequent to Status Epilepticus and Cerebral Anoxia.

Objective: Our objective was to fully characterize the neurological and neuroanatomical consequences of an episode of status epilepticus and cerebral anoxia in a patient who is densely amnesic as a result.

Participants and Methods: We describe the case of 1846, a 47-year-old woman with profound amnesia (WMS 3 GMI = 57, WAIS 3 FSIQ = 91) following status epilepticus and an associated anoxic episode at age 30. 1846 has undergone extensive neuropsychological testing at the University of Iowa over the intervening 17 years, and we present those longitudinal data here. Importantly, the results indicate that her amnesia has remained stable for the entire chronic epoch.

Results: On eight administrations of the Rey AVLT, her trial-5 immediate recall scores were 6/2/7/7/4/6/5/4 (mean = 5.13), and her delayed recall scores were 0/0/1/2/1/1/3/1 (mean = 1.13). Likewise, her Rey-Osterrieth Complex Figure Test delayed recall scores on seven of the same occasions were 0/1.5/5/6/6/4/3 (mean = 3.64), and her GMI was extremely low but stable on both the WMS R (60) and the WMS 3 (57), administered several years apart. Despite this profound amnesia, her cognition is mostly intact: CFT copy scores of 27/27/28/27/26/26/11.5 (mean = 24.64); normal WRAT-R reading scores (95-102); no signs of clinical aphasia; and normal WCST scores (68 correct, 14 errors). Additionally, we have recently collected high-resolution MRI scans of 1846's brain revealing the extent of 1846's substantial bilateral hippocampal atrophy (Studentized residual = -4.23) and some additional white-matter pathology.

Conclusions: Despite her severe amnesia, 1846 receives sufficient social support from her family to maintain a relatively normal life, providing a compelling example of a fascinating patient whose research potential might have gone undetected if not for the family's pursuit of professional guidance.

Correspondence: *David E. Warren, PhD, Neurology, University of Iowa Hospitals and Clinics, 200 Hawkins Drive, 2155 RCP, Iowa City, IA 52242. E-mail: davideugenewarren@gmail.com*

Epilepsy/Seizures

L.D. BAIR, L.D. HAMIWKA & K.O. YEATES. Social Adjustment in Children with Epilepsy: A Self-report.

Objective: Difficulties with social functioning are reported in children with epilepsy. Social adjustment encompasses the quality of children's relationships with others, but also includes other aspects of social functioning, such as self-perceptions of loneliness or social self-esteem. Through self-report we assessed social adjustment in children with epilepsy.

Participants and Methods: Seventeen children 9-11 years with established epilepsy and 6 classmate controls were asked to complete the Relational Provisions Questionnaire, the Harter Social Acceptance Scale and the Network of Relationships Inventory. Total scores/subscales of cases and controls were compared using a t-test analysis corrected for multiple comparisons using a Sidak correction.

Results: Children with epilepsy report significantly more loneliness with peers ($p=0.008$), less peer group integration ($p=0.01$) and less peer personal intimacy ($p=0.02$) on the Relational Provisions Questionnaire compared to controls. They also reported a trend for poorer perceived social acceptance ($p=0.08$) on the Harter Social Acceptance scale compared to controls. No differences were seen between the two groups for relationship qualities in terms of reliability of alliance, enhancement of worth, affection, companionship, instrumental help, intimacy, and nurturance of the others as measured by the Network Relationships Inventory.

Conclusions: Children with epilepsy perceive more loneliness and difficulties in their peer relationships compared to classmate controls. They also tend to perceive themselves as less socially accepted than their peers. Our findings, limited by a small sample, suggest that children with epilepsy may have poorer social adjustment when compared to their peers.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Layne D. Bair, BA, Nationwide Childrens Hospital, 700 Children's Drive, Columbus, OH 43205. E-mail: layne.bair@nationwidechildrens.org*

S.J. BANKS & M. JONES-GOTMAN. Aging Without a Hippocampus: Long term cognitive outcomes of temporal lobe surgery for epilepsy.

Objective: Unilateral temporal lobe epilepsy (TLE) is associated with material specific memory impairment, with verbal loss when the epileptogenic focus is in the dominant hemisphere, and nonverbal loss in patients with a nondominant focus. This memory deficit is associated with hippocampal atrophy, which has been shown to be progressive. In many cases, TLE is refractory to medication, but responds well to resective surgery. In our clinical experience, we find that many patients who have undergone surgery report increased problems with memory as they age. Investigation of this apparent decline has been limited by short follow-up periods. It is therefore unclear if the memory loss with aging experienced by patients with epilepsy and those who have had surgery occurs on a steeper gradient than the memory loss associated with normal aging.

Participants and Methods: In a multicenter study, we are collecting long term outcome data on patients who underwent epilepsy surgery as young adults, as well as patients with early epilepsy onset who have not had surgery.

Results: Preliminary data analysis comparing patients who had undergone surgery (mean age 59 years, mean years since surgery 28) with age-matched healthy controls show the expected material specific memory deficits. However, patients with who had left TLE demonstrated a worse material specific deficit than patient with right TLE. Despite this, quality of life was comparable in the two groups.

Conclusions: Our results will be discussed in the context of preoperative testing, the ApoE status of patients, extent of surgical resection and volume of the hippocampus in the unoperated hemisphere.

Correspondence: *Sarah J. Banks, PhD, Neuropsychology, Montreal Neurological Institute, 3801 University St, Room 276, Montreal, QC H2W2B1, Canada. E-mail: sarah.banks@mail.mcgill.ca*

O.J. BENITEZ, C.L. CASTILLO, P. GLASIER & P.L. STAVINOHA. Fearing the Worst: Anxiety in Children with Secondary Generalized Seizures.

Objective: Epilepsy is the most common neurological condition in children in the United States, affecting 150,000 to 325,000 between the ages of 5 and 14. Research has consistently found that children with epilepsy have an increased risk for psychiatric symptoms. However, minimal research has addressed anxiety among different types of seizures, especially those with secondary generalized seizures. This study aimed to identify the relationship between seizure type (generalized seizures, partial seizures, or partial seizures with secondary generalization) and parent rating of anxiety in children with epilepsy.

Participants and Methods: The Behavior Assessment System for Children, Second Edition™ (BASC-2™) was administered to the parents of 119 children with one of the three types of seizures as part of a neuropsychological evaluation. Patients included 51% male, 39% Caucasian, 23% African American, and 38% Latino, ages 4 to 17. Chart review was utilized to obtain BASC-2™ scores. ANCOVA and multivariate ANOVAs were conducted in order to evaluate whether parent-reported anxiety was discrepant among the three types of seizures while also addressing medication-related variables.

Results: Results indicated that children with secondary generalized seizures (M = 60.71, SD = 15.82) were rated higher in anxiety by parents compared to those with generalized seizures (M = 49.70, SD = 11.84), $F(2, 116) = 4.79$ $p = 0.01$. Additionally, the findings were supported after taking medication-related variables into account.

Conclusions: It can be concluded the different clinical manifestations of seizures may produce unique patterns of anxiety within pediatric populations, such as found in this study.

Correspondence: *Oscar J. Benitez, Ph.D., Department of Psychiatry, Children's Medical Center Dallas, 120 Frankfort Square, Columbus, OH 43206. E-mail: oscarjbenitez@gmail.com*

S.R. BONGIOLATTI BOWEN, J.S. CHAPIN, R.M. BUSCH, J.S. HAUT, P. KLAAS, R.A. PRAYSON & W.E. BINGAMAN. Left Temporal Resection in Pediatric Epilepsy: Neuropathology and Memory Outcome.

Objective: Adult epilepsy patients with mesial temporal sclerosis (MTS) are often at lower risk for verbal memory decline following dominant anterior temporal lobectomy (ATL). Despite the rise in pediatric epilepsy surgery, the relationship between pathology and memory outcome in children remains unclear. This study evaluated the relationship between neuropathology and memory outcome in children with epilepsy following left ATL.

Participants and Methods: Twenty-four children who underwent left ATL were retrospectively identified for analysis of surgical pathology (MTS = 13; Malformative Lesion [ML; e.g., cortical dysplasia] = 7; Tumor = 4) and performance on the Children's Memory Scale pre- and post-operatively. Multivariate analysis of variance (MANOVA) was conducted to assess group differences in pre- to post-operative change on the Verbal and Visual Memory Indices (Immediate and Delayed). Given the small sample size, effect size calculations were also used to examine outcomes.

Results: Groups did not differ on pre-operative memory performance. Across memory indices, there was a significant multivariate Time x Pathology interaction, $F(8, 36) = 3.15$, $p < .01$, $\mu_p^2 = .412$. Univariate analyses indicated that on the Verbal Memory Indices, both the MTS and Tumor groups showed improved scores post-operatively, while the ML group declined in post-operative performance. On the Visual Memory Indices, there were no significant declines from pre- to post-operative testing.

Conclusions: Post-operative memory outcome appears more favorable for children with tumors or MTS than for those with malformative lesions. To better understand this finding, further analyses to examine cognitive change at the individual level are currently underway.

Correspondence: *Susan R. Bongiolatti Bowen, Ph.D., Psychiatry and Psychology, Cleveland Clinic, 9500 Euclid Ave., P-57, Cleveland, OH 44195. E-mail: sbongi@gmail.com*

M.T. WAGNER, L.A. BRENNER & P.B. PRITCHARD. Out-of-body Experience and Autoscopy in a Case of Focal Epilepsy.

Objective: We report on a rare syndrome of autoscopy with and without disembodiment. Autoscopy involves the impression of seeing one's own body from a distanced visuospatial perspective, which can occur with or without disembodiment. Disembodiment is when the sense of self is perceived as being outside of the body. These symptoms are distinctly different from the psychiatric symptoms of derealization or depersonalization that do not have a clear anatomic significance.

Participants and Methods: A 57-year-old male presented for possible neurosurgical treatment of life-long, medically refractory epilepsy and underwent extensive diagnostics and left anterior temporal amygdalohippocampectomy. Surgery resulted in elimination of seizures and associated symptoms of autoscopy/disembodiment.

Results: Patient seizure semiology was pre-ictal autoscopy with and without disembodiment. VEEG recorded 11 complex partial seizures from the left temporal region over a four-day period. 3-T MRI showed mild bifrontal atrophy and a swollen bright left hippocampus. Ictal SPECT revealed a large focus of abnormal activity in the left lateral temporal lobe. Extensive neurocognitive testing demonstrated significant impairment for verbal versus visuospatial delayed recall with other cognitive function intact. The Wada showed left hemisphere representation of language and bilateral control of verbal memory. Pathology results showed subpial gliosis of the temporal lobe and mesiotemporal sclerosis of the hippocampus.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results demonstrated that the symptoms of autoscopy and disembodiment were probably due to lateral temporoparietal junction pathology. The anatomical importance of the pre-ictal semiology is of academic interest in understanding this rare phenomenon and is critical in presurgical planning.

Correspondence: *Laurie A. Brenner, M.A., Neurology, Medical University of South Carolina, MUSC Rutledge Tower, Charleston, SC 29403. E-mail: brenner@musc.edu*

E. CHIN, R. WILSON, J. LEE, S. MARION, S. YUOVIN, G. MATHERN & R. ASARNOW. Lateralization and plasticity of emotional processing in individuals with a history of intractable epilepsy and hemispherectomy surgery.

Objective: We know that the left and right hemispheres play distinct roles in the regulation of emotion, yet our understanding of the interaction between hemispheric asymmetry and functional brain plasticity is limited. Studying individuals following hemispherectomy (HE) for intractable seizures allows us to investigate this complex question. Based on established models of lateralization, we hypothesized that individuals with a history of left HE would show higher levels of internalizing behavior (e.g., depression) while those with a right HE would have higher externalizing behavior (e.g., AHDH behaviors).

Participants and Methods: Participants were 31 individuals (ages 4 to 30) recruited from the UCLA Pediatric Surgery Program with a variable number of years and grouped into left (n=18) vs. right (n=13) hemispherectomy (mean age at surgery = 4.7 years) groups. Caregivers filled out the Achenbach Child Behavior Checklist (CBCL) as part of a larger study of neurocognitive outcome of hemispherectomy.

Results: Results of a MANOVA revealed no differences between the groups on any of the CBCL sub-scales (all F's Λ3.31, all p's □ .08) including the internalizing (F = 0.05, p □ .82) and externalizing (F = 0.52, p □ .48) scales.

Conclusions: The fact that left vs. right HE patients were no different in their behavioral profile stands in stark contrast to expectations held in the cognitive and neuropsychological community and with well-established models of emotional lateralization. Though somewhat puzzling, functional plasticity is the likely explanation in that emotional processing for these children likely shifted to the "good" hemisphere prior to surgery. Future studies will more extensively investigate this possibility.

Correspondence: *Esther Chin, Fuller Graduate School of Psychology, 262 N. Los Robles Ave, Apt 102, Pasadena, CA 91101. E-mail: ykechin1130@gmail.com*

T.B. FAY-MCCLYMONT, E.M. SHERMAN, B.L. BROOKS & H.L. CARLSON. Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV) Performance in Children with Temporal (TLE) versus Frontal Lobe Epilepsy (FLE).

Objective: To examine WISC-IV performance in children with TLE versus FLE, and the relationship between WISC-IV scores and epilepsy variables.

Participants and Methods: Participants included 17 children with TLE and 17 children with FLE aged 6 to 16 (mean age = 10.84, SD = 2.9; 18 girls, 16 boys) with mean parental education of 13.2 years (SD = 3.4). Retrospective data from clinical referrals of children at the Alberta Children's Hospital were included. All children received a standardized assessment that included the WISC-IV. TLE and FLE groups were compared using t-tests, and relationships were explored using Pearson correlation coefficients.

Results: There were no significant differences between TLE and FLE groups on demographic or epilepsy variables. Of the sample, 56% had a positive MRI, and 17 had a clearly lateralized focus on EEG involving either the right or left hemisphere. Most children had early-onset epilepsy (M = 6.10 years, SD = 4.1), were on multiple antiepileptic medications (AEDs; M = 1.56, SD = .84), and had high seizure burden (median seizure frequency each month = 2.0). While children with FLE demonstrated slightly higher mean scores on each subtest, the differences were not statistically significant. Children with TLE and FLE did not differ on full scale IQ (FSIQ), index scores, or subtest scores. The combined mean FSIQ was in the borderline range (M = 78.0, SD = 18.9) and 35.3% of children had FSIQ < 70. In children with TLE, number of previous AEDs trials were inversely correlated with FSIQ (r= -.54, p<.05) and Verbal Comprehension Index (VCI) scores (r = -.66, p < .01). In children with FLE, shorter epilepsy duration was correlated with higher WISC-IV FSIQ, VCI, and Working Memory index scores (rs ranging from -.51 to -.59, p <.05).

Conclusions: Children with TLE and FLE do not differ in their intellectual functioning. However, children with TLE and FLE demonstrate different relationships between markers of epilepsy severity, FSIQ, and VCI.

Correspondence: *Taryn B. Fay-McClymont, Ph.D., Neuropsychology, Alberta Children's Hospital, 416 3500 Varsity Drive NW, Calgary, AB T2L 1V3, Canada. E-mail: tarynfay@gmail.com*

Y. GRANADER, H.A. BENDER, A. FRESHMAN, L. WHITMAN, V. ZEMON, T. WELSH & W.S. MACALLISTER. Correlations Between Seizure Variables and Measures of Executive Functioning in Children and Adolescents with Epilepsy.

Objective: Children and adolescents with epilepsy have a wide range of cognitive deficits including executive dysfunction. Epilepsy variables such as age of seizure onset, number of antiepileptic drugs (AEDs), and frequency of seizure activity may have some impact on an individual's abilities. This study aimed to examine the correlations between the epilepsy variables and three measures of executive functioning: the Behavior Rating Inventory of Executive Function (BRIEF), Trail Making Test (TMT), and Digit Span Backward (DSB).

Participants and Methods: Forty-one children and adolescents with epilepsy (22 males/19 females, ages 6-17, mean = 11.46, SD = 2.97) were evaluated. Executive functioning was assessed through the BRIEF (parent-report questionnaire), TMT part B z-scores, and DSB scaled scores.

Results: The mean age of seizure onset was 65.20 months, SD = 47.52. Mean number of AEDs was 1.24, SD = .969. Three participants had daily seizures (7.3%), seven had weekly seizures (17.1%), seven had monthly seizures (17.1%), seven had a seizure at least once every six months (17.1%), and fifteen participants were currently seizure free (36.6%). Significant correlations were found individually for age of seizure onset (r = .333, p = .033), number of AEDs (r = -.376, p = .015), and seizure frequency (r = .320, p = .047) and TMT part B z-score.

Conclusions: The three epilepsy variables that were assessed all correlated with the TMT B z-score. There were no significant correlations found between any of the seizure variables with the BRIEF subscales or Digit Span Backward. The TMT shows stronger relations to epilepsy severity indices.

Correspondence: *Yael Granader, Ferkauf Graduate School of Psychology, 169 E 91st Street, Apt 7E, New York, NY 10128. E-mail: yaelgranader@gmail.com*

B.T. TYSON, A. STEIN, K. BAKER, K. WATANABE & G. HOSTETTER. Differential Diagnosis of Video-EEG Confirmed Epilepsy and Psychogenic Nonepileptic Seizures Using Psychometric Inventories and Clinical Interview.

Objective: Psychogenic nonepileptic seizures (PNES) are events that share semiology with epileptic seizures, but are not due to epileptiform discharges and are thought to represent manifestations of psychosocial distress. Patients with PNES present a difficult problem for neurologists and neuropsychologists. Diagnostic uncertainty can lead to expensive diagnostic procedures and potentially harmful treatments. Patients with PNES vary in symptomology, but often overlap with respect to conversion, somatization, dissociation and history of prior psychological trauma. Most investigations into the differential diagnosis of epilepsy and PNES focus on Minnesota Multiphasic Personality Inventory, Second Edition (MMPI-II) scales 1 and 3, which provide adequate differential diagnosis information, but assess only conversion and somatization. Further,

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

despite the high prevalence of prior psychological trauma, no investigations into the use of trauma inventories in differential diagnosis were found in the literature. We hypothesized that PNES patients would demonstrate higher scores on MMPI-II scales 1 and 3, and Anxious Arousal, Defensive Avoidance, Dissociation, and Impaired Self-Reference scales of the Trauma Symptom Inventory (TSI).
Participants and Methods: Eighty patients with video-EEG confirmed epilepsy (N=36) or PNES (N=44) completed a clinical interview, MMPI-II and TSI as a part of neuropsychological evaluation. We then compared scores on the selected scales in the two groups.
Results: ANOVA with post hoc analysis supported our hypotheses on all clinical scales. Nonparametric analysis demonstrated significance on several demographic and symptom variables.
Conclusions: Results demonstrate the utility of trauma-based inventories in epilepsy and PNES differential diagnosis. This information is being used to develop a unitary psychometric measure specifically targeting this clinical conundrum.
Correspondence: *Gayle Hostetter, Ph.D., Neuropsychology Service, QCS, The Queen's Medical Center, 1374 Nuuanu Avenue, Honolulu, HI 96817. E-mail: ghostetter@queens.org*

C.P. JOHNSON, R.L. COLLINS & M.L. CHAPIESKI. Explaining Discrepant Math Performance in Children with Epilepsy: Relative Contribution of Cognitive and Attentional Factors.
Objective: Problems with attention are common in children with epilepsy and inattention has been implicated in the poor math skills reported for a variety of other neurological disorders. This study investigated the impact of variables of attention on math performance in a group of children with epilepsy.
Participants and Methods: The sample included 63 children with intractable, focal seizures (ages 5 to 18 and IQ > 69). Attention variables included omission errors, commission errors, response time, and response time variability scores from the Conners' Continuous Performance Test-II (CPT) as well as the Attention Problems scale from the Achenbach Child Behavior Checklist (CBCL). Math performance was assessed with the Math Applications and Concepts and Math Computation subtests from the Kaufman Test of Educational Achievement-II (KTEA). The contributions of age of seizure onset, seizure frequency and number of medications were also assessed. Since CBCL data were only available for 42 subjects, a separate analysis was conducted with that variable.
Results: For the stepwise regression analysis predicting math computation scores, IQ, CPT Commission Errors, and CPT Hit Response Time remained in the model, explaining 37%, 4%, and 6% of the variance respectively (R^2=0.47, p<0.001). Conversely, the stepwise regression analysis predicting math applications retained only IQ as a predictor (R^2=0.55, p<0.001). CBCL attention scores had no relationship to performance on either test. Further analyses indicated that seizure related variables did not predict attentional deficits.
Conclusions: Math performance in children with epilepsy is primarily determined by general level of intellectual functioning, but attentional variables are an additional factor that may account for the discrepancy between mathematical skill level and performance in the classroom. Differences in performance between math applications and computations probably reflect a difference in the amount of structure inherent in the two tasks.
Correspondence: *Chad P. Johnson, MA, Clinical Neuropsychology, University of Houston, 4800 Calhoun Road, Houston, TX 77004. E-mail: C.Parker.Johnson@gmail.com*

D. KENDALL, L. BISLICK, T. GRABOWSKI, V. PHATAK & J. OJEMANN. Linguistic reorganization of proper faces and proper places prior to anterior temporal lobe surgery. Can deficits be mitigated?
Objective: Temporal lobe epilepsy and anterior temporal lobectomy (ATL) are associated with word retrieval deficits of proper nouns. The aim of this pilot study was to discover if linguistic representation of faces and places could be reorganized prior to ATL with the goal of mitigating word retrieval deficits post-operatively.
Participants and Methods: Using a single subject multiple baseline design, a 51-year-old, right-handed male received 32 hours of language rehabilitation prior to ATL. His diagnostic workup indicated seizure onset since 42, left temporal lobe seizures, and left mesial temporal sclerosis. Treatment stimuli included Famous Faces and Landmarks from Daniel Tranel's dataset, and personally relevant faces. Generalization stimuli included untrained Famous Faces, Landmarks, and personally relevant faces. The treatment protocol was linguistically distributed (lexical, semantic, phonologic, orthographic) and multi-modal (visual, auditory, articulatory). Repeated probe data were collected prior to, after every 4 hours, immediately post treatment, and within one month following ATL surgery. Research questions asked if there was an effect of treatment on naming of trained stimuli prior to surgery and if effects were maintained following ATL surgery.
Results: Results of rehabilitation before surgery showed a positive effect of treatment of trained stimuli. ATL surgery will be performed following abstract submission deadline and language results post surgery will be presented at the conference.
Conclusions: The ATL appears critical for the convergence of visual information and proper names. Our protocol may mitigate the effects of disease and surgery and would represent a novel opportunity for rehabilitation of planned surgical patients.
Correspondence: *Diane Kendall, PhD, Speech and Hearing Sciences, University of Washington, 1417 42nd Street NE, Seattle, WA 98105. E-mail: dkendall@uw.edu*

E. LEAFFER, D. HESDORFFER & V. HINTON. Cognitive and motor development in children with first febrile seizure.
Objective: Febrile seizures (FS) are convulsions accompanied by fever > 101oF affecting 2-5% of infants and young children. Cognitive and motor outcomes of children with FS are uncertain due to mixed findings in the literature.
Participants and Methods: Using a prospective cohort study, 270 children under 3 years of age were identified in a hospital located in an urban, low income area (141 with fFS and 129 controls seen for fever). Cognitive and motor domain scores on the Bayley Scales of Infant Development performed at one month after the illness were compared between the groups using t-tests. Delayed cognition and motor domains (> 2 sd below the mean of 100) were compared using chi-square.
Results: The two groups were comparable on demographics. Bayley data indicated a wide spread of scores, with means from both groups shifted down from population norms (Cognitive scores: mean fFS = 90.0, mean controls = 88.7, t = -0.69, p = 0.49; Motor scores: mean fFS = 92.0, mean controls = 91.4, t = -0.35, p = 0.72). On the cognitive scale, 10.6% of fFS versus 12.4% of controls scored in the "delayed" range (p = .64). On the motor scale, 11.4% of fFS versus 7.0% of controls scored in the "delayed" range (p = .22).
Conclusions: We did not find significant differences between groups; however, we did see worse motor performance in the cases. Additionally, the sample as a whole performed poorly on the Bayley which may be due to environmental factors of the disadvantaged community.
Correspondence: *Emily Leaffer, Columbia University, 244 E 78th Street, Apt 1F, New York, NY 10075. E-mail: emily.leaffer@gmail.com*

T. LINEWEAVER, J. HAUT, C. KALMAN, L. FERGUSON, S. BANGIOLATTI BOWEN & R. BUSCH. Does Mother Know Best? Self-Reports and Parent-Reports of Memory in Pediatric Epilepsy Patients at Two Time Points.
Objective: Memory deficits in children with epilepsy are documented, but few studies have examined the subjective memory complaints of these children or their parents. This study investigated how accurately pediatric epilepsy patients and their parents monitor change in memory over time.
Participants and Methods: Twenty-six children with epilepsy (M age=9.73, 12 males/14 females) completed objective (Children's Memory Scale: CMS) and subjective (Child Memory Scale Self-Report) memory measures. Parents also completed a subjective memory measure

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

(Child Memory Scale Parent-Report). All children scheduled a repeat evaluation 9 months later. To date, eleven have completed both baseline and reassessment (M age=9.82, 5 males/6 females), with subjective memory scores available from all parents (n=11) and from children old enough to complete the self-report measure (n=7).
Results: Change scores were calculated for the CMS, self-reports, and parent-reports (positive=improvement; negative=decline). Parent- and self-reports showed little agreement [Chi-square Likelihood Ratio (LR: n=7)=1.65, p=.20; r=-.51]. Parents of all boys perceived their sons' memory as improving, whereas only half of the girls' parents perceived improvement [LR (n=11)=4.57, p=.03]. The opposite was true of the children's self-reports [3/3 (100%) girls and 2/4 boys (50%) perceived improvement; LR (n=7)=2.83, p=.09], although this result was not significant. Correlations between subjective and objective memory change scores indicated that self-reports more accurately paralleled changes in CMS memory (r range= +.21 to +.55) than parent-reports (r range=-.23 to -.70).
Conclusions: Results indicate that children may be more sensitive to changes in their memory than their parents and that gender may play a role in parents' perceptions of pediatric epilepsy patients' memory.
Correspondence: *Tara Lineweaver, Ph.D., Psychology, Butler University, 4600 Sunset Avenue, Indianapolis, IN 46208. E-mail: tlinewea@butler.edu*

E. LUTHER, R. BERMAN & D. TUCKER. Visual Stimuli in the Wada Test: Evidence for Bilateral Processing.
Objective: Pictures of familiar objects are commonly used in the Wada Procedure to test visual and verbal memory. The extent of their use as a measure of visual memory in this procedure has not been systematically examined.
Participants and Methods: A sample of 19 left-language dominant patients (mean age: 37.1 SD: 10.6; 9 males, 10 females; 6 right seizure focus, 13 left seizure focus) with intractable epilepsy who underwent the Wada Procedure were included. Eight pictorial items, three reading items, and three repetition items were presented to patients while they were under unilateral influence of sodium amytal. Participants were later asked to recognize stimuli from four possible choices.
Results: The percentage of visual (pictorial) and verbal (reading and repetition) items was calculated for each individual and a within-subjects ANOVA was used to determine if an affect of injection side or stimuli type existed using seizure focus as a between subjects measure. A main effect of both stimulus type ($p<.001$) and injection side ($p<.001$) was found independent of seizure focus. No interactions were found.
Conclusions: More stimuli were recognized after the right (non-dominant for language) hemisphere was injected with sodium amytal, and more pictorial items were recalled overall suggesting that these items benefit greatly from their dual-role as verbal and visual representations. Implications this has for the clinical interpretation of Wada test results will be discussed.
Correspondence: *Emily Luther, M.A., University of Texas at Austin, 1 University Station A8000, Austin, TX 78712. E-mail: eluther@mail.utexas.edu*

H. O'REILLY, K. VERHAERT, C. ELTZE, R. SCOTT, H. CROSS & M. DE HAAN. Early-Onset Epilepsy and Autism Spectrum Disorder.
Objective: Early-onset epilepsies are associated with impairments in cognitive and social abilities. Previous literature documents an elevated incidence of epilepsy or EEG abnormalities in children already diagnosed with autism spectrum disorder (ASD). The aim of this study was to examine the early natural history of children with infant-onset epilepsy who go on to develop ASD.
Participants and Methods: Fifteen children (10 male) presenting with recurrent unprovoked seizures at <2 years of age were assessed on cognitive, social and neurological development close to diagnosis (baseline) as part of a longitudinal study and at 3-year follow-up were screened for ASD using the Autism Diagnostic Observation Scale (ADOS).
Results: Three of 15 children (20%) met the criteria for ASD. All scored atypically on the Communication & Symbolic Behaviour Scales at baseline, compared to 28.5% of non-ASD.
Baseline IQs of ASD children were 55, 75 and 80, all within range of non-ASD (M=87.8, range 55-115). Baseline language scores for all ASD children were >2SD below the normative mean, while only 1/12 (8.3%) non-ASD scored so low.
All ASD displayed abnormalities on imaging and 2 showed epileptiform discharges on EEG, with percentages in non-ASD of 66.6% and 62.5% respectively.
Conclusions: 20% of the children assessed met the criteria for ASD. Language delay at presentation was common in ASD, while IQ, EEG and MRI were similar for ASD and non-ASD. These preliminary findings should be validated with larger numbers to establish the predictors of ASD in children with infant-onset epilepsy.
Correspondence: *Helen O'Reilly, Developmental Cognitive Neuroscience Unit, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, United Kingdom. E-mail: h.oreilly@ich.ucl.ac.uk*

M. RAMIREZ, T. LINEWEAVER, R.I. NAUGLE & R. BUSCH. Memory Outcome Following Temporal Lobectomy in Epilepsy Patients with Bilateral Mesial Temporal Sclerosis.
Objective: Unilateral mesial temporal sclerosis (uniMTS) ipsilateral to seizure onset is associated with reduced risk for memory decline following anterior temporal lobectomy (ATL). However, concern has been raised about performing ATL in patients with bilateral MTS (bilatMTS) due to reduced functional reserve capacity in the contralateral hippocampus. This study examined memory outcome following ATL in patients with bilatMTS as compared to those with uniMTS.
Participants and Methods: Participants included 84 patients who underwent ATL (left=42; right=42) for treatment of intractable epilepsy. Differences in memory performance were examined using the WMS-III Auditory (ADM) and Visual (VDM) Delayed Memory Indices before and after surgery.
Results: In left ATL patients (29 uniMTS, 13 bilatMTS), presurgical ADM performance was poorer in patients with bilatMTS; however, there was no group difference in the magnitude of ADM change after ATL. In contrast, there was no significant difference in VDM performance between the groups prior to surgery; however, the uniMTS group was more likely to show improvements in VDM than those with bilatMTS.
In right ATL patients (34 uniMTS, 8 bilatMTS), bilatMTS patients demonstrated poorer presurgical VDM and ADM performance as compared to uniMTS patients. There were no differences between the groups with regard to change in memory scores following surgery.
Conclusions: Patients with bilatMTS demonstrated reduced presurgical memory compared to patients with uniMTS. Results suggest that bilMTS does not put patients at higher risk of auditory memory decline after ATL, but might interfere with recovery of delayed visual memory after left-sided resection.
Correspondence: *Maya Ramirez, PhD, Psychiatry and Psychology, Cleveland Clinic, 9500 Euclid Ave / P57, Cleveland, OH 44195. E-mail: maya.ramirez@gmail.com*

G.Z. RECKESS, C.J. BECK, J.E. JONES, K. DABBS, M. SEIDENBERG, B.P. HERMANN, R.M. BAUER & C.M. LEONARD. Clinical and Neurocognitive Relevance of Collateral-Rhinal Sulcal Connection in Temporal Lobe Epilepsy.
Objective: The collateral (CS) and rhinal (RS) sulci contribute to medial temporal morphology and are anatomic landmarks for surgery and neuroimaging. Kim et al. (2008) found these sulci were connected in more individuals with temporal lobe epilepsy (TLE: 72-77%) than controls (41-47%). They hypothesized that CS-RS connection represents a neurodevelopmentally "simplified" morphology that increases risk for

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

pathology. Using different methods, Novak et al. (2002) found CS-RS connection in only 28-38% of TLE. Using Kim's rating methods, we predicted CS-RS connection would be more prevalent in TLE than in age-matched controls and, in addition, would be associated with worse memory performance.
Participants and Methods: We analyzed participant group (TLE: N = 79; Control: N = 70) and CS-RS connection (present/absent) within each hemisphere. Cognitive measures included IQ (WAIS-III), language (BNT; Fluency), and memory (WMS-III).
Results: Contrary to predictions, prevalence of CS-RS connection (36-46%) did not differ between groups and there was no main effect of connection on neurocognition. Follow-up analysis revealed significant ($p < .05$) association between CS-RS connection in the right hemisphere and worse immediate ($r = .20$) and delayed ($r = .23$) nonverbal recall in the patient group.
Conclusions: The prevalence of CS-RS connections matched Kim et al.'s findings in healthy controls while results for TLE were consistent with Novak et al. Nonetheless, our neurocognitive data reveal weak association between CS-RS morphology in the right hemisphere and nonverbal memory performance in TLE, which is partially consistent with both Kim et al. and the theory of material specificity.
Correspondence: *Gila Z. Reckess, MS, Clinical and Health Psychology, University of Florida, University of Florida, PO Box 100165, Gainesville, FL 32610. E-mail: reckessg@phhp.ufl.edu*

V.N. TUCHSCHERER, K. DABBS, J. JONES, B. HERMANN & M. SEIDENBERG. Ventricular Volume and Cognition in Temporal Lobe Epilepsy.
Objective: Ventricular enlargement is considered a general measure of overall brain atrophy, and is a common feature of progressive neurological disorders. We report findings for changes in ventricular size over a four year interval for adults with chronic temporal lobe epilepsy (TLE). We also examined the relationship between ventricular enlargement and neuropsychological performance.
Participants and Methods: MRI volumes and neuropsychological testing for 17 individuals diagnosed with probable or definite TLE (mean age = 35.1) and 26 age-matched controls (mean age = 37.2) were examined twice, separated by four years. No participants underwent surgery during the test-retest interval. FreeSurfer was used to determine percent ventricle volume changes over time. Domain z-scores were created to examine neuropsychological variables. Effect size (Cohen's d, product-moment r) for percent change in ventricle size was calculated to examine the relationship between neuropsychological performance and ventricle size.
Results: The TLE group showed increased ventricular enlargement during the four-year interval for the third ventricle ($d = .80$), left lateral ventricle ($d = .54$), right lateral ventricle ($d = .66$) and fourth ventricle ($d = .45$). Test-retest decline in immediate memory and language showed moderate to strong effect size correlations with volume enlargement in the lateral volume and third ventricle.
Conclusions: Abnormal ventricular enlargement may provide an index of progression of brain atrophy and associated cognitive decline in chronic TLE. This is the first time progressive ventricular enlargement has been identified in the TLE prospective MR literature. Overall, this is consistent with other reports of widespread brain atrophy and generalized cognitive impairment in chronic TLE.
Correspondence: *Victoria N. Tuchscherer, M.S., Rosalind Franklin University, 3333 Green Bay RD, North Chicago, IL 60064. E-mail: vntuchscherer@gmail.com*

N.G. VELISSARIS, M. SEIDENBERG, K. DABBS & B. HERMANN. Longitudinal Analysis of Cortical Thickness in New Onset Pediatric Epilepsy.
Objective: Previous findings indicate the presence of brain abnormalities in non-lesional epilepsy within the first year of diagnosis. Cortical thickness abnormalities have been reported in adults with longstanding epilepsy, but there are very few studies in the pediatric literature, and none utilizing longitudinal methodology.
Participants and Methods: Cortical thickness data was derived for three groups: idiopathic generalized epilepsy(IGE;n=19), localized related epilepsy(LRE;n=22) and healthy controls(n=31) at baseline and 2-years later. Cortical thickness for lobular regions in both hemispheres was processed using FreeSurfer. Analyses included age and ICV as covariates.
Results: At baseline, the epilepsy groups(IGE and LRE) did not show significant cortical thickness differences compared to controls in either hemisphere. When the epilepsy groups are examined separately, IGE show significantly thinner cortical gray matter than controls in left lateral-temporal and left parietal lobes; and showed a similar trend for left medial-temporal lobe and right lateral-temporal, parietal, and frontal lobes. Thickness remained quite stable at follow-up for the epilepsy groups over the 2-year interval. The control group showed normal developmental thinning.
Conclusions: The IGE group shows less cortical thickness than LRE and CON at time of diagnosis which is indicative of more diffuse and significant brain abnormalities within 12-months of disease onset. These findings are consistent with the literature that IGE display more brain abnormalities than LRE early in the course of epilepsy. The typical developmental pattern of cortical thickness exhibited by normal children is aberrant in new onset IGE, and significant neocortical differences are present prior to an extended duration of the disease.
Correspondence: *Nicholas G. Velissaris, Rosalind Franklin School of Medicine and Science, 1900 Green Bay Rd. Unit K, Highland Park, IL 60035. E-mail: nvelissa@gmail.com*

T. WELSH, L. WHITMAN, H.A. BENDER, Y. GRANADER & W.S. MACALLISTER. Examining Suboptimal Effort with Reliable Digit Span and the TOMM in Children and Adolescents with Epilepsy.
Objective: Assessing effort is an important aspect of a comprehensive neuropsychological evaluation, as it can significantly impact testing interpretations. While there has been a strong focus on the assessment of effort in adults and recent work has validated the appropriateness of adult-derived cutoffs of stand-alone effort measures in younger populations, little research has focused on embedded effort measures in children.
Participants and Methods: This study includes 54 clinically referred children and adolescents (32 males/22 females; ages 6-17) with epilepsy. Reliable Digit Spans (RDS) were calculated and the Test of Memory Malingering (TOMM) was administered as part of a comprehensive neuropsychological evaluation. Chi-square analyses assessed for differences between these two measures and Pearson correlational coefficients assessed the relations between RDS scores, age, and intelligence estimates.
Results: Using the least (<6) and most (<8) stringent published RDS cutoffs, pass rates of 78% and 48% were obtained, both below the recommended 90% pass rate for an effective effort test (Donders, 2005). In contrast, using adult criteria on TOMM Trial 2, a 90% pass rate was observed. The difference between RDS and the TOMM on participant outcome was not significant for the least stringent RDS criteria ($\alpha 2 = 2.513$, $p = .113$), but was for the most stringent criteria ($\alpha 2 = 21.120$, $p < .0001$). RDS scores were significantly correlated with IQ estimates ($r = .591$, $p < .001$) and age ($r = .606$, $p < .001$).
Conclusions: These results suggest that RDS may be of limited utility in detecting poor effort in a pediatric epilepsy population, as it appears to yield an unacceptable number of false positives.
Correspondence: *Toni Welsh, Seton Hall University, 400 South Orange Avenue, South Orange, NJ 07079. E-mail: tonijwelsh@gmail.com*

L.A. WHITMAN, H.A. BENDER, W.S. MACALLISTER, C. MORRISON, W.B. BARR, J. WEINFELD, E. FARRELL, D. MILES, J. LAJOIE & C. CARLSON. Rates and Predictors of Successful Intracarotid Amobarbital Testing in Preadolescent Children.
Objective: Little is known about the efficacy of the intracarotid amobarbital procedure (IAP) in children, with the rates of reduced cooperation and obtundation being higher than those observed in adults. This investigation examined whether age and FSIQ predict success of the IAP in preadolescent children.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: FSIQ scores in 13 children <13 years undergoing an IAP as part of an epilepsy presurgical evaluation were reviewed. Mean age of the sample was 8.8 with mean FSIQ of 79.1. Participants were divided into three groups: successful language lateralization (right, left, bilateral), unsuccessful language lateralization due to the inability to rule out bilateral representation, and unsuccessful language lateralization due to obtundation or reduced cooperation.
Results: Language was lateralized clearly in 5 of 13 children (38.5%). In another 5 (38.5%), language localization was unclear due to an inability to rule out bilateral representation. Language laterality could not be determined in 3 of the 13 IAPs (23.1%). Memory testing was completed successfully in 8 of 13 children (61.5%). There were no age or IQ differences between children with successful and unsuccessful language lateralization. Although there were no group differences in FSIQ with regard to successful memory testing, memory testing was completed more successfully in older children (t=-2.26; p=.047).
Conclusions: These data indicate that IAPs in children under 13 do not yield a high level of success regarding language or memory testing, and that IQ and age are not clear predictors of overall success. Results raise question regarding the value of current methodology for IAP testing in preadolescent children.
Correspondence: *Lindsay A. Whitman, Ph.D., Comprehensive Epilepsy Center, New York University, 119 Smith St., Apt. 3, Brooklyn, NY 11201. E-mail: lindsayallenwhitman@gmail.com*

L.A. WHITMAN, D.T. WANG, E. STAIKOVA, K. BLACKMON, W.S. MACALLISTER, C. MORRISON & W.B. BARR. Self-Reported ADHD Symptoms in an Adult Epilepsy Inpatient Sample.
Objective: Elevated rates of Attention Deficit Hyperactivity Disorder (ADHD) are reported in children with epilepsy. Relatively little is known about the comorbidity between ADHD and epilepsy in adults. The goal of this study was to assess the level of subjective self-reported ADHD symptomatology in a sample of adults undergoing video-EEG (VEEG) monitoring for epilepsy.
Participants and Methods: Records from a sample of adults monitored over a one-year period were evaluated. Of this sample, 33 had confirmed medical diagnoses of epilepsy and completed the Conner's Adult ADHD Rating Scale-Self Report: Short Version (CAARS-S:S). Twenty-one subjects were female. Mean age was 33.2 years. Mean age of seizure onset was 17.7 years, and mean number of AEDs was 1.8. Ten protocols were excluded as a result of inconsistent responding or incomplete data.
Results: Rates of elevated scores (T-Scores > 65) ranged from 3% to 12% across the various CAARS domains with the largest observed on the Inattention/Memory factor. Only one individual reported a general elevation of symptoms, as defined by elevation on the ADHD Index. There was no significant relationship between number of AED's and any of the CAARS factor scores.
Conclusions: Results indicate that a low percentage of adult epilepsy inpatients self-report clinically elevated levels of ADHD symptoms. There was no link between number of AEDs and ADHD symptoms. Although this study is limited by a small sample, and results are based exclusively on self-report, the data suggest a low rate of self-reported ADHD symptoms in adults with epilepsy.
Correspondence: *Lindsay A. Whitman, Ph.D., Comprehensive Epilepsy Center, New York University, 119 Smith St., Apt. 3, Brooklyn, NY 11201. E-mail: lindsayallenwhitman@gmail.com*

R. WILSON, S. MARION, E. CHIN, J. LEE, G. MATHERN (UCLA DEPARTMENT OF NEUROSURGERY), S. YUDOVIN & R. ASARNOW (UCLA DEPARTMENT OF PSYCHIATRY). Age of Seizure Onset and Not Side of Resection Predicts Neurocognitive Functioning: A Case-comparison of Pediatric Hemispherectomy.
Objective: Although hemispherectomy has become a medically viable option to control intractable epilepsy, strikingly little has been discovered regarding what predicts positive versus negative functional outcome. Many pre- and post-surgical variables are known to mediate outcome, yet it remains challenging to isolate specific casual factors. In the current study, we analyzed neurocognitive outcome in two children participating in the UCLA Pediatric Epilepsy Surgery Program. It is hypothesized that the child with a remaining left hemisphere will have better functional outcome.
Participants and Methods: Participants were two 8-year-old girls matched on several variables including age (28 days apart), seizure pathology type, surgery type (hemispherotomy), date of surgery (occurred 3 days apart), lack of shunt usage following surgery, and absence of AED's following surgery. Participant R had her right hemisphere removed and participant L had her left hemisphere removed
Results: Analysis of these two cases indicated distinct patterns of neurocognitive functioning. First, participant L's FSIQ was average (SS = 92) with no significant split between verbal (VIQ = 94) and performance (PIQ = 90) domains. Participant R's FSIQ was significantly delayed (SS = 49); she too had a non-significant VIQ(SS = 54)-PIQ(SS = 53) split. Interestingly, R's performance on other neurocognitive domains was better than would predicted from her IQ.
Conclusions: While it was hypothesized that hemispherectomy side would be the best predictor of functional outcome due to localization of language, age of seizure onset proved to be better predictor of neurocognitive performance in these two children. These findings are consistent with research indicating that very early insult to the brain (in this case seizure onset) leads to worse outcome than if occurs after age five but before neurons become more fixed.
Correspondence: *Rod Wilson, MA, Fuller Graduate School of Psychology, 681 Mountain View Street, Altadena, CA 91001. E-mail: rtw1979@gmail.com*

J.K. JANECEK, S.J. SWANSON, D.S. SABSEVITZ, T.A. HAMMEKE, E.T. POSSING & J.R. BINDER. Language Outcome after Left Anterior Temporal Lobectomy (ATL) in Patients with Discordant Functional Magnetic Resonance Imaging (fMRI) and Intracarotid Sodium Amobarbital Testing (Wada) Results.
Objective: The rationale for this study was to examine 1) language lateralization discordance rates between fMRI and Wada in temporal lobectomy candidates and 2) naming outcome after left ATL in a group of patients for whom Wada and fMRI language LIs were discordant.
Participants and Methods: Participants were 229 consecutive pre-surgical epilepsy patients who underwent Wada and fMRI. Wada LIs (% correct inject right –% correct inject left condition) were calculated based on performance on comprehension, naming, repetition and reading language tasks. fMRI LIs [(L-R)/(L+R) where L = number of activated left hemisphere voxels and R = number of activated right hemisphere voxels)] were calculated for lateral, angular gyrus, temporal, and frontal regions of interest (ROIs) using a published semantic decision task. Discordance was determined using cut scores and difference scores for each method. Regression analyses were performed to investigate predictors of discordance. Additionally, previous regression formulas developed from a separate sample for predicting language outcome using fMRI and Wada LIs were applied to the discordant cases so that observed and predicted outcome scores could be compared with each method.
Results: Discordance rates ranged from 14-17%, depending on ROI. Atypical language dominance on fMRI was most predictive of discordance. Of discordant cases who underwent left ATL, language outcome was more accurately predicted by each method in approximately half the cases.
Conclusions: When fMRI indicates left language dominance, Wada LI concordance is high. However, when fMRI indicates atypical language dominance, concordance rates with Wada decrease. Post-operative language outcome data suggests that Wada and fMRI each predict outcome in certain cases, suggesting some error variance with each mapping method.
Correspondence: *Julie K. Janecek, M.S., Counseling Psychology, Marquette University, PO Box 1881, Schroeder Health Complex, Milwaukee, WI 53201. E-mail: jjanecek@phhp.ufl.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Executive Functions/Frontal Lobes

C. ANDERSON-HANLEY, P. ARCIERO, J. NIMON, S. WESTEN & E. ZIMMERMAN. Neuropsychological Effects of Exercise: Greater Impact Among Older Persons with Diabetes.

Objective: This study examined the cognitive effects of exercise for older adults with and without diabetes. Cognitive decline in our aging population results in part from a combination of age-dependent neuronal changes that are often intensified by microangiopathic vascular damage. This damage develops with age and the progressive accumulation of cardiovascular risk factors, including diabetes. Calls have been made to identify interventions to curb or even prevent this cognitive decline, which has been linked to frontal-subcortical dysfunction and subsequent dementia. Older diabetics have been shown to exhibit a pattern of fronto-subcortical cognitive deficits (e.g., impaired executive and visuospatial functions) which suggests microvascular disease of the brain. Exercise has been shown to improve cognition among older adults and also in persons with diabetes. Cross-sectional research has shown that increased physical activity among diabetics was related to better cognitive function.

Participants and Methods: Nine diabetic older adults were compared with 46 non-diabetic older adults, all who were participating in a three-month randomized trial comparing exergaming (cybercycling in virtual terrains) and control exercisers (using a traditional stationary bike). We examined the impact of exercise on executive function, while controlling for age and education.

Results: Diabetic exercisers exhibited significantly greater improvement on Color Trails 2 ($p < .001$); no significant differences were found for Digit Span Backwards or Stroop C.

Conclusions: These results lend additional support to the growing body of literature which suggests that exercise can be helpful to cognition in later life, specifically among persons with diabetes. Additional research is needed to clarify why certain aspects of executive function might be differentially affected.

Correspondence: *Cay Anderson-Hanley, PhD, Psychology, Union College, 807 Union Street, Schenectady, NY 12308. E-mail: andersoc@union.edu*

G.C. ARAUJO, V. MANDOSKE & D.A. WHITE. Response Monitoring During Typical Development.

Objective: Response monitoring is subserved by frontal brain regions (anterior cingulate and prefrontal cortices) and refers to the ability to detect errors during cognitive tasks and subsequently adjust behavior to enhance performance. To extend our understanding of the development of response monitoring, we examined the effect of age on response monitoring in relation to other frontally-mediated executive abilities (i.e., processing speed and inhibitory control).

Participants and Methods: 89 typically-developing children (36 male, 53 female) from 4-24 years of age completed a go/no-go task. Children pressed a key as quickly as possible following presentation of three specified colors (go-condition) but inhibited key presses in response to a fourth specified color (no-go-condition). No-go trials occurred randomly on 25% of all trials.

Results: Regression analyses revealed quadratic relationships between age and inhibitory control ($R^2 = .31$, $p < .01$), response monitoring ($R^2 = .73$, $p < .05$), and processing speed ($R^2 = .68$, $p < .05$). Calculation of inflection points revealed that developmental improvements in inhibitory control, response monitoring, and processing speed leveled off at 18.19, 18.33, and 25.54 years, respectively.

Conclusions: Findings from our study reveal developmental improvements in executive abilities into young adulthood, reflecting continued maturation of frontal brain regions. Inhibitory control and response monitoring matured first, whereas maturation of processing speed continued into young adulthood. The similarity in developmental trajectories between response monitoring and inhibitory control likely reflects maturation of overlapping brain regions subserving these abilities (i.e., anterior cingulate and prefrontal cortices).

Correspondence: *Gabriel C. Araujo, M.A., Psychiatry, University of Illinois at Chicago, 1747 W. Roosevelt Rd., Office 333, Chicago, IL 60608. E-mail: garaujo@psych.uic.edu*

D. BADENES, L. CASAS, C. JOAN CARLES, N. CALZADO, P. QUILEZ & M. AGUILAR. Parkinson Disease and driving in "on" and "off" states.

Objective: a)To study driving capacity in Parkinson disease (PD) in "on" and "off" state with the assessment tools used for driver's licence renewal in Spain b)to study the neuropsychological performance in PD "on" and "off" ; c)to describe the relationship between this neuropsychological performance and driving testing.

Participants and Methods: 37 PD were included. Each patient was examined two times ("on" and "off" state). In PD"off" state the antiparkinsonian medication was withdrawn overnight, resulting in a drug free interval of at least 12 h before the evaluation and were examined at 8am.Cognitive functioning was evaluated by RBANS,TMT, Blocks and Driving capacity with ASDE and UFOV. PD severity was assessed by Hoën y Yahr (YH). Concurrent psychiatric comorbidity as depressive and anxiety were evaluated by BDI and BAI and Sleep disturbances by Epworth Scale.

Results: In the ASDE results, Patients showed worse results in reaction Time Tasks, Sustained Attention and Resistance to Monotony in "off state" compared to "on". In UFOV 19.5% PD"on" were not suitable for driving whereas in PD"off" increases to 27,2%. Neuropsychological profile showed the same punctuations in "on" and "off" state in attention, language, visuespatial and memory tests; but, in TMTA-B the PD"off" showed more impairment than PD"on". They do not differ in depression and ansiety, but showed a major trend to sleepiness. UFOV and ASDE correlated by Coding, Line Orientation, UFOV correlated by memory and ASDE with TMT.

Conclusions: Patients in "off" state showed more impairment in driving and cognition than "on state". We recommended evaluated accurately driving abilities in PD patients with fluctuations.

Supported by the Servei Català de Trànsit and Fundación Mútua Madrileña

Correspondence: *Dolors Badenes, MSc, Hospital Universitari Mútua de Terrassa, Castell 25, Terrassa 08221, Spain. E-mail: dolors@badenes.cat*

B.C. BAUGHMAN, J.C. YOUNG, B.L. ROPER, N.T. YEHYAWI & P.W. HELMER. Speaking of Doing: Further Validation of a Action Fluency as a Verbal Executive Measure.

Objective: Previous studies have implicated verb generation in frontostriatal pathophysiology (Piatt, et al., 1999b; Woods et al., 2005), with evidence for the neural dissociation between nouns and verbs (Damasio & Tranel, 1993). The Action Fluency (AF) test was first described, standardized, and validated by Piatt and colleagues (1999a) and further validated by Woods and colleagues (2005), with results supporting its role as a unique measure of executive function and frontostriatal circuitry. The current study attempts to extend the findings of Woods, et al., (2005) and Piatt, et al., (1999) by examining the validity of action fluency in a more diverse clinical sample, utilizing an extensive neuropsychological battery.

Participants and Methods: AF was administered as part of a neuropsychological battery in veterans of varied age (24-93; M = 65.8) and education (2-20; M = 12.4). Bivariate correlations, followed by partial correlations, were calculated for AF and other neuropsychological measures.

Results: Correlational analysis revealed significant relationships between AF and nearly all other neuropsychological test scores. After including only those without global cognitive impairment (i.e., MMSE >= 25), correlations with measures of executive function remained robust. However, AF also correlated strongly with other measure of verbal fluency, memory, attention, processing speed, and verbal intelligence, even when controlling for education.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results broadly converge with previous studies of AF. Specifically, verb generation robustly correlated with other putative measures of executive function. However, in our mixed clinical sample, action fluency demonstrated less domain specificity. Clinical implications and recommendations are discussed.
Correspondence: *Brandon C. Baughman, Ph.D., Psychology Section, Memphis VA Medical Center, 1030 Jefferson Ave. #116A, Memphis, TN 38014. E-mail: the.baughman.b@gmail.com*

D. BRITO & O. FEGGY. Development of inhibitory processes in Pre-school age.
Objective: To described and analyzed the effect of age on inhibitory processes in pre-school children.
Participants and Methods: 150 preschool age regular children from Mexico City, from 3 to 6 years old (69 male and 81 were female) were studied . Subjects were divided according to age into three groups: Group 1: 50 subjects with mean age of: 3.3 ±1.4; group 2: 50 subjects with mean age of: 4.8 ±1.9; and group 3: 50 subjects with a mean age of: 5.4 ±1.7. Children were tested individually with four inhibitory tasks presented in a fixed order: Angel-Devil (adapted from Strommen, 1973), Day –Night stroop (adapted from Gerstadt, Hong & Diamond, 1994), Fist-Palm (adapted from Hughes, 1998) and Delay gratification (adapted from Kochanska et al., 2000).
Results: In all the neuropsychological measures the ANOVAs show significant differences between all age groups. Post hoc analyses show that: Group 1 vs group 2 and 3 ($p<0.001$); and group 2 vs group 3 ($p<0.003$). Mistakes decreased significantly in older children.
Conclusions: Inhibitory control improves between 3 and 5 years. Discussion emphasized the effects of age on executive function and how inhibitory processes affect cognitive development.
Correspondence: *Diana Brito, Neuropsychollogy, UNAM, Av Universidad 3004 Col. Copilco Universidad, Mexico DF 04510, Mexico. E-mail: dianabritonava@hotmail.com*

M.R. CARRILLO CASTRO & J. SALVADOR CRUZ. Alterations in the development of executive functions: A qualitative evaluation from an ecological perspective.
Objective: The purpose of this work is to describe the neuropsychological assessment of a girl and discuss recent literature about executive functions. We state that the ecological validity of the executive functions is essential for the right treatment of patients.
Participants and Methods: We present the case of an eight years old girl, who is in second grade of elementary school. Method: we used a developmental questionnaire, the Wechsler Intelligence Scale for Children fourth edition, the Rey-Osterrieth Complex Figure, the Frostig Developmental Test of Visual Perception, the Evaluación Neuropsicológica Infantil (ENI), a Qualitative evaluation of reading and writing and an interview to determine the ecological validity of the results. We focus on the repercussions of the neuropsychological alterations in the patient`s life, we also describe the cognitive demands of the environment and her compensatory strategies.
Results: We found out that the cognitive factors primary altered are attention and executive functions (principally planning, organizing, mental control, working memory and emotional regulation (Fuster, J. 2001)). These cognitive impairments result in poor performance in many cognitive and social tasks.
Conclusions: "Extra test variables" are essential for the effective assessment of executive functions, especially when trying to understand the relationships between cognitive testing and real world performance (Chaytor, Schmitter-Edgecombe & Burr, 2006); there are still many issues that need to be solved when speaking about an extensive concept as "executive functions" (Chan, Shumb, Toulopoulou & Chen, 2008).
Correspondence: *Maria R. Carrillo Castro, Bachelor, Residencia en Neuropsicologia Clinica, Unversidad Nacional Autonoma de Mexico, Cerro Gordo #46 entre Cerro de Guadalupe y Cerro del Chapulin colonia Campestre Churubusco, Delegacion Coyoacan 04200, Mexico. E-mail: rouxypouxy@gmail.com*

A. GARCIA, M.H. TAVARES & C. TOMAZ. The Central Executive and the Emotional Role in a Visuo-spatial Working Memory Tasks.
Objective: Working memory (WM) is recognized as temporary storage and manipulation of information. It comprises of a central executive (CE), which coordinates the activities of subsystems like the visuo-spatial sketchpad, responsible for retention of visuo and/or spatial information. The present study aims to examine the act of this substrate in face of an emotional factor.
Participants and Methods: There were evaluate the performance of young subjects (N=55; 25M; ages: 17-28; ~21,45) in a spatial-delayed recognition span task using pictures from IAPS (neutral and emotional) and geometric figures as stimuli. Individuals had to identify novelty element that appeared after short delay of 2 secs in variable pictures set (VT) or in repeating a unique picture (UT) in different positions.
Results: The results showed a significant difference between the tasks related to the number of corrects choices (VT>UT; p= 0,000) and related to the category of stimuli, emotional or neutral, the VT didn't demonstrated significant difference between the elements, but we observed this issue in the UT, among the categories (Negative>Neutral>Geometric>Positive; p= 0,000), mostly between the emotional ones (Negative>Positive; p= 0,000).
Conclusions: The difference between the tasks could lead us to suppose that the visuo aspect of the different pictures works as mnemonic for later recall of the spatial process facilitating the identification of new picture in new position. Additionally, in absence of a reference in the UT, the CE, that plays a key role in directing and controlling attention and the encoding process, one of its attribution, requires attention on both aspects (visuo-spatial). The findings about the elements indicate needs of CE in changing the focus and enforce a mnemonic. The emotional information promotes an advantage to this act different of the neutral ones.
Correspondence: *Ana Garcia, M Sc, Dept. of Physiological Sciences, Inst. of Biology, Lab. of Neurosciences and Behavior, UnB, Campus Universitário Darcy Ribeiro, Institute of Biology, Brasilia 70910-900, Brazil. E-mail: anacog@pobox.com*

J.C. GIDLEY LARSON, K. PARRY & Y. SUCHY. The Effect of Language on Motor Planning.
Objective: The current study sought to examine the role of language on motor planning (M-PLN) across two levels of task complexity.
Participants and Methods: 80 healthy participants, ages 18-27, learned to perform either a simple or complex motor sequence using a computerized response console. Half of the participants in each condition were pre-trained in the sequence using both action and verbalization, and half were pre-trained using action only. Once the sequence was learned there was a brief 90-second interruption, after which participants performed the task for a total of three Blocks, each block consisting of three sequence trials. M-PLN, conceptualized as the latency time between the last movement of the preceding sequence and the first movement of the next correct sequence, was recorded electronically.
Results: Repeated measures ANOVA revealed a significant main effect of Block ($p<.001$) with all participants showing significantly slower performance on the first Block of trials with performance improving overtime. There was also a main effect of complexity ($p<.001$) indicating that M-PLN time was slower for the complex task compared to the simple task. Lastly, there was a trend towards a Block X Complexity X Pre-training interaction ($p=.088$) suggesting that while all groups exhibited slower M-PLN times in the first Block compared to subsequent Blocks, the use of verbalization facilitated M-PLN, but only when the task was complex.
Conclusions: These findings suggest that language, in the form of self-guided speech, facilitates M-PLN only on complex tasks. Further our findings are consistent with previous research that M-PLN is deleteriously effected by task complexity.
Correspondence: *Jennifer C. Gidley Larson, M.A., Psychology, University of Utah, 310 S. 1300 E., Salt Lake City, UT 84102. E-mail: jen.larson@utah.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

W. GUY & M.E. BEHEN. Executive Functioning Predicts Behavioral Problems in Cognitively Intact Institutionally Reared Children.

Objective: Marked behavior problems have been reported in up to 20% of children with histories of early deprivation (ED). Several variables have been inconsistently demonstrated to predict behavioral outcomes, including duration of deprivation, attachment, country of institution and FSIQ. We examined the contribution of executive function/behavior to behavioral outcomes in cognitively intact children with histories of ED.

Participants and Methods: Eighty-six children (mean age=9.37 years; SD=2.38; 39 males, all with FSIQ>85) raised from birth in international orphanages and later adopted into the U.S. underwent neuropsychological evaluations. Separate regression analyses were performed to assess the unique contribution of laboratory measures of executive function (sustained attention, behavioral control) and parent-reported executive behavior (Metacognitive and Behavioral Regulation indices) on externalizing and internalizing behaviors, while controlling for demographic (age, gender), duration-specific (duration in orphanage, country of institution), and subject variables (attachment, FSIQ).

Results: Both regressions for internalizing and externalizing behaviors were significant. For internalizing models, sustained attention ($p=0.001$) and metacognition contributed significant unique variance ($p=0.007$) to outcome over covariates. Country of institution ($p=0.005$) and attachment ($p=0.003$) also contributed unique variance to internalizing behaviors. For externalizing behaviors, sustained attention ($p=0.05$) and the behavioral regulation index ($p<0.01$) contributed significant unique variance to outcome; neither country of institution nor attachment contributed significant variance to externalizing behavior. Neither age, gender, nor FSIQ contributed significant unique variance to any of the models.

Conclusions: Both laboratory measures of executive function and parent-reported executive behavior contribute significant unique variance to behavioral outcomes over and above demographic and deprivation-specific variables.

Correspondence: *William Guy, Wayne St. University, 3901 Beaubien, Detroit, MI MI. E-mail: willcguy@comcast.net*

D.B. HAMMERS, G. RAMIREZ, N. FRECKA, C. PERSAD, S. WILSON, D. POWELLS, A. BHAUMIK, J. HEIDEBRINK, N. BARBAS & B. GIORDANI. Neuropsychological And Diagnostic Profiles Of Patients Differentially Failing Executive Functioning Measures.

Objective: The Wisconsin Card Sorting Task (WCST) and the Trail Making Test (TMT) are executive-functioning measures commonly used in neuropsychological evaluations to assess for dementia. Limited research exists to explain the cause of the differential impairment in these tasks often observed in clinical populations. This study examines the neuropsychological profiles of patients failing none, WCST-alone, TMT-alone, or both tasks, and evaluates the distribution of diagnoses within these groups.

Participants and Methods: Participants were 266 individuals seen through the University of Michigan Alzheimer's Disease Research Center (MADRC). Diagnoses were established through consensus for healthy control (n= 81), Mild Cognitive Impairment (MCI; n= 89), Alzheimer's disease (AD; n= 66), and other dementias (Fronto-temporal dementia, FTD n= 11, dementia with Lewy Bodies, DLB n= 10, and undifferentiated possible AD n= 9). Participants were administered measures of executive functioning, memory, orientation, visual-discrimination, verbal fluency, and motor speed.

Results: MANOVA analyses indicated that participants failing executive tasks performed worse on most neuropsychological measures administered ($p<.001$). In a direct comparison, TMT failure, with or without WCST failure, was implicated in worse neuropsychological profiles ($p<.05$) and tended to have higher associations with more severe clinical diagnoses based on chi squared analyses ($p<.01$). In addition, FTD and DLB diagnoses displayed similar distributions across executive task impairment ($p= .92$).

Conclusions: Executive dysfunction was related to worse performance on other neuropsychological tasks with selective TMT failure suggesting greater impairments across most neuropsychological domains. TMT failure was also implicated in dementia in a higher proportion than WCST, alone. Research was supported by grant NIH-NIA P50-AG08671 and MADRC.

Correspondence: *Dustin B. Hammers, Ph.D., Psychiatry, University of Michigan, 2101 Commonwealth Blvd., Suite C, Ann Arbor, MI 48105. E-mail: hammersd@med.umich.edu*

A.K. HOLLAND, A. SMITH, L. MOSELEY, W. RINER, J.E. CARMONA & D.W. HARRISON. Physiological and Behavioral Correlates of Obesity: Changes is Fluency Performance and Regulation of Sympathetic Tone in Normal Weight and Overweight Men and Women.

Objective: Frontal cerebral regions have been demonstrated to regulate posterior regions of the brain through interconnected cerebral systems. Differential activation of the left cerebral systems as a function of body mass index (BMI) classification may be evidenced through changes in left-lateralized neuropsychological and physiological measures.

Participants and Methods: Seven right-handed men and women with a BMI between 16.5 and 25 (M=20.65) were classified as normal weight. Eight men and women with a BMI between 25.1 and 39.9 (M=30.9) were classified as overweight. Participants were administered the Controlled Oral Word Association Task (COWAT) and the Finger Tapping Task (FTT) before and after ingesting a sandwich. Systolic blood pressure (SBP) recordings were taken before and after each experimental manipulation.

Results: A main effect for BMI was found for SBP ($F(1, 13)=10.88$, $p=.005$), indicating increased SBP for overweight men and women across conditions. A nonsignificant BMI x Condition trend was found for SBP ($F(4, 52)=2.27$, $p=.07$), indicating a decrease in SBP in overweight but not normal weight men and women after administration of the FTT and COWAT. Moreover, a BMI x Condition interaction was found for fluency on the COWAT ($F(1, 13)=5.87$, $p<.05$), indicating an increase in verbal fluency for normal weight but not overweight individuals.

Conclusions: The results support that individuals classified as overweight were unable to demonstrate the same enhancement in verbal fluency performance upon undergoing digestive stress compared to normal weight men and women. These findings provide preliminary support the regulatory influence of the left frontal region as a function of BMI classification.

Correspondence: *Alissa K. Holland, Ph.D., Psychology, University of South Carolina Lancaster, 476 Hubbard Drive, Lancaster, SC 29721. E-mail: akhollan@mailbox.sc.edu*

P.K. ISQUITH, R.M. ROTH, G.A. GIOIA & R. GERHARDSTEIN. Sensitivity to Working Memory Load in Children with ADHD-I, ADHD-C or Mild TBI on the Tasks of Executive Control.

Objective: Working memory deficits are common in children with ADHD or mild traumatic brain injury (mTBI). The impact of working memory load in these distinct clinical groups has received limited investigation. We compared performances of children with ADHD-I, ADHD-C, and mTBI on a computer administered set of tasks manipulating working memory load with and without inhibitory control demand.

Participants and Methods: Unmedicated children, 15 ADHD-I, 16 ADHD-C, 84 mTBI, and 150 controls completed the Tasks of Executive Control (TEC) which integrates an n-back to parametrically increase working memory load (0-, 1-, and 2-back) with a go/no-go task to manipulate inhibitory control demand. Repeated measures MANOVA (Group X Working Memory Load) compared groups on target versus standard stimulus detection accuracy, reaction time, and reaction time variability.

Results: Across working memory loads, with and without inhibitory demand, all three patient groups showed worse accuracy in responding to target and standard stimuli and were slower and more variable relative

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

to controls. Increasing working memory load under conditions without inhibitory demand had its greatest impact in the ADHD-C group, resulting in a greater decrement in standard accuracy than seen for the other groups. When inhibitory demand was required, accuracy, response time and variability were most affected in the ADHD-C group.
Conclusions: Children with ADHD-C had the greatest difficulty when working memory demands were increased, though all clinical groups performed worse than controls in general. Children with different conditions may share working memory deficits, but may respond to changes in working memory demand differently.
Correspondence: *Peter K. Isquith, Ph.D., Department of Psychiatry, Dartmouth Medical School, 367 Route 120 Unit B1, Lebanon, NH 03766. E-mail: Peter@QPsych.com*

A.L. JUDD, J.L. WOODARD, J.E. CALAMARI, M. DUX, M. MESSINA, N. PONTARELLI, J. SOCHA, B. DEJONG & K. ARMSTRONG. Anxiety and Depressive Symptoms Predict Future Executive Functioning Declines.
Objective: While several studies have suggested that the presence of depression and anxiety can predict future cognitive decline in older adults, little research has examined specific cognitive abilities that are affected. The purpose of this study was to investigate the effect of baseline depression and anxiety on change in Dementia Rating Scale-2 (DRS-2) subscales after six months.
Participants and Methods: This study utilized data from a larger, longitudinal study measuring late-life anxiety risk factors in older adults. Participants (N=152) were given various neuropsychological assessments at baseline and biannually over a two-year period. Measures used for this study included the Geriatric Depression Scale (GDS), Perceived Stress Scale, Penn State Worry Questionnaire, Positive and Negative Affect Schedule (PANAS), Spielberger Trait Anxiety Inventory and DRS-2. Standardized residual change scores were computed for each DRS-2 subscale by predicting six-month performance from baseline performance.
Results: Significant changes in the Initiation/Perseveration subscale at six-month follow-up were significantly ($p<.05$) negatively associated with baseline GDS, Perceived Stress Scale, PANAS negative affect, and Speilberger Trait Anxiety (p's=.026 to .004). Six-month decline on the DRS Conceptualization scale was negatively associated with the Perceived Stress Scale and positively associated with the PANAS positive affect scale.
Conclusions: The presence of depression and anxiety in subjects at baseline was predictive of declines on the Initiation/Perseveration and Conceptualization scales of the DRS-2 at six-month follow-up. These findings suggest that depressive or anxious symptoms may raise the risk of future decline in executive functioning in late life.
Correspondence: *Andrea L. Judd, Wayne State University, 4447 Huron, Dearborn Heights, MI 48125. E-mail: ay8274@wayne.edu*

K.A. KERNS, I.S. BARON, F.R. LITMAN, M.R. MILLER & U. MÜLLER. Executive Function in Preschool Children Who Were Born at Extremely Low Birth Weight or Late Preterm.
Objective: Medical advances have substantially increased survival rates for extremely low birth weight (ELBW; < 1000 g) infants. However, neurobehavioural deficits remain common in these children throughout childhood and adolescence. By school age ELBW children show pervasive deficits in a number of executive functions (EF). Importantly, EF has been shown to mediate adaptive functioning and academic success in typically developing children and preterm children. Less is known about the extent of EF deficits in early childhood. The goal of the present study was to compare performance of ELBW, late-preterm, and term-born preschoolers on a battery of EF tasks.
Participants and Methods: Thirty-eight ELBW, 189 late-preterm, and 118 term-born children (ages = 3.0 to 4.3 years) were administered a newly developed, touch-screen based computerized battery of EF tasks assessing executive attention, working memory and inhibitory control (e.g., Go-No-Go task) in addition to standardized clinical measures. Children enjoyed these tasks on which previous research has established developmental sensitivity and good test-retest reliability.
Results: ELBW performed significantly more poorly on most measures of inhibition and working memory in comparison to both late-preterm and term-born children, while there were few differences between late-preterm and term-born children.
Conclusions: Analyses suggest that preschoolers born ELBW have pervasive deficits in two central components of EF: inhibition and working memory. By contrast, the performance profile of late-preterm preschool children differed very little from that of term-born children. EF is an area that should be targeted by early intervention in at-risk preterm children.
Correspondence: *Kimberly A. Kerns, PhD, Psychology, University of Victoria, PO Box 3050, Stn CSC, Victoria, BC V8W 3P5, Canada. E-mail: kkerns@uvic.ca*

M. KRAFT, L. HANKEE & M.M. AMICK. Driving Simulator and Neuropsychological Performance in Aggressive Drivers.
Objective: Speeding is one of the most common causes of car crashes. This form of aggressive driving may be particularly dangerous as time to adapt to the constantly changing driving environment is reduced. Aggressive driving has been linked to frontal systems dysfunction. The objective of this study was to examine the relationship between neuropsychological performance and operational driving maneuvers in people who frequently and infrequently committed speeding errors on a driving simulator.
Participants and Methods: Fifty adults (aged 18-45) performed a driving simulator task that recorded a range of operational driving behavior errors. Based on the frequency of speeding errors (SE), participants were divided into two groups (Low SE, N=12 and High SE, N=13). Neuropsychological measures of attention, memory, visuomotor speed, visuospatial cognition, and executive functioning were also administered.
Results: Overall, the High SE group committed more frequent operational errors than the Low SE group ($p<0.01$). The High, compared to the Low, SE group demonstrated poorer lane positioning ($p<0.05$) and tended to brake more rapidly ($p<0.10$). On the neuropsychological measures, the two groups differed only on the subtests of visual scanning, motor speed and set-shifting from the Delis-Kaplan Executive Function System Trail Making Tests (ps <0.05, each comparison).
Conclusions: Individuals who committed more frequent speeding errors demonstrated poorer operational driving skills (e.g., lane position and braking), visuomotor slowing, and impaired set shifting. Due to poorer vehicle control and slowed cognitive responding, those who speed may create unsafe driving conditions for other people on the road and increase crash risk.
Correspondence: *Malissa Kraft, Psy.D., VA Boston Healthcare System, 150 S. Huntington Ave., Boston, MA 02130. E-mail: Malissa.Kraft@va.gov*

A.K. LAMARRE, K.P. RANKIN, K.L. POSSIN, A. BERHEL, A. BOSTROM, B.L. MILLER & J.H. KRAMER. Ecological Validity of EXAMINER: Working Memory and Inhibition Significantly Predict FrSBE Ratings.
Objective: A dissociation often exists between performance on executive function tasks and real world behavior, indicating poor ecological validity of the measure. We examined how well performance on EXAMINER, an NINDS project aimed at developing executive tasks for clinical trials, predicted participants' behavior, as measured by the Frontal Systems Behavior Scale (FrSBe).
Participants and Methods: Informants completed the FrSBe for 189 adults, including normal controls and individuals with a range of neurologic diagnoses (e.g., Alzheimer's disease, focal lesions, traumatic brain injuries). The FrSBe was designed to capture three aspects of frontally-mediated behavioral dysfunction: apathy, disinhibition and executive dysfunction. Participants completed computerized and traditional paper/pencil tasks of executive function from EXAMINER.
Results: A modified Allen-Cady selection procedure was used to build the best regression model for predicting FrSBe Total Score from exec-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

utive function testing. Eight tasks measuring inhibition, working memory and updating/shifting were selected as potential predictors. Confounds (age, gender, general intelligence, processing speed) were forced to remain in the model. A final model including Dot Counting (≥=-0.363, p<.001), Go/NoGo False Alarms (≥=-0.530, p<.01) and 1 N-Back (≥=-0.723, p<.001) accounted for 38% of the variance in FrSBe Total score, after conservatively retaining all predictors significant at p<0.15.

Conclusions: EXAMINER tasks measuring working memory and inhibition strongly predict frontally-mediated behavior in the real world. Our results suggest that these EXAMINER tasks have good ecological validity and can facilitate informed decision making regarding a patients' functional status.

Correspondence: *Amanda K. LaMarre, PhD, Neurology, University of California, San Francisco, 350 Parnassus Avenue, Suite 905, San Francisco, CA 94143-1207. E-mail: alamarre@memory.ucsf.edu*

V.W. MARK & A.Y. GROVE. Hands-Free Executive Assessment In Acute Quadriplegia Following Spinal Cord Illness.

Objective: Persons with acute spinal cord illness (SCI) often do not undergo formal cognitive evaluation because concurrent brain illness may not be suspected, and many conventional assessments require manual responses. However, persons with SCI may be at risk for cognitive dysfunction because of occult brain trauma, premorbid personality disorders, surgical or medical complications, or other reasons. We evaluated the feasibility and outcomes of a simple bedside evaluation battery of executive functions in acute SCI, in part through adapting conventional manual tests to oral responses.

Participants and Methods: 13 adults aged 29-77 with SCI, including traumatic and nontraumatic illnesses, all with acute quadriplegia in a rehabilitation hospital, were evaluated on a short bedside battery that included (1) word fluency (F-A-S) tests, (2) Stoop color-word interference test, (3) a novel oral version of the Trail Making Tests, and (4) oral cancellation tests. Responses were compared to those of age-matched neurologically healthy, community-living individuals (N = 4). Patients who scored worse than 2 SD of control mean values were considered impaired.

Results: 10/13 patients completed all of the tests; exceptions were due to failure to follow instructions (Stroop), color-blindness (Stroop and Trail Making), or emotional distress. 9/13 patients were impaired on at least 1 test. Most patients (N = 9) were impaired on the Trail Making Tests in regard to completion time (particularly form B). Patients maintained normal visual scanning strategies on oral cancellation and rarely perseverated, but 4 patients had significantly abnormal target omission rates, which may have reflected working memory deficits because targets were not visibly marked. Stroop and fluency tests were seldom abnormal.

Conclusions: SCI patients in acute rehabilitation are likely to show executive dysfunction on novel tests that bypass manual responding. Further studies should explore underlying causes of executive dysfunction and relationship to therapy outcomes.

Correspondence: *Victor W. Mark, M.D., Physical Medicine and Rehabilitation, University of Alabama at Birmingham, 619 19th Street South, SRC 190, Birmingham, AL 35249-7330. E-mail: vwmark@uab.edu*

S.M. MITCHELL, C.C. PRICE, J.J. TANNER, P.T. NGUYEN, J.P. WARD, D.J. LIBON & M.S. OKUN. Verbal Fluency and Performance Over Time in Idiopathic Parkinson's Disease.

Objective: Cognitive slowing and executive dysfunction have been observed in patients with Parkinson's disease (PD); however, few have examined performance patterns over time. Compromised subcortical structures in PD suggest impaired function of dorsolateral prefrontal circuitry. Fuster's (1985) theory of temporally organized behavior suggests that sustained behavioral output requires increasing modulation by the prefrontal cortex. Lamar, et al. (2002) found that patients with PD-dementia had a dramatic decline in responses during later segments of a letter fluency task compared to those with Alzheimer's dementia. We examined performance over time in non-demented idiopathic PD patients on letter versus category fluency and hypothesized that the PD patients would have a significantly sharper decline in output over time on letter fluency relative to age matched non-PD peers.

Participants and Methods: 35 cognitively intact idiopathic PD patients and 30 controls matched on age, education, cognitive status and comorbidity (all p's >.10). Performance on letter and category fluency was recorded in 15s increments and calculated output slopes. An oral digit substitution task (SDMT) was used to control for verbal processing speed.

Results: PD patients were significantly slower on the SDMT than controls (p=.002). Patients showed a greater decline in performance (i.e., slope) than controls in their letter fluency output even after controlling for SDMT (p=0.25, d=.535). Groups were similar on category fluency scores (p>.10).

Conclusions: These results demonstrate compromised output on an effortful verbal fluency test in non-demented idiopathic PD. They support hypotheses of compromised dorsolateral prefrontal circuit in these individuals.

Supported by: K23NS60660 (CP) and T32AG020499 (SM)

Correspondence: *Sandra M. Mitchell, M.A., Clinical & Health Psychology, University of Florida, P.O. Box 100165, Gainesville, FL 32610-0165. E-mail: sandramm@phhp.ufl.edu*

U. MUELLER, K. KERNS & K. KONKIN. Test-Retest Reliability of Executive Function Tasks in Preschool Children.

Objective: Recently, numerous developmentally sensitive measures of executive function (EF) have been developed. However, surprisingly little information is available concerning the psychometric properties of EF measures, particularly their test-retest reliability (TRT) in preschool children. The present study assessed the TRT of a newly developed EF battery in preschool children.

Participants and Methods: Participants were 33 children between 36 and 72 months old (M = 54.75 months). The interval between test and retest was on average 21 days. On each testing session, children were administered 6 computerized and 5 noncomputerized EF tasks that were assessing different components of EF (simple and complex working memory, response inhibition, attentional flexibility, and planning). The battery has been shown to be developmentally sensitive in previous studies.

Results: Whereas measures of working memory and planning generally had good TRTs (> .70), measures of response inhibition and flexibility had poor TRTs (< .50). TRT for response inhibition was acceptable when scores from the different measures of response inhibition were aggregated.

Conclusions: The study replicates the finding that simple and complex working memory tasks show good TRT in preschool children. However, measures of flexibility and response inhibition show poor TRT in preschoolers. To improve reliability of measures of response inhibition and attentional flexibility, future studies should consider aggregating over conceptually similar tasks.

Correspondence: *Ulrich Mueller, Ph.D., Psychology, University of Victoria, PO Box 3050 STN CSC, Victoria, BC V8W 3P5, Canada. E-mail: umueller@uvic.ca*

S.V. ROWE, J. SHOUSE, J. CARMASIN & B.T. MAST. Awareness of Cognitive Functioning and Theory of Mind in Community-Dwelling Older Adults.

Objective: Awareness of cognitive functioning and theory of mind (ToM) are two constructs which may be linked with frontal systems dysfunction and potentially affect social functioning in geriatric patients. However, the extent to which they are linked has not been established. This study examined the extent to which diminished ToM performance is linked with decreased awareness.

Participants and Methods: The current study utilized data from the Study of Thinking and Relationships (STAR). The sample was

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

composed of 58 community-dwelling older adults (mean age = 69.43 years, SD = 7.7 years). ToM measures included the Faux Pas Test and the Reading the Mind in the Eyes Test (EYES). Awareness was measured by comparison of primary participant reports of their functioning with an informant's report and by comparing predictions and postdictions of performance on selected neuropsychological tests with actual performance.

Results: Consistent with prior research, those participants with poorer cognitive functioning (lower Dementia Rating Scale - 2 scores) overpredicted their memory performance ($r = -.313$, $p < .017$). In addition, awareness was associated with ToM, but these relationships only approached significance (i.e. EYES & memory awareness ($r = -.246$, $p = .065$)).

Conclusions: These results suggest that both cognitive functioning and the ability to infer the mental states of others may contribute to performance on common measures of awareness, but also highlight the need for continued investigation of ToM and awareness in larger samples.

Correspondence: *Sarah V. Rowe, M.A., Department of Psychological and Brain Sciences, University of Louisville, 317 Life Sciences Building, University of Louisville, Louisville, KY 40292. E-mail: sarah.rowe@louisville.edu*

J.E. SCHREIBER & C. MRAKOTSKY. Cognitive and Emotional Functioning in Children with Recurrent Abdominal Pain.

Objective: Recurrent abdominal pain (RAP) is a common complaint of school age children and is typically not related to serious medical conditions (Walker et. al, 2004). School, social problems, and anxiety/depression have all been associated with RAP (Scharff, 1997). Cognitive outcomes in children with RAP have been less studied. We examined associations between measures of attention and executive functions, depression, and severity of pain in children with RAP.

Participants and Methods: Data from twenty-three children (14 girls) between 8-16 years who were involved in a larger NIH study on cognitive outcomes of children with gastrointestinal conditions were available on measures of attention, processing speed, set-shifting, and organization. Questionnaire data was available for abdominal pain symptoms, depression symptoms, attention and executive functions. Regression analysis examined associations among measures.

Results: In the overall sample, more severe self-reported pain symptoms predicted slower processing speed ($p = 0.004$) and poorer set-shifting ($p=0.011$). No significant associations were found between self-reported pain and performance on tasks of attention and organization. In older children with available self-report measures (N=14), more severe pain symptoms predicted more problems with metacognition ($p=0.001$), but not with behavior regulation. Additional analyses confirmed associations between more self-reported pain symptoms and more self-reported depression in older children only ($p=0.016$). Depression was a mediator of poorer set shifting but not processing speed.

Conclusions: Children with RAP demonstrate poorer performance and more self-reported problems with aspects of executive functions. As predicted, children with RAP also report a direct relationship between increased pain symptoms and increased depression.

Correspondence: *Jane E. Schreiber, Ph.D., Children's Hospital Boston/Harvard Medical School, 300 Longwood Avenue, Fegan 8, Boston, MA 02115. E-mail: jane.schreiber@childrens.harvard.edu*

J.C. SHEEHAN, J.C. LARSON & Y. SUCHY. The Impact of Language on Motor Set-Maintenance.

Objective: While it is known that language facilitates motor skill acquisition, it is unclear whether language facilitates performance over time. This study sought to evaluate the impact of language on motor set-maintenance (M-SM).

Participants and Methods: Eighty healthy participants, ages 18-27, learned a five-movement motor sequence. In experiment 1, 20 participants were pre-trained in the sequence using action+verbalization (A+V) and 20 were pre-trained using action+verbal interference (A+VI). Following pre-training, there was a brief 90-second interruption, after which the participants completed three assessment blocks each consisting of three trials. For experiment 2, 20 participants were pre-trained in the sequence using verbalization+action interference (V+AI) and 20 received no pre-training (N-PT). All participants received three training trials where actions were paired with verbalizations immediately followed with three assessment blocks. For both experiments, errors (i.e., M-SM) were recorded electronically across the assessment block.

Results: Repeated measures ANOVA for experiment 1 yielded a significant Block X Condition interaction ($p=.033$), with the A+VI condition exhibiting significantly more errors than the A+V condition on Block 1 ($p=.027$). This suggests verbalization paired with action facilitates M-SM across interruption. For experiment 2, repeated measures ANOVA revealed a trend towards a Block X Condition interaction ($p=.057$) with the N-PT condition showing significantly more errors than the V+AI condition on Block 3 ($p=.036$), suggesting verbalization maintains set over-time. No significant main effects were found on either experiment.

Conclusions: Together, these findings suggest that verbalization, regardless of whether paired with action or learned rotely, improves M-SM across a brief interruption (i.e., change in environment) and over-time.

Correspondence: *John C. Sheehan, Psychology, University of Utah, 1061 Creekside Dr., Ogden, UT 84404. E-mail: j.sheehan@utah.edu*

A.K. SOMMERFELD, K. BEKKEN & J. STASIOR. Confirmatory Support for the Utility of Cogmed Working Memory Training Program in a Clinical Sample of Children and Adolescents.

Objective: This poster presentation shares preliminary findings on the effectiveness of Cogmed Working Memory Training in a clinical setting. Cogmed is a 5-week, computerized training program designed to increase working memory through repetition of ability-matched auditory and visual working memory exercises. Previous research has shown significant positive correlations between Cogmed completion and reading comprehension, recall of numbers, following multi-level instructions, attentional/impulse control, and time management (Klingberg et al., 2002 & 2005).

Participants and Methods: Participants were 28 children/adolescents, ages 5-17 (μ=12 years, 75% male) who completed Cogmed under the direction of a certified Cogmed coach at an interdisciplinary pediatric specialty practice in New England. Participants were referred to Cogmed by a practice neuropsychologist or independently sought out Cogmed services. Data included computer-generated initial and maximum index scores (μ=28, sd=12) and anecdotal reports of behavioral changes provided by participants and parents.

Results: Descriptive statistics revealed an average initial index of 79 (min=45, max=104) and an average maximum index of 102 (min=66, max=137). The average index improvement was 23.46 points (sd=7.41), with 68% gaining 20 or more points and 29% improving by more than 30 points. Participants anecdotally stated that program completion "helped my focus a lot" and "helped me remember what [my] teacher has to say." Parents additionally reported behavioral changes: "When [she] was doing [the program] she was a lot sharper;" "He's a lot calmer and less frustrated or mad."

Conclusions: Cogmed Working Memory Training Program is one of the first empirically-supported treatments for working memory and holds as one strength its usability. As results of this preliminary investigation reveal, the program retains its beneficial properties in a clinical setting, with participants showing comparable improvement on index scores and favorable anecdotal reports of behavioral change.

Correspondence: *Amanda K. Sommerfeld, Ph.D., Child Development Network, 76 Bedford St., Suite 12, Lexington, MA 02420. E-mail: asommerfeld@cdnkids.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. BLANCO-MIRANDA, I. BARONA-RODILES & B. TÉLLEZ-ALANÍS. Cognitive Flexibility in Children and Adolescents.

Objective: Cognitive flexibility is the ability that allows shifting between different conditions. The purpose of this study was to compare cognitive flexibility among children and adolescents.

Participants and Methods: Twenty children (mean age=11.6, SD=0.3 years) and twenty adolescents (mean age=15.5, SD=0.3 years) participated. We used a switching task paradigm that included two conditions: non-switching (two separate tasks) and switching conditions (combination of both tasks).

Results: Overall, the adolescents made significantly more correct responses (93% ± 2.2) and lower reaction times (715 ms ± 54.2) than children (81% ± 2.2 and 896 ms ± 54.2), without differentiating between conditions. Both groups showed greater accuracy on the non-switching condition (91% ± 1.7) than the switching condition (84% ± 1.5), however there was no interaction between age and condition. Moreover, the adolescents showed a greater accuracy in both, switch trials (93% ± 6.2) and non-switch trials (93% ± 6.6) than children (switch 74% ± 13.2; non-switch 78% ± 14.3). Additionally, a local switch cost was revealed since subjects were faster in non-switch trials (children 686 ms ± 36.41 and adolescents 622 ms ± 23.01) than in the switch trials (children 762 ms ± 47.64 and adolescents 660 ms ± 31.38), but there was no difference between groups.

Conclusions: These results indicate a global cost in performance, as well as local cost in reaction time. However, both costs were not different between groups. This indicates that cognitive flexibility in adolescents is not completely developed yet since their performance is not fully differentiated from that observed in children.

Correspondence: *Bernarda Téllez-Alanís, PhD, Psychology, UAEM, Pico de Orizaba 1, Col. Chamilpa, Cuernavaca 62350, Mexico. E-mail: btellez@uaem.mx*

M.M. VALMAS, S.M. RUIZ, K.S. SAWYER, G.J. HARRIS & M. OSCAR-BERMAN. Relationships among Brain Volumes and Executive Functioning in Alcoholism and Antisocial Personality Disorder.

Objective: Alcoholics and individuals with Antisocial Personality Disorder (ASPD) have difficulties in executive functioning and emotional processing. We examined these traits in relation to measures of brain volume in ASPD and alcoholic individuals.

Participants and Methods: Eighty-four abstinent alcoholic and healthy nonalcoholic men and women completed psychiatric questionnaires and interviews, MRI scans, and a battery of neuropsychological tests. Group differences for alcoholism and ASPD were examined in cortical and subcortical volumes of interest.

Results: Participants with ASPD symptoms had smaller gray matter volumes in bilateral dorsolateral prefrontal cortex (DLPFC) and right thalamus. Among alcoholics, there were significant interactions with ASPD symptoms and brain volumes on the Controlled Oral Word Association, Wisconsin Card Sorting Task, and several measures of the WAIS. ASPD symptoms and smaller frontal volumes (left DLPFC and right inferior frontal cortex) were associated with measures of executive functioning (e.g., on Trails A and B) in the alcoholic group. Barratt Impulsiveness Scale scores were associated with smaller bilateral thalamus and lingual gyrus volumes in the ASPD group. For the alcoholic group only, there were significant interactions with ASPD symptoms and left amygdala and bilateral thalamus volumes on the Profile of Mood States, while Multiple Affective Adjective Checklist scores were associated with smaller right thalamus and larger left nucleus accumbens volumes.

Conclusions: Our results suggest that ASPD symptoms may be associated with regional gray matter loss. Moreover, our results demonstrate that alcoholics with ASPD symptoms have abnormalities in regions underlying emotional processing and impulsivity, and smaller frontal brain volumes may be related to executive functioning impairments.

Correspondence: *Mary M. Valmas, MA, Behavioral Neuroscience, Boston University School of Medicine, 183 School Street, Apt 1, Somerville, MA 02145. E-mail: mvalmas@bu.edu*

J. WALDMAN, M. HERTING, S.T. LI & B.J. NAGEL. PASAT Performance Improves Across Adolescence.

Objective: The Paced Auditory Serial Addition Test (PASAT) is a sensitive measure of speed of information processing, sustained attention, and working memory. Notably, many of these cognitive processes develop across adolescence. Since much of the research has used the PASAT with adult populations, its effectiveness in assessing adolescent cognitive maturation remains unclear. In the current study, we examined several predictor variables of PASAT performance in a large sample of typically developing adolescents.

Participants and Methods: 101 adolescent boys and girls, ages 10 to 16 (Mean age=13.1±1.7), completed a modified version of the PASAT that included 3.0 second (s) and 2.0s trials. Independent stepwise multiple regression analyses were conducted to determine how well age, IQ, and gender predicted accuracy in performance on both trials of the PASAT in adolescents.

Results: Regression results indicated that the linear combination of age, IQ, and gender significantly predicted performance on the PASAT 3.0s ($R2=.34$, $F(3,97)=16.38$, $p<.001$). Age was the strongest predictor of PASAT 3.0s performance ($\geq=.48$, $p<.001$), with an increase in performance seen across adolescence. A positive relationship was also seen between PASAT 3.0s performance and IQ ($\geq=.29$, $p=.001$, $Pr=.33$). Lastly, gender also was a significant predictor ($\geq=.23$, $p=.008$, $Pr=.27$), with boys performing significantly better than girls. Similar results were seen when examining the influence of age, IQ, and gender on PASAT 2.0s performance ($R2=.34$, $F(3,97)=16.73$, $p<.001$; age: $\geq=.45$, $p<.001$, $Pr=.48$; IQ: $\geq=.33$, $p<.001$, $Pr=.37$; gender: $\geq=.25$, $p=.003$, $Pr=.29$).

Conclusions: Overall, these results show that PASAT performance improves across adolescence, and that IQ and gender are also contributory. These findings suggest that the adult version of the PASAT is an appropriate and sensitive measure to capture the development of higher-order cognitive processes during adolescence.

Correspondence: *Jill Waldman, MA, Graduate School of Professional Psychology, Pacific University, 190 SE 8th Ave., Hillsboro, OR 97123. E-mail: wald5224@pacificu.edu*

S.J. WALKER, K.E. HAZLETT, R.E. KAY, S. SEN, K.K. MEYERS, C. CONSIDINE, A.J. RANSOHOFF, J. ZUBIETA & S.A. LANGENECKER. Post-Error Slowing as a Function of Neuroticism.

Objective: Individuals monitor their behavior based on multiple factors. Processing performance errors is integral to adaptation and learning from feedback. This study examined how error-processing varies with Neuroticism. We hypothesized a positive linear relationship between Neuroticism and slowed reaction time following commission errors on a task of attention, set-shifting, and inhibitory control.

Participants and Methods: Reaction times to targets before and after commission errors on a Parametric Go/No-Go (PGNG; Langenecker et al., 2007) task were measured among 27 healthy participants. As PGNG stimuli are presented rapidly, post-error slowing was calculated on a 500 ms resolution scale, smoothed with a 1 second filter. Individuals were grouped into tertiles based on NEO-PI-R (Costa and McCrae, 1992) Neuroticism score, yielding groups lower ($M=32.5$, $SD=4.1$), medium ($M=41.7$, $SD=3.0$), and higher ($M=51.4$, $SD=5.0$) in the trait among our sample.

Results: Repeated-measures ANOVA indicated a within-group effect such that reaction times slowed following commission errors, $F(26, 624)=6.03$, $p<.001$. There was also an interaction between group status and post-error slowing, $F(52, 624)=2.10$, $p<.001$, with mid levels of neuroticism associated with lesser post-error slowing. Number of errors did not differ between groups, $F(2, 25)=.45$, n.s.

Conclusions: Individuals showed different post-error slowing depending on their level of Neuroticism. The medium group exhibited the least, suggesting a potentially optimal level of Neuroticism for efficient adaptation to errors. Assessment of Neuroticism yielded additional information when examining performance monitoring, and may provide insight into related psychiatric disorders. The role of Neuroticism in error-monitoring in depression will be discussed.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Sara J. Walker, Ph.D., Psychiatry, University of Michigan, 2101 Commonwealth Blvd., Suite C, Ann Arbor, MI 48105. E-mail: sarajw@umich.edu*

W. WATSON, M. BODZY, M.E. MAHONE, E. LEVEY, L.A. JACOBSON & A. ZABEL. Stability of parent ratings of executive function across the adolescence-young adulthood transition in spina bifida.

Objective: Executive dysfunction (EdF) is a consistent finding in youth with spina bifida (SB) and may contribute to risk for poor adaptive outcomes. However, little is known about the trajectory of EF development into young adulthood in SB. Use of consistent methodology over the adolescent-adult transition can provide important information regarding stability of these skills.

Participants and Methods: Participants (parents of 13 youth with SB [61.5% male]), completed behavioral ratings of their child's executive skills (BRIEF) during adolescence (time 1, ages 10-18) and at follow-up 8 years later (time 2, ages 18-26).

Results: Compared to normative means, youth with SB were rated with significant EdF (mean BRIEF GEC = 64.0, SD = 14.2, p=.004) in adolescence, with elevations in both cognitive aspects of EF (BRIEF MI = 65.6, p= .001) and emotional/behavioral regulation (BRI = 59.5, p=.029).

In contrast, parents reported less EdF in young adulthood overall (GEC = 54.9, SD = 9.4, p=.098; MI = 56.4, p=.016; BRI = 52.3, p=.483), with a decrease over time (GEC, t(11) = 2.219, p=.048). Notably, no adolescents rated as "sub-clinical" (GEC <60) at time 1 were rated with significant EdF at time 2. However, 57.1 % of those with EdF (GEC score > 60) at time 1 also showed EdF at time 2. Qualitatively, those with persisting EdF demonstrated greater psychiatric concerns (mood dysregulation) over time.

Conclusions: Overall, youth with SB appear to demonstrate delayed acquisition of EF skills. Preexisting affective disorders may complicate EF skill development and contribute to poor adult outcomes and should be carefully monitored.

Correspondence: *William Watson, M.S., Kennedy Krieger Institute, 117 S Linwood Ave, Baltimore, MD 21224. E-mail: watsonw@kennedykrieger.org*

Imaging (Structural)

M. ALOIA, V. CASTRONOVO, P. SCIFO, D. PERANI, S. CAPPA, A. FALINI, V. GINEX & L. FERINI-STRAMBI. Structural Brain Changes in Obstructive Sleep Apnea and the Effects of Treatment.

Objective: Obstructive Sleep Apnea (OSA) is commonly associated with neurocognitive impairments. These impairments have not consistently been related to specific brain structures. Knowledge of brain structures implicated in OSA and the corresponding functional implications could provide clues on the pathogenesis of cognitive impairment and its reversibility in OSA.

Participants and Methods: We coupled neuropsychological testing and Voxel-Based-Morphometry (VBM) to investigate the cognitive deficits and corresponding brain morphology changes of 17 OSA-patients, compared to 15 controls. We also obtained follow-up cognitive and imaging data at 3 months post-treatment.

Results: Neuropsychological results before treatment for OSA showed impairments in most cognitive areas. These impairments were associated with focal reductions of grey-matter volume in the left hippocampus (enthorinal cortex), posterior parietal cortex, and right superior frontal gyrus. After treatment we observed significant improvements in memory, attention and executive-functioning that paralleled a volume increase in hippocampal and frontal structures.

Conclusions: The reversibility of the observed deficits, both at the cognitive and structural level, suggests the structural cortical damage observed in OSA to be secondary to sleep deprivation or repetitive nocturnal intermittent hypoxemia.

Correspondence: *Mark Aloia, PhD, Medicine, National Jewish Health, 1400 Jackson Street, Denver, CO 80206. E-mail: aloiam@njhealth.org*

K.W. AYOUB, E.A. WILDE, Z. CHU, E.D. BIGLER, J.V. HUNTER, T.C. WU, S.R. MCCAULEY & H.S. LEVIN. Longitudinal Voxel-based Analysis in Traumatic Brain Injury: A Comparison of Diffusion Tensor Imaging Metrics over an 18-month Post-injury Interval.

Objective: Diffusion tensor imaging (DTI) may improve detection of microstructural changes over traditional MR imaging in traumatic brain injury (TBI). However, while there is a presumed relation between the different DTI metrics, the degree of anatomical overlap between them is incompletely understood, as is the manner in which these DTI-related changes may evolve over time.

Participants and Methods: Twenty-one participants with TBI and 24 control participants with extracranial injury aged of 7-17 years underwent DTI at 3 and 18 months post-injury. Using voxel-based analyses, we compared the groups on measures of fractional anisotropy (FA), apparent diffusion coefficient (ADC) and radial diffusivity (RD) at 3 and 18 month time points. Additionally, we examined DTI-related changes within the TBI group between 3 and 18 months.

Results: At both 3- and 18-month intervals, significant ($p<0.005$) regions of FA decrease in the TBI group involved subcortical white matter, corpus callosum, fornix, thalamus, cingulum bundle, and cerebellum. In contrast, significantly increased ADC and were demonstrated in the TBI group in similar general regions of white matter. However, in structures exhibiting change in all three metrics, the pattern of differences in FA both across groups and within the TBI group was more anterior in those structures than ADC/RD.

Conclusions: VBA indicated several white matter regions affected in patients with TBI that shift in location and degree between 3 and 18 months post-injury. These results also suggest that FA changes do not necessarily exactly overlap with changes in ADC/RD. These findings may be important in understanding the dynamic nature of recovery and development following pediatric TBI.

Correspondence: *Kareem W. Ayoub, BSBE, Rice University, 21307 Ganton Drive, Katy, TX TX. E-mail: kwa1@rice.edu*

A.M. BRICKMAN, I.B. MEIER, M.S. KORGAONKAR, F.A. PROVENZANO, S.M. GRIEVE, L.M. WILLIAMS & M.E. ZIMMERMAN. Testing the retrogenesis hypothesis of cognitive aging across the lifespan.

Objective: The retrogenesis hypothesis of cognitive aging postulates that breakdown of late myelinating white matter fibers mediates age-associated cognitive decline. We used diffusion tensor imaging to examine the pattern of white matter integrity across the lifespan and its neuropsychological correlates in older age. We hypothesized that late myelinating fiber integrity would show greater age-associated increases in early life and decreases in later life than early myelinating fibers, and that late myelinating fiber integrity predicts cognitive performance better than early myelinating fibers among older adults.

Participants and Methods: Diffusion tensor MRI and neuropsychological evaluations were conducted in 282 healthy individuals (age range=7-87 years) from the Brain Resource International Database, accessed via the independent BRAINnet Foundation (www.BRAINnet.net). Fractional anisotropy (FA) was derived in two prototypical early and late myelinating fiber tracts (posterior limb of the internal capsules (PLIC), cerebral peduncles (CP), and superior longitudinal fasciculus (SLF), inferior longitudinal fasciculus (ILF), respectively). We examined differences in FA across three age groups (7-21, 22-49, 50-78 years) and analyzed cognitive correlates among older subjects.

Results: Across fiber tracts, FA was the highest in the middle aged group and lowest in the older group. Early myelinating fiber tracts had higher FA than later myelinating fiber tracts. The difference in FA between the older and the middle groups was greater in the CP (early) and SLF (late) as compared to the PLIC (early) and ILF (late). Increased FA in ILF was associated with better learning and letter fluency performance among older adults.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The ILF, a late myelinating bundle, was most consistently associated with cognitive functioning among older adults, providing some support for the retrogenesis hypothesis. However, the overall pattern of age-associated differences in FA was not consistent with retrogenesis.
Correspondence: *Adam M. Brickman, Ph.D., Taub Institute, Columbia University, 630 West 168th Street, New York, NY 10032. E-mail: amb2139@columbia.edu*

F.A. PROVENZANO, E.R. CORTES, S. DASHNAW & A.M. BRICKMAN. Neuroimaging-guided pathological examination of white matter hyperintensities in aging.
Objective: White matter hyperintensities (WMH) are areas of increased lucency visualized on T2-weighted magnetic resonance imaging (MRI) scans. Despite findings implicating WMH involvement in cognitive dysfunction among neurologically healthy older adults and those with neurodegenerative disease, the exact pathological nature of these radiological lesions is unclear. Through postmortem examination of tissue that appears as WMH on MRI, we may be able to determine whether there are remediable or preventable pathological features that are specifically involved in cognitive aging. Here, we present preliminary data from an ex vivo MRI study of WMH in older adults.
Participants and Methods: Seven consecutive autopsy cases from an aging and dementia center were studied with an ex vivo MRI protocol. After extraction from skull, one hemisphere was fixed and scanned following an approximate 14-day fixation interval. Using in-house developed software, WMH were identified on MRI scans and used to guide tissue sampling for histopathological examination. We compared pathological features of tissue appearing as WMH to tissue sampled from normal appearing white matter areas.
Results: Comparison of ex vivo MRI scans to standardized research antemortem MRI scans, available for 2 subjects, demonstrated regional overlap in WMH distribution, which supports the validity of our postmortem MRI protocol to identify WMH. Preliminary analyses suggest that areas appearing as WMH have rarefaction of myelin, diminished axonal density, widening of perivascular space, increased inflammatory markers, and fibrosis of the vessel walls.
Conclusions: These preliminary results highlight the potential utility of ex vivo MRI for identification of mechanisms linking WMH to cognitive aging. Future work will compare pathological correlates of WMH in neurodegenerative disease and healthy aging.
Correspondence: *Adam M. Brickman, Ph.D., Taub Institute, Columbia University, 630 West 168th Street, New York, NY 10032. E-mail: amb2139@columbia.edu*

A. HALEY, M.M. GONZALES, T. TARUMI, S.C. MILES, K. GOUDARZI & H. TANAKA. Evidence of Altered Cerebral Neurochemistry in Metabolic Syndrome.
Objective: Metabolic syndrome (MetS) identifies a constellation of risk factors including obesity, elevated blood pressure and dysregulation of glucose and lipid metabolism. In addition to the well-known impact on cardiovascular morbidity and mortality, many of the individual components of MetS, such as diabetes, hypertension and obesity, also have negative cognitive consequences. Furthermore, the cluster has added value in estimating individual cognitive trajectories, above and beyond the sum of its components, yet the mechanisms of MetS-related cognitive dysfunction remain unknown. To address this gap, we examined the relationship between diagnosis of MetS and cerebral metabolism.
Participants and Methods: Thirteen participants with MetS (aged 48±6 years) and 25 healthy adults (aged 51±6 years) underwent neuropsychological assessment, health screen and proton magnetic resonance spectroscopy (1H MRS) examining N-acetyl-aspartate (NAA), myo-inositol (mI), creatine (Cr), choline (Cho), and glutamate (Glu) concentrations in cerebral grey matter. Cerebral metabolite ratios (NAA/Cr, Cho/Cr, mI/Cr, and Glu/Cr) of participants with MetS, defined by the International Diabetes Federation criteria, were compared with controls matched for age, education, cognition, and emotional function.
Results: There were no significant differences in global cognitive function, memory, language, and psychomotor performance between the groups. Diagnosis of MetS was associated with significantly higher mI/Cr ($F(1,36)=5.02$, $p=0.031$) and Glu/Cr ratio ($F(1,36)=4.81$, $p=0.035$).
Conclusions: Even in cognitively normal adults, MetS is related to cerebral metabolic disturbances, a possible indication of early brain vulnerability. Longitudinal studies that begin in mid-life can help validate the use of 1H MRS markers as indicators of long-term cognitive outcomes.
Correspondence: *Andreana Haley, PhD, Psychology, University of Texas, 1 University Station, A8000, Austin, TX 78712. E-mail: haley@psy.utexas.edu*

P. KOURTIDOU, T.C. WU, E. TRAIPE, J.V. HUNTER, E.D. BIGLER, Z. CHU, S.R. MCCAULEY, X. LI, M. MACLEOD, H.S. LEVIN & E.A. WILDE. Centrum Semiovale and Corpus Callosum Integrity in Relation to Information Processing Speed of Patients with Severe Traumatic Brain Injury.
Objective: This study investigated white matter alterations in the corpus callosum (CC) and centrum semiovale (CSO) using diffusion tensor imaging (DTI) and magnetization transfer imaging (MTI) in participants with severe traumatic brain injury (TBI) and related these changes to processing speed measures.
Participants and Methods: Fourteen adult participants with severe TBI underwent neuroimaging and assessment of processing speed using the Symbol Digit Modalities test (SDMT; written and oral administrations) and Trail Making test, part B (TMT) at approximately six months post-injury. Thirteen demographically-similar, neurologically-intact adults were examined for comparison.
Results: The TBI group had significantly smaller fractional anisotropy (FA) ($p<0.001$) for the right CSO and larger apparent diffusion coefficient (ADC) for the CSO bilaterally (right, $p=0.012$; left, $p=0.006$). Smaller FA was noted in all regions of the CC (genu, $p<0.001$; body, $p<0.001$; splenium, $p<0.001$), with larger ADC also noted in genu ($p<0.001$), body ($p<0.001$) and splenium ($p<0.001$). MTI analysis revealed significantly smaller magnetization transfer ratios (MTRs) in the right and left CSO (right, $p<0.001$; left, $p=0.006$), and both regions of the CC (genu, $p=0.009$; splenium $p=0.002$). Written SDMT performance was significantly related to right ($r=0.652$) CSO FA, right and left CSO ADC ($r=-0.771$; $r=-0.631$), CC FA ($r=0.591$) and right CSO MTR ($r=0.703$), while oral SDMT was related to right CSO FA ($r=0.635$), right CSO ADC ($r=-0.608$) and right CSO MTR ($r=0.576$). TMT was significantly related to right CSO FA ($r=-0.634$) and right ($r=-0.620$) CSO MTR.
Conclusions: Advanced neuroimaging modalities such as DTI and MTI demonstrate significant alterations in white matter, which are related to processing speed.
Correspondence: *Paraskevi Kourtidou, BS, Medical School, Athens, Greece, Postgraduate Program of "Clinical Neuropsychology" Medical School, National and Kapodistrian University of Athens, Greece, 72-74 Vas. Sofias Avenue,, Athens 11528, Greece. E-mail: ekourtid@gmail.com*

M.A. LANCASTER, S. DURGERIAN, M. SEIDENBERG, K.A. NIELSON, J.L. WOODARD, J.C. SMITH, M.A. MATTHEWS, A.M. BUTTS, N. HANTKE & S.M. RAO. White Matter Disruption in Asymptomatic Individuals at Risk for Alzheimer's Disease.
Objective: Changes in white matter integrity, as measured by Diffusion Tensor Imaging (DTI), have been observed in Mild Cognitive Impairment and Alzheimer's Disease (AD). Previous DTI studies of asymptomatic individuals at risk for AD have focused solely on changes in fractional anisotropy (FA). We compared four DTI indices, mean diffusivity (MD), axial diffusivity (AxD), radial diffusivity (RadD), and FA, in cognitively intact older participants who were either at increased or reduced risk for AD.
Participants and Methods: The increased risk group had a positive family history of AD and one or both Apolipoprotein (APOE) ε4 alleles

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

(n = 29; mean age = 72.6; 22 females); the reduced risk group had neither risk factor (n = 29; mean age = 73.8; 24 females). Intergroup comparisons of the four DTI indices were based on tract-based spatial statistics (TBSS) and region of interest (ROI) analysis using Freesurfer parcellation of white matter.
Results: Good correspondence was observed between the ROI and TBSS analysis methods. The increased risk group demonstrated widespread, bilateral increase in AxD and, to a lesser extent, in RadD relative to reduced risk group. Increases in AxD and RadD diffusivity were reflected in an overall increase in MD in the increased risk group. In contrast, no group differences were observed in FA.
Conclusions: DTI indices of diffusivity, especially in the axial direction, suggest disruption of white matter function in otherwise cognitively intact older persons at risk for AD. Longitudinal studies are needed to determine if these DTI indices are predictive of future cognitive decline in at-risk individuals.
Correspondence: *Melissa Lancaster, Rosalind Franklin University of Medicine and Science, 3615 N Whipple St, Unit 2, Chicago, IL 60618. E-mail: melissa.lancaster@my.rfums.org*

M. LUCIANA, M. PETROSKO, R. MUETZEL & P.F. COLLINS. Effects of Alcohol Versus Marijuana Use on Neurocognitive Performance, Brain Structure, and Neural Connectivity in Adolescence.
Objective: Through adolescence, brain structural changes in gray and white matter volumes alter functional connectivity and behavior, particularly regulatory control. A compelling question concerns how substance use compromises adolescent behavioral development by altering neural connections that support it. We have assessed how normative patterns of alcohol and marijuana use impact brain and behavioral development.
Participants and Methods: Typically developing adolescents (n=161) and a subgroup of marijuana users (n= 36) completed MRI scans and neurocognitive testing, including measures of learning, memory, attention, motor, and executive functions. Substance use patterns were quantified by self-report. The study is longitudinal; participants were studied at multiple time points, allowing correlates of increased substance use to be discerned.
Results: Diffusion tensor imaging (DTI) measures of white matter development suggest that normative increases in alcohol use are associated with reduced connectivity in frontal and temporal lobe regions, with changes in subcortical volume, particularly in the nucleus accumbens (NAS), and with decreased volumes of tracts connecting the NAS and orbitofrontal cortex. In contrast, marijuana use is associated with a distinct set of neural correlates that differ in direction and location from what is associated with alcohol use and with deficits in learning, memory, and executive decision-making. These behaviors correlate with regional brain volumes and connectivity.
Conclusions: Cumulatively, these findings illustrate how imaging measures can address questions involving the effects of substance use on developing neural connectivity in adolescence. These findings indicate that substance use (but not necessarily misuse) during this important period of brain development has measurable neuropsychological consequences.
Correspondence: *Monica Luciana, Ph.D., Psychology, University of Minnesota, 75 East River Road, N218 Elliott Hall, Minneapolis, MN 55455. E-mail: lucia003@umn.edu*

T.L. MERKLEY, E.A. WILDE, E.D. BIGLER, K.P. SCHNELLE, S.R. MCCAULEY, G. HANTEN, Z. CHU, J.V. HUNTER & H.S. LEVIN. Cortical Thinning in Adolescence.
Objective: Cortical gray matter thinning occurs from childhood through adolescence in typical brain development. Child/adolescent TBI studies often employ orthopedically injured (OI) subjects to control for risk factors predisposing youths to traumatic injury. Does cortical thinning in child/adolescent OI subjects follow the expected pattern of maturational changes?
Participants and Methods: Participants were OI children/adolescents enrolled as control subjects in a developmental study of brain changes following traumatic brain injury. The sample consisted of 33 male and 13 female adolescents, with mean age of 12.46 ± 2.57. T1-weighted volumetric MRI data from a single imaging session were used for the automated cortical reconstruction, parcellation and cortical thickness analysis, as performed using the Freesurfer image analysis suite. Correlation between cortical thickness and age was conducted, with cluster simulation to correct for multiple comparisons.
Results: Significant regions of cortical thinning with increasing age was observed throughout the brain, including superior temporal (bilateral), inferior temporal (left), lateral and medial orbital frontal (bilateral), lateral occipital (bilateral), rostral middle frontal (bilateral), precuneus, posterior cingulate, superior frontal (bilateral), superior parietal (bilateral), and inferior parietal (right) regions (clusterwise p<.0001).
Conclusions: These findings suggest that cortical gray matter changes occur throughout the developing OI brain, similar to typical patterns of brain development. This could be due to the proliferation of myelination into the cortical neuropil and/or neural pruning, leading to more efficient neurotransmission during the maturation process. These findings highlight the dynamic nature of brain structure and function during development, and suggest that OI subjects generally follow the expected pattern of maturational changes.
Correspondence: *Tricia L. Merkley, Psychology, Brigham Young University, 1001 Kimball Tower, Brigham Young University, Provo, UT 84602. E-mail: merkleytl@gmail.com*

J. COLLAZO, J.J. TANNER, S. TOWLER, S. OROZCO, N. SCHWAB, M. OKUN & C.C. PRICE. Caudate Volume and Cognitive Correlates in Parkinson's disease: Artifact of Alignment Technique?
Objective: Neuroanatomical structure measurement can occur in different ways: in natively acquired space, registration to six degree (linear transformation in x,y,z, directions), nine degree (linear transformation and stretching in x,y,z, directions), or twelve degree (linear transformation, stretching, and shearing in x,y,z, directions). We hypothesized that caudate volumes and cognitive correlates would differ from native acquired space relative to other alignment approaches.
Participants and Methods: A group of 30 Parkinson's disease (PD) and age matched controls (66.1±7.04) completed brain MRI (1.5Telsa) that included volumetric measurements, and neuropsychological tests. An expert rater segmented the caudate nuclei in native space and in alignment method. Registered masks were then reverted to native space for statistical comparison with masks originally acquired in native space.
Results: Intra-rater reliability was high for all alignment approaches (Dice similarity coefficient {DSC} mean range =.84-.87) as was inter-rater (DSC= .84 ± .032). Volumes: Caudate volumes measured in native space were significantly lower than 9 and 12 degree alignment volumes (p<.001), with 6 degree < 9 degree < 12 degree (all p<.001). After reversion from alignment type back to native space, there was no volume difference. Cognitive associations: Correlations to cognitive measures were significant in native space (e.g., Trails B: r=-.35), 6 degree alignment (r=-.40), and 12 degree alignment (r=-.46). Reversion to native space improved 12 degree alignment associations.
Conclusions: MRI masks segmented in registered space might differ from those segmented in native space. Reverting to native space might increase accuracy of volumes and improve cognitive associations. Studies are encouraged to report registered space when reporting volumes and whether reversion to native space was completed.
Supported by: K23NS60660 (CP)
Correspondence: *Jared J. Tanner, MS, Clinical & Health Psychology, University of Florida, 4037 SW 21st Rd, Gainesville, FL 32607. E-mail: jjtanner@phhp.ufl.edu*

J.J. TANNER, C.C. PRICE, P.T. NGUYEN, W. TRIPLETT, M.S. OKUN, H. FERNANDEZ & T.H. MARECI. Examining A Case of Hemiatrophy with Parkinsonism Using Neuropsychology and Diffusion Imaging Approaches.
Objective: 66-year old (GL) with 6-year left onset tremor diagnosed as Parkinson's disease (PD) completed brain MRIs and neuropsy-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

chological testing for two years as part of a larger PD study protocol. MRI scans showed reduced right caudate relative to left, possibly suggesting hemiatrophy. We investigated the hypothesis that GL's right caudate and associated fiber connectivity to the right frontal lobe would be less than the left side and also smaller relative to same side onset PD peers. Year 1-2 caudate and cognitive changes were investigated.

Participants and Methods: GL and same symptom side onset peers (n=5) completed 3Tesla MRI T1-weighted and 64-direction diffusion weighted scans processed via semi-automated programs (FreeSurfer) and software based on mixture of Wishart distributions (MOW). Measures controlled for intracranial volume and ROI surface area. Processing speed, problem solving, and motor function were examined for change and asymmetry.

Results: GL's right caudate < left by 39% (2213 mm^3 versus 3627 mm^3) and less than same side onset peers (z=-2.37). Fibers leaving the right caudate were fewer than the left (101,192 versus 125,717). Right frontal to caudate fiber connectivity was reduced ($EW_{right}=1.8x10^{-7}$; $EW_{left}=2.2x10^{-7}$; peer comparison: right z=-2.51, left z=-1.33). There were no differences between GL and peer total brain or ventricle volume. Cognitively, year 1-2 volumetric and reliable change cognitive measurements were unremarkable. Motor symptoms remain stable with dominant left side tremor.

Conclusions: This case demonstrates the unique integration of serial imaging and neurosychology methods to understand PD subtypes. These data suggest GL may not have PD. Considerations for hemiatrophy are discussed.

Study supported by: K23NS60660 (CP)

Correspondence: *Jared J. Tanner, MS, Clinical & Health Psychology, University of Florida, 4037 SW 21st Rd, Gainesville, FL 32607. E-mail: jjtanner@phhp.ufl.edu*

A. TREBLE, K.M. HASAN, P.R. SWANK, A. IFTIKHAR, J.M. FLETCHER & L. EWING-COBBS. Predicting Verbal and Visuospatial Working Memory Deficits following Pediatric Traumatic Brain Injury through Callosal Subregion Integrity: A Diffusion Tensor Tractography Study.

Objective: Working memory (WM) deficits are a common consequence of pediatric traumatic brain injury (TBI). Reduced integrity of the corpus callosum (CC) may disrupt connectivity between bilateral anterior and posterior neural networks underlying WM. Diffusion tensor tractography (DTT) of the CC was utilized to predict WM following pediatric TBI.

Participants and Methods: DTT was acquired in 78 children sustaining complicated mild to severe TBI and compared with 49 community comparison children. Commissural fibers traversing the CC were divided into eight subregions based on their cortical origin/termination. Subregions were tracked using DTI Studio software based on the fiber assignment by continuous tracking algorithm. Hierarchically-ordered regression analyses examined fractional anisotropy (FA) and radial diffusivity (RD) in relation to WM scores across groups.

Results: Relative to the comparison group, FA was lower in six CC subregions ($p < 0.006$), and RD was higher in all subregions ($p < 0.0001$), in children with TBI. Children with TBI performed below the comparison group on the visuospatial ($p = 0.0067$), but not verbal, WM task. Lower FA and higher RD predicted lower verbal WM performance in subregions of the splenium through which temporal and parietal fibers course. Lower FA and higher RD in the rostrum and genu, as well as in regions of the splenium through which fibers from parietal cortices traverse, predicted lower visuospatial WM.

Conclusions: Reduced integrity of callosal fibers connecting temporal and parietal cortices was associated with poorer verbal WM; whereas reduced integrity of fibers connecting prefrontal and parietal cortices was associated with lower visuospatial WM. NIH ROI NS46308

Correspondence: *Amery Treble, B. Sc., Psychology, University of Houston, 126 Heyne Building, University of Houston, Houston, TX 77204. E-mail: amerytreble@gmail.com*

A. TREBLE, J.M. FLETCHER & J. JURANEK. Functional Significance of Neocortical Reorganization in Spina Bifida: Relations among Cortical Thickness, Cortical Complexity, and IQ.

Objective: Spina bifida myelomeningocele (SBM) is a congenital disorder involving abnormal neurodevelopment of the brain and spinal cord. We examined the functional significance of neocortical reorganization in SBM by investigating relations among cortical thickness, cortical complexity, and IQ in children and young adults with SBM.

Participants and Methods: MRIs were examined in 69 participants with SBM and 29 age- and gender-matched healthy controls. Cortical thickness and 3D local gyrification index (LGI) were acquired through a semi-automated image processing stream using FreeSurfer. Standardized composite IQ was obtained using the Stanford-Binet Intelligence Test-IV. Using FreeSurfer's QDEC utility to execute analyses across the whole brain, separate general linear models examined (1) group differences in cortical thickness and LGI, and (2) relations of cortical thickness and LGI to IQ within the SB group. A false discovery rate of $p < 0.05$ corrected for multiple comparisons across all vertices.

Results: Regions demonstrating positive associations between cortical thickness and IQ in SBM were identified in abnormally thin regions, particularly in the medial temporal cortices. Negative associations were found in abnormally thick regions including the inferior frontal and medial posterior occipital cortices. Regions demonstrating positive associations between LGI and IQ were found in less complex cortical regions including the superior parietal and lateral occipital cortices; whereas negative associations localized to regions of abnormally high cortical complexity including the lateral inferior parietal and superior temporal cortices.

Conclusions: Neocortical reorganization in SBM has implications for cognition. Individuals with SBM tend to have higher intellectual function the more their cortex approximates typical measurements of thickness and complexity.

Correspondence: *Amery Treble, B. Sc., Psychology, University of Houston, 126 Heyne Building, University of Houston, Houston, TX 77204. E-mail: amerytreble@gmail.com*

A. TREBLE, J. JURANEK & L. EWING-COBBS. Reduced White Matter Integrity following Pediatric Traumatic Brain Injury: A Tract Based Spatial Statistics Study.

Objective: Diffuse axonal injury is the primary pathophysiological consequence of traumatic brain injury (TBI). Tract Based Spatial Statistics (TBSS) is an automated group-wise observer-independent whole-brain approach which enables statistically powerful comparisons of diffusion tensor images (DTI) without the need for a priori, subjectively-defined regions of interest. The present study utilized TBSS to examine white matter integrity following pediatric TBI.

Participants and Methods: DTI were collected at 3 months post-injury in age- and gender-matched children with moderate to severe TBI (n=43) or orthopedic injury (n=37). Using FSL software, fractional anisotropy (FA) images were aligned to common space using nonlinear registration. A mean FA skeleton, representing the centers of all tracts common to the sample, was generated. Voxelwise statistical analysis of individual skeleton images was performed using a nonparametric permutation test correcting for multiple comparisons with a significance threshold of $p < 0.01$. White matter tracts were identified using the JHU White-Matter Tractography Atlas.

Results: Relative to the comparison group, children with TBI evidenced reduced FA in the majority of white matter tracts bilaterally throughout the cerebrum. Association pathways affected included the inferior and superior longitudinal, occipitofrontal, and uncinate fascicului, as well as the dorsal cingulum bundle and fornices. FA in the hippocampal region of the cingulum did not differ across groups. All regions of the corpus callosum showed reduced FA. Projection fibers affected included the corticospinal tracts, internal capsule, and thalamic radiations.

Conclusions: Pediatric TBI resulted in widespread reductions in white matter integrity in association, projection, and commissural pathways measured at 3 months post-injury. NIH ROI NS43608.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Amery Treble, B. Sc., Psychology, University of Houston, 126 Heyne Building, University of Houston, Houston, TX 77204. E-mail: amerytreble@gmail.com*

E. ARETOULI, T.D. VANNORSDALL, T. HO, G.D. PEARLSON, B. GORDON & D.J. SCHRETLEN. The Neural Substrates of Personality: A Voxel-based Morphometry Study of the Big Five Personality Traits.

Objective: A growing literature suggests that human personality traits reflect individual differences in brain function and structure. Here we use voxel-based morphometry (VBM) to explore the neural correlates of the Big Five personality traits.

Participants and Methods: Participants included 133 healthy adults who completed a personality inventory, the NEO-FFI, and underwent structural brain magnetic imaging. We used VBM to correlate NEO raw scores with regional gray matter volumes after adjusting for age, total intracranial volume, and remaining NEO traits.

Results: Lower levels of extraversion were associated with larger volumes in frontal brain regions, potentially representing a neural substrate for the increased inhibitory control and social avoidance seen in introverts. Neuroticism was negatively correlated with brain regions involved in the identification and appraisal of the emotional significance of a stimulus and the generation of emotional states, especially in response to aversive and threatening stimuli. Conscientiousness was inversely related to an extended brain network subserving a variety of cognitive functions, including error and performance monitoring, regulation of emotional responses, and social cognitive processes. Agreeableness covaried with volume in the frontal areas, sub-lobar areas, and the hippocampus, whereas openness was positively associated with regions involved in auditory processing, language and encoding of semantic and non-semantic information.

Conclusions: Here we demonstrate that some widely-distributed brain regions underlying multiple cognitive and psychological processes are also related to several distinct personality dimensions. Further, the Big Five personality traits also have specific neuroanatomical correlates within the cerebral cortex that subserve the psychological/cognitive mechanisms central to each trait.

Correspondence: *Tracy D. Vannorsdall, Ph.D., Psychiatry, Johns Hopkins University School of Medicine, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21224. E-mail: TVannor1@jhmi.edu*

J. WARD, S. FIELDSTONE, C. LASSEN-GREENE & D. SCHRETLEN. Cerebellar Gray Matter Volume and Divided Attention/ Working Memory in Patients with Schizophrenia.

Objective: There is increasing evidence for the role of the cerebellum in cognitive functioning, and prior research has demonstrated a relationship between cerebellar volume and divided attention (DA) and auditory working memory (aWM) in both healthy control (HC) participants and individuals with cerebellar lesions. Furthermore, it has been proposed that the relationship between attention and cerebellar function is mediated by working memory demands inherent in many measures of complex attention. Impairments in cognitive functioning are common in schizophrenia, and deficits in DA/aWM have been associated with reduced cerebellar volume in this population.

Participants and Methods: The current study investigated the relationship between cerebellar grey matter (GM) volume and performance on a task of DA/aWM in 52 individuals with schizophrenia (SCZ) and 90 HC participants using voxel based morphometry (VBM).

Results: There were no significant group differences in total brain, total brain GM, or cerebellar GM volumes, controlling for total intracranial volume, age, and sex. Unexpectedly, there was not a significant relationship between DA/aWM and cerebellar volume in the HC group. However, a significant positive relationship was seen between left cerebellar volume and DA/aWM in the SCZ group.

Conclusions: Given the known anatomical connections between the cerebellar hemispheres and contralateral cerebrum, the current findings indirectly suggest a role for the right cerebrum in DA/aWM, which is consistent with prior research implicating the right hemisphere in attentional processes. The current findings provide additional evidence for the role of the cerebellum in DA/aWM, although it is unclear why such a relationship was seen among SCZ but not HC participants.

Correspondence: *Julianna Ward, Ph.D., Psychiatry & Behavioral Sciences, Johns Hopkins University/Hospital, Meyer 218, Div. of Med. Psychology, 600 N. Wolfe Street, Baltimore, MD 21218. E-mail: jward24@jhmi.edu*

Memory Functions

S.E. ADAMS, L.R. KNUYCKY, H.M. KLEIDER & T.Z. KING. Valence of Event Stimuli Differentially Affects Memory for Central and Peripheral Items Under Conditions of High Arousal.

Objective: Research suggests that memory for central items are heightened while memory for peripheral items are inhibited by emotionally arousing stimuli (i.e., memory narrowing). A majority of studies have used negatively valenced and arousing stimuli, which confounds the issue of whether arousal or valence underlies attention shifting and memory recall. The current study examines memory for differentially valenced and nonarousing events.

Participants and Methods: Sixty-nine students were shown an arousing video to evoke a state of high arousal. Then a nonarousing memory video (positive, negative, or neutral valence) was administered. Experimental conditions were confirmed by self-report measures of arousal and valence (pre and post each video). Memory was tested after a twenty minute delay.

Results: All participants reported a significant increase in arousal after viewing the arousing video. The main effect of memory video type was significant ($F(2)=4.94$, $p<.01$), as participants had better memory for central items in both valenced videos (positive M=97.3%, negative M=93.9%) than for those items in the neutral video (M=87.5%). Conversely, peripheral items were better remembered in the neutral video (M=77.5%; $F(2)=12.54$, $p<.0005$) compared to the positive video (M=65.5%) and negative video (M=50.4%) conditions.

Conclusions: Our results support previous findings of a memory narrowing effect for valenced stimuli. Additionally, it supports that this effect is present for both positive and negative stimuli. Finally, because all participants were aroused and only those in the valenced memory conditions experienced memory narrowing, it suggests that event valence may be a more important factor than arousal in the memory of central versus peripheral items.

Correspondence: *Shanna E. Adams, Georgia State University, 20 Iron Belt Rd SE, Cartersville, GA 30120. E-mail: shanna.e.adams@gmail.com*

E. ATTALI & G. DALLA BARBA. On the influence of the semantic relatedness on the Word Frequency Mirror Effect.

Objective: The word frequency mirror effect (WFME) refers to the fact that Low Frequency-words (LF) provide more Hits than High Frequency-words (HF) whereas HF-words induce more False alarms than LF-words. This effect had been explained by the Source of Activation Confusion theory. Otherwise, Roediger and McDermott demonstrated that FA can be attributed to the activation of the semantic network. In this study we aim to understand the role of the semantic relatedness in the WFME.

Participants and Methods: 35 young, 34 older healthy adults and 18 mild AD patients participated in the study.

Subjects studied 3 lists of HF- and LF-words. After each study list, participants were asked to recognize the studied words between targets, semantically related foils and unrelated foils.

Results: Results indicated:

- group effect with a decrease in Hit rate and an increase in FA rate across age and AD.
- relatedness effect: semantically related foils induce more FA and less Hits than unrelated foils, whereas unrelated foils induce the reverse pattern.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

- interaction for group X relatedness: AD patients are not sensitive to the relatedness of the foils.
- frequency effect: LF-words produce both a higher hit rate and a lower FA-rate than HF-words.
- interaction for frequency X relatedness: HF words do not produce more FA than LF words when they are related to the previously studied words targets

Conclusions: WFME and relatedness effect tends to decrease in OA and to disappear in AD. Moreover the WFME decreases for semantically related foils: the benefit for LF words and the disadvantage for HF words disappear when they are semantically related with the targets.

Correspondence: *Eve Attali, PhD, U975, CRICM INSERM, Hopital de la Salpetrière, 47 Boulevard de l Hôpital, Paris 75013, France. E-mail: eveattali@hotmail.com*

A. BARNABE, V. WHITEHEAD & H. CHERTKOW. The Pattern of Autobiographic Memory Loss in Transient Global Amnesia – What Does it Tell Us About Models of Memory Consolidation?

Objective: Disagreement exists over whether the hippocampus plays a time-limited role in autobiographical episodic memory indexing and retrieval or whether this structure is more permanently required for the retrieval of long-term episodic memories. While retrograde amnesia for episodic memories would be temporally graded following selective hippocampal dysfunction in the former view, retrograde amnesia for episodic memories would be extensive and ungraded in the latter view. The pattern of loss during and after transient global amnesia in a single individual was used to evaluate the impact of selective hippocampal dysfunction.

Participants and Methods: Autobiographical memory was tested in a 79-year-old man suffering from transient global amnesia (TGA) and in 20 elderly normal controls (ENCs). Pattern of memory loss was assessed both during the amnesic episode and four months after the episode using the Autobiographical Interview (AI) of Levine and the Autobiographical Memory Interview (AMI) of Kopelman.

Results: The subject's performance was assessed by converting his results into z-scores in relation to the performance of the ENCs, with any z score <2 SD considered significant. Significant differences were found on the AMI episodic scores in early adulthood and recent epochs, with improvement four months following the amnesic episode. On the AI, a temporal gradient for internal episodic details was found during the period of amnesia, and marked improvement four months later. No differences were found in relation to AI external details or AMI semantic memory.

Conclusions: These findings provide partial evidence for a time-limited role of the hippocampus in autobiographical episodic memory.

Correspondence: *Howard Chertkow, M.D., Neurology, McGill University, Room 408, Lady Davis Institute, 3755 Cote St. Catherine Road, Montreal, QC H3T1E2, Canada. E-mail: howard.chertkow@mcgill.ca*

R.G. DEASON, E.T. CREHAN, S. FLANNERY, E.P. HUSSEY, B.A. ALLY & A.E. BUDSON. Shifting Response Bias and Alzheimer's Disease: The Role of Self-Monitoring on Memory Tests.

Objective: Patients with Alzheimer's disease (AD) typically show a liberal response bias (greater tendency to response "old") on memory tests. This tendency may be due, in part, to their inability to successfully monitor their responses and implement criterion changes. The current experiment varied the proportion of old/new items in the test phase to examine shifts in response bias.

Participants and Methods: During 3 sessions, young adults, healthy older adults, and AD patients (12 per group) studied words and then were tested with varying percentages of old items in the test phase (50%, 30%, and 70%).

Results: Overall, younger and healthy older adults were most conservative in the 70% condition and most liberal in the 30% condition. The performance of the AD patients did not reflect this pattern. Each test was then analyzed by thirds to observe changes in response patterns. Younger and healthy older adults responded to items in the first third of each test based on memory strength, classifying fewer items as old for the 30% condition and more items as old for the 70% condition. In subsequent thirds, younger and healthy older adults adjusted their response bias to match an initial assumption of a 50-50 old/new ratio, responding more liberally in the 30% condition and more conservatively in the 70% condition. AD patients did not show this same strategy of adjustment and maintained a liberal response bias throughout the tests.

Conclusions: The inability to self-monitor responses and implement criterion changes could explain why AD patients show a liberal response bias on these memory tests.

Correspondence: *Rebecca G. Deason, PhD, Neurology, Boston University School of Medicine, 63 HIghland Ave, Arlington, MA 02476. E-mail: deas0007@umn.edu*

J.A. EASTMAN, K. HWANG, S. BABAKCHANIAN, L. RAMIREZ, N. CHOW, P. THOMPSON & L.G. APOSTOLOVA. The Relationship Between Cortical Thickness and Verbal Memory.

Objective: We examined the relationship between the Delayed Word Recall task from the ADAS-COG neuropsychology test, and cortical atrophy in structural MRI in order to determine if there are any correlations.

Participants and Methods: We analyzed the structural Magnetic Resonance Imaging data (MRI) of 10 Normal (NC), 22 Mild Cognitive Impairment (MCI), and 11 probable Alzheimer's Disease (AD) subjects who were administered the ADAS-COG within one month of the MRI. A computational anatomy-based cortical thickness technique was performed on the MRI scans, and linear regression models were applied to detect associations between the subject performance on the Delayed Word Recall task and cortical atrophy.

Results: The global permutation-corrected significance of the maps associating Delayed Word Recall with cortical atrophy was p= .035 for the right hemisphere and p= .053 for the left hemisphere. The severity of verbal memory impairment correlated with cortical atrophy of the lateral parietal lobe (Brodman area (BA)7, 39), lateral temporal lobe (BA 37) and posterior frontal lobe (BA 6, 4) of the left hemisphere; and the lateral parietal (BA 39, 40), occipital (BA 19, 18), and temporal lobes (BA 22, 37) of the right hemisphere.

Conclusions: These results demonstrate that verbal memory performance is related to cortical thickness, which has previously been shown to be a predictor for AD. Our findings on the Dellayed Word Recall task from ADAS-COG are consistent with the observations of others, who have reported activation in a fronto-parieto-occipital network during immediate and delayed recall tasks.

Correspondence: *Jennifer A. Eastman, MA, Neurology, University of California Los Angeles, 10911 Weyburn Ave Ste 200, Los Angeles, CA 90095. E-mail: jeastman@mednet.ucla.edu*

E.M. FINE, V. LALUZ, B.L. MILLER & J.H. KRAMER. Frontal Lobe Correlates of Intrusion Errors on the CVLT-II: A Quantitative MRI Study.

Objective: Elevated levels of intrusion errors (IEs) on list-learning procedures are commonly exhibited by patients with a host of neurological and psychiatric populations. Although there is some evidence that IEs, like other types of memory distortions (e.g., confabulations and false recognition), are in particular associated with frontal-lobe dysfunction, there continues to be uncertainty regarding the neuroanatomical specificity of the intrusion effect. With that in mind, the goal of the current study was to explore the neuroanatomical basis of IEs on the CVLT-II.

Participants and Methods: 185 subjects, including 112 healthy elderly participants, 55 with mild cognitive impairment, and 19 with possible/probable Alzheimer's disease, were administered the CVLT-II (Delis et al., 1999). Freesurfer was used for cerebral/subcortical segmentation, cortical parcellation, and for determination of cortical thickness. Regions of interest included: left and right superior frontal, middle frontal, inferior frontal, orbitofrontal, hippocampus, and entorhinal cortex. A multiple regression analysis was used to examine the contributions of these regions to the production of IEs (total number of intrusions across all conditions).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The results from this analysis indicate that, after controlling for MMSE, demographics, total intracranial volume, and, importantly, the total number of words accurately recalled across all the conditions, only the left middle frontal region significantly predicted the amount of IEs.
Conclusions: The results from the present study extend the extant literature regarding the frontal-lobe basis of the intrusion effect on episodic memory measures by demonstrating that a subregion of the left prefrontal cortex, in specific, plays an integral role in the production of IEs.
Correspondence: *Eric M. Fine, Ph.D., Veterans Healthcare System San Diego, Psychology Service (116B) - Delis Lab, VA San Diego Healthcare System, 3350 La Jolla Village Drive, San Diego, CA 92161. E-mail: fine.eric@gmail.com*

D.L. GONZALEZ, J. NOVITSKI, L.M. GUIDOTTI- BRETING & M. SEIDENBERG. Impact of Media Exposure for Recent and Remote Famous Names in MCI.
Objective: Previous research has indicated that individuals diagnosed with Mild Cognitive Impairment (MCI) recognize older famous names better than recent famous names. The impact of media exposure for the temporal gradient (TG) of remote memory has rarely been studied. In our study we examined the relationship between four types of media exposure and remote memory TG.
Participants and Methods: 16 MCI participants (mean age =72.53) and 15 asymptomatic subjects (mean age =76.81) completed a media exposure questionnaire which asked each individual for number of TV hours, number of magazines, newspapers and movie watching. Each subject viewed 30 famous names from the recent and remote time epoch. For correct famous name responses subjects then provided semantic (SK) and autobiographical details (AK) for the famous name.
Results: Self-reported exposure did not significantly differ between asymptomatic and MCI groups for any type of media exposure (all p's > .05). The asymptomatic group provided more SK and AK than the MCI group for both time periods (all p's < .05). For the MCI group, increased TV exposure was marginally correlated with increased remote SK (r =. 49, p< .057), and for the older group, increased remote AK was associated with increased TV exposure (r = .56, p = .03).
Conclusions: Amount of self-report media exposure does not appear to account for differences in famous name SK and AK between MCI and controls. Additional investigation into the influence of media exposure and the TG for famous names would be of interest.
Correspondence: *Dana L. Gonzalez, Master's, Psychology, Rosalind Franklin University of Medicine and Science, 630 Sheridan Road, Apt 2C, Highwood, IL 60040. E-mail: dana.gonzalez@my.rfums.org*

K.A. GUERRERO & V.M. PATIÑO. Concept formation in scholars with antecedent of perinatal Hypoxic-Ischaemic Encephalopathy.
Objective: To detect the possible difficulties in the semantic formation of concrete concepts in scholars with antecedent of perinatal HIE.
Participants and Methods: A group of 8 children (7 to 10 years old) with perinatal HIE and a group of 8 controls matched in age and education participated in the study. An experimental task based on Vigotsky's double stimulation method was used. Among others, the total time required to form categories, the number of formed categories, the total number of responses used to form categories and the total number of defining and non defining attributes considered by children were analyzed
Results: Significant differences in favor of the control group in 17/24 analyzed variables. The most relevant were response time (t=14.5, p=.01) the total number of non-formed categories (z=.000, p=.001) the total number of responses to form a category (z=10, p=,01), the total number of errors (z=7, p=,007) and the ability to find defining attributes (z=3.5, p=.002).
Conclusions: These results suggest that the semantic memory might not be spared in HIE cases, as has been supposed. The use of experimental tasks to observe specific cognitive operations in the process of concept formation might provide more specific data about this issue.
Correspondence: *Karen A. Guerrero, Doctor, Servicios psicológicos Unisep, Universidad Autónoma del Estado de Morelos, Privada Panoramica Numero 41 colonia del bosque, Cuernavaca, 62150, Mexico. E-mail: karencitaguerrero@hotmail.com*

M.L. LUGO, K. CRAIG, M. BERMAN, J. JONIDES & C. LUSTIG. Can We Escape the Past?: Investigations in Short-Term Memory.
Objective: We modified a commonly-used short-term memory task (Sternberg) to test the hypothesis that interference from the recent past depends on the type of judgment made about a probe item (whether it was a member of a recent memory set versus whether it was a member of a particular category).
Participants and Methods: Participants are slower to give a negative response to something that occurred recently. This is known as the "recent negatives effect". In two experiments, we tested the hypothesis that the recent negatives effect only occurs when participants make judgments that require them to consider an item's temporal, episodic properties (whether or not it was a member of the current memory set). In experiment one, (n=28) half of the trials required participants to judge whether a probe word was a member of that trial's memory set, half of the trials required participants to judge whether the probe word was a member of a semantic category (manmade or natural). In experiment two (n=32), the semantic category was replaced by a perceptual one (italic or bold front).
Results: We found the usual recent negatives effect on memory-judgment trials, but not for category-judgment trials, regardless of whether the category judgments were overall slower (semantic) or faster (font) than the memory judgments.
Conclusions: These results suggest that interference from the recent past can be avoided when people know in advance that their recent experience will not be needed to make a decision.
Correspondence: *Matthew L. Lugo, Psychology, Binghamton University, 14-42-30th Road, Astoria, NY 11102. E-mail: mlugo1@binghamton.edu*

P. MAY, J. WOODARD, E. RICHARDSON, E. HOLCOMB & K. STRATE. Effect of Gum Chewing on Memory and Processing Speed.
Objective: Several recent empirical studies have suggested that gum chewing has positive effects on memory and sustained attention. In this study, we assessed whether gum chewing improves 20-minute and one-week delayed memory and processing speed, as well as whether specific chewing gum flavors differentially enhance performance.
Participants and Methods: Undergraduates (N=141) were randomized to one of four conditions: chewing spearmint, cherry, or cinnamon gum, or not chewing gum. Participants completed tests of recall and recognition of a word list and pictorial stimuli prior to group assignment. Next, they completed tests of psychomotor speed and perceptual reasoning, followed by tests of 20-minute delayed recall and recognition while chewing (or not chewing) gum. Participants' delayed recall and recognition performance was tested again after one week.
Results: One-way ANOVAs revealed that participants' baseline and follow-up performance did not significantly differ for measures of memory or processing speed across all four treatment conditions. When conditions were collapsed into two groups (gum chewing versus no gum chewing), t-tests demonstrated that gum chewers performed significantly better on measures of one-week delayed verbal recall (p=.04) and visual recognition (p=.02), as well as on the Digit Symbol subtest (p=.01).
Conclusions: Results suggest that gum chewing itself, but not the specific flavor, has an enhancing effect on verbal and visual memory, as well as on processing speed. Possible mechanisms, such as chewing-induced increases in cerebral blood flow or a glucose-mediated memory enhancement during consolidation, may underlie this effect.
Correspondence: *Pamela May, B.A., Wayne State University, 5057 Woodward Ave., 7th Floor, Detroit, MI 48202. E-mail: pamela.e.may@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

B.C. MCDONALD, C.R. EDWARDS, L.K. STICKANS, J.D. WEST & A.J. SAYKIN. Differentiation of Neural Networks Involved in Episodic Memory Encoding and Retrieval in Children.

Objective: Adult functional neuroimaging studies have elucidated neural networks subserving episodic memory processing, leading to hypothesized models of the role of frontal and medial temporal brain regions in encoding and retrieval (e.g., HIPER, HERA). It is unclear if such models accurately characterize episodic memory processing in children.

Participants and Methods: Fifty-one healthy children and adolescents (ages 8-16, 28 females) completed visual scene encoding and recognition fMRI tasks. Whole brain activation analyses were conducted using SPM8. All clusters reported survived both FWE and FDR correction for multiple comparisons ($p < 0.05$).

Results: During encoding of novel scenes relative to viewing a control image bilateral activation was seen in medial temporal lobe structures (hippocampus, amygdala, and parahippocampal gyrus), fusiform gyrus, temporoparietal association cortex, thalamus, and inferior frontal lobes, as well as primary occipital cortex. This pattern encompasses a network of regions previously shown to be related to episodic memory encoding in adults. Frontal activation was greater in the left than right hemisphere, consistent with the HERA model. Both anterior and posterior hippocampal activation was noted, contrary to what might be predicted based on the HIPER model. During retrieval greater activation was found in bilateral parietal and middle and inferior frontal regions when viewing familiar relative to novel scenes. Increased encoding-related activation in bilateral occipitotemporal and left inferior frontal regions correlated with subsequent accurate recognition of familiar scenes.

Conclusions: These findings demonstrate robust activation in children of neural networks previously reported during episodic memory processing in adults, and offer partial support for models of regional and hemispheric involvement of brain structures in encoding and retrieval.

Correspondence: *Brenna C. McDonald, PsyD, MBA, Radiology and Imaging Sciences, Indiana University School of Medicine, Center for Neuroimaging, 950 W. Walnut St., R2 E124, Indianapolis, IN 46202. E-mail: mcdonalb@iupui.edu*

J.B. MILLER, D.S. KAUFMAN, O. BOXER & R.M. BILDER. Working Memory contributions to Latent Inhibition: Exploring the roles of maintenance vs. manipulation.

Objective: The abilities to maintain and manipulate information in working memory (WM) are both critical components of cognitive flexibility, while latent inhibition (LI) is the attenuation of learning of unreinforced information. It was hypothesized that the ability to pre-categorize information as irrelevant is positively associated with working memory function, but the extent of its association with WM sub-processes is unknown.

Participants and Methods: One hundred and sixty two healthy adult participants completed several experimental tasks assessing verbal WM-maintenance and WM-manipulation abilities, a measure of latent inhibition, as well as the Continuous Performance Test (CPT), and the D-KEFS Verbal Fluency. Hierarchical linear regression was used to examine the relationships between measures of working memory and latent inhibition.

Results: Fitting a regression model using each of the 4 measures as predictors with latent inhibition as the outcome identified a significant relationship ($R2 = .07$; $p = .03$) between WM-Manipulation ($\geq = .23$, $p = .035$), but not WM-Maintenance, sustained attention as measured by the CPT, or set-shifting as measured by the D-KEFS.

Conclusions: Performance on the measure of latent inhibition was significantly predicted by verbal WM-manipulation abilities. Interestingly, the maintenance of information in WM did not predict LI performance. Results from the present study suggest that LI appears to be distinct from sustained attention and cognitive set-shifting. Thus, the present findings indicate that the ability to manipulate information, more so than the ability to maintain information, within WM stores is important for LI, and that stronger LI is associated with greater WM control.

Correspondence: *Justin B. Miller, Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI, MI 48202. E-mail: justin.b.miller@gmail.com*

T. PRESTON & P. EISENBERG. Prospective Memory Functions in Referred and Nonreferred Children.

Objective: Although it is typically used far more often in daily life than declarative memory, prospective memory – or memory for intentions – has only recently become the focus of attention in clinical assessment. In this project, a revised version of the Prospective Memory Screening (PROMS; Sohlberg, Mateer, & Geyer, 1985; Sohlberg, Mateer, Geyer, & Preston, 2009) was utilized as part of the assessment of clinically referred children and nonreferred children. The PROMS was administered concurrently with academic achievement testing using the WIAT 2, with the aim of exploring (1) whether prospective memory assessment could be integrated into a typically occurring part of the neuropsychological evaluation, and also (2) whether this integration might be an ecologically valid manner of measuring prospective memory.

Participants and Methods: Twenty-four clinically referred children with significant attention and executive deficits, ranging in age from 6-12 years, were compared to 24 age and sex-matched nonreferred children.

Results: The children with attention and executive deficits showed significantly worse overall prospective memory scores on the PROMS, particularly on time-based tasks. They were also poorer at telling and predicting time, and – not surprisingly — had more significant elevations on CBCL and BRIEF scales involving attention and metacognition.

Conclusions: Although further research is clearly needed, results suggest that if utilized carefully, a prospective memory measure can be integrated into testing and can provide useful clinical information, and that, as in previous research, prospective memory deficits are linked to attention and executive problems. Implications for clinical assessment and aims for further research are discussed.

Correspondence: *Tom Preston, PhD, Neuropsychology Service, SUNY Stony Brook, 179 Belle Meade Road, Suite 3, East Setauket, NY 11733. E-mail: thomas.preston@sunysb.edu*

E.E. RICHARDSON, J.L. WOODARD, J.E. CALAMARI, M. DUX, M. MESSINA, N. PONTARELLI, J. SOCHA, B. DEJONG & K.M. ARMSTRONG. Subscales of the Anxiety Sensitivity Index Predict One-Year Change in Retroactive Interference as Measured by the Rey Auditory-Verbal Learning Task.

Objective: Anxiety is known to interfere with memory function. However, the specific mechanisms by which anxiety exerts these effects on memory are not well understood. The Anxiety Sensitivity Index (ASI) is a measure that quantifies Anxiety Sensitivity (AS), or an individual's reactions to anxious arousal. A trait-like predisposition to anxious arousal could affect memory by influencing susceptibility to distraction. In this study, we examined whether baseline AS levels could predict future change after one year in susceptibility to proactive and retroactive interference on the Rey Auditory-Verbal Learning Test (AVLT).

Participants and Methods: Participants included 111 older adults (M age = 76.7), drawn from a longitudinal study assessing anxiety and neuropsychological functioning in late life. Participants completed the ASI and the AVLT at baseline and at a one-year follow up. Standardized residual change scores were calculated for the AVLT proactive and retroactive interference raw scores. Linear regression was used to determine whether baseline ASI subscale scores predicted one-year performance changes on the proactive and retroactive interference indices of the AVLT.

Results: Baseline ASI subscale scores significantly predicted one-year change in retroactive interference scores ($r=.33$, $p<.001$) but not change in proactive interference scores. In addition, when predicting change in retroactive interference, the Mental Incapacitation Concern ($\geq=.28$, $p=.01$) and Social Concern subscales ($\geq=.32$, $p=.01$) were significant predictors of retroactive interference scores, whereas the Physical Concern subscale was not. None of the ASI subscales predicted change in proactive interference scores.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: In healthy older adults, baseline AS predicted future change in retroactive interference after one year. It is possible that elevations in ASI scores reflect decreases in older adults' ability to resist distraction, which in turn, could interfere with memory performance and learning.
Correspondence: *Emily E. Richardson, BA, Psychology, Wayne State University, 5057 Woodward Ave, Detroit, MI 48208. E-mail: emily.richardson@wayne.edu*

J.T. VILLALOBOS ESMA. Episodic memory: neuroanatomical and neuropsychological bases of the autobiographic store.
Objective: Through history memory has been divided into different subtypes. One of these is episodic memory (EM), defined as autobiographical memory for events and personal experiences that allows us to return at some point in our past and mentally relive our memories (Tulving & Markowitsch, 1998; Hasselmo, 2009). The aim of this paper is to review the literature concerning the neuropsychological and neuroanatomical bases of this autobiographical store.
Participants and Methods: There are not subjects in this paper because it is a literature review.
Results: The ME requires the optimal functioning of various psychological processes: from sensory perception to associative functions of highest level, which are related to specific neuroanatomical structures. First, the medial temporal lobe, including hippocampus (contextual relationships), being the substructure with a greater involvement, followed by the limbic system (emotional tone) (Fernandez, Claver, Fell, Grumwal & Elger, 2002; Ryan, Lin, Ketcham & Nadel, 2009). In the same wey, the prefrontal cortex (regulating and monitoring the process of evocation) (Lundstrom, Ingvar & Petersson, 2005) and the parietal cortex (sensory association, care and evaluation of the records) (Lundstrom, et al. 2005; Head, 2008) are critically involved in this process.
Conclusions: ME being a major part in people lifes should be approached with greater precision. I encourage the development of new methods of measurement and assessment not based just on artificial tasks, but more attached to the daily reality. Helping to fill an important gap in understanding. Because it's difficult to measure in a precise and objective way, a mental process that is so abstract and subjective that makes it hard to quantify.
Correspondence: *Jorge T. Villalobos Esma, UNAM, Pestalozzi # 417 Col. Narvarte., Mexico City 03020, Mexico. E-mail: serj_1@hotmail.com*

Assessment/Psychometrics/Methods (Adult)

J. MISHAAN, K.E. ESKINE & L.A. RABIN. Convergence Across a Performance-Based Executive Function Measure and Behavioral Ratings of Real-World Executive Functions in a College Sample.
Objective: Executive functions are a group of brain processes that enable higher order abilities such as planning, cognitive flexibility, initiation of actions, and the overriding of automatic responses. Executive functioning may be assessed through performance-based laboratory tasks or behavioral reports. Some studies have found agreement between objective and subjective measures of executive functioning in children (Mabry, 2005), while others have found little to no relationship (McAuley et al., 2010).
Participants and Methods: We investigated the relationship between scores on the D-KEFS Design Fluency Test (Delis et al., 2001), a widely used executive function task, and the Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A; Roth et al., 2005), a self-report questionnaire that taps everyday executive behaviors. We investigated convergent validity among the two measures in a sample of 68 cognitively normal young adults (aged 18-30).
Results: Using Pearson's correlations we first examined total scores on these two measures and found a small but significant correlation of r=.22, $p < .05$. We next examined correlations between the BRIEF-A clinical subscales and scores on the Design Fluency Switching Condition and found that 4 of the 9 subscales were significantly correlated with task performance at $p < .05$ (Inhibit, r=.24, Shift, r=.20, Self monitor, r=.21, and Task Monitor, r=.24).
Conclusions: Overall, results revealed only modest convergent validity between the measures. The BRIEF-A may tap different aspects of executive function than those assessed by performance-based tests and may add unique information, over and above traditional measures. Results should be replicated in a clinical sample of young adults.
Correspondence: *Jonah Mishaan, B.A. Psychology, Psychology, Brooklyn College, 2900 Bedford Ave, Brooklyn, NY 11210. E-mail: jlm4988@aol.com*

Paper Session 3: Memory Systems and Memory Disorders

Moderator: Christina Wierenga

10:15 a.m.–12:00 p.m.

M.M. ADAMSON, J.B. HUTCHINSON, A. SHELTON, A.D. WAGNER & J.L. TAYLOR. Reduced hippocampal activity during encoding in cognitively normal adults carrying the APOE X4 allele.
Objective: Apolipoprotein (APOE) X4-related differences in memory performance have been detected before age 65. The hippocampus and the surrounding medial temporal lobe (MTL) structures are the first site affected by Alzheimer's disease (AD) and the MTL is the seat of episodic memory, including visuo-spatial memory. Though findings from structural and functional neuroimaging studies of APOE X4-related differences in the MTL are not consistent, there is increasing evidence that brain activity at baseline (defined as activity during fixation or rest) may differ in APOE X4 carriers compared to non-carriers.
Participants and Methods: In this functional magnetic resonance imaging (fMRI) study cognitively normal APOE X4 carriers and non-carriers engaged in a perspective-dependent spatial learning task (Shelton and Gabrieli, 2002) previously shown to activate MTL structures in older participants (Borghesani et al., 2008). A low-level, visually engaging dot-control task was used for comparison, in addition to fixation.
Results: APOE X4 carriers showed less activation than non-carriers in the hippocampus proper during encoding. Specifically, when spatial encoding was contrasted against the dot-control task, encoding-related activation was significantly lower in carriers than non-carriers. By contrast, no X4-related differences in the hippocampus were found when spatial encoding was compared with fixation. Lower activation, however, was not global since encoding-related activation in bilateral middle occipital cortex) was not different between APOE X4 carriers and non-carriers.
Conclusions: The present results have implications for fMRI studies that investigate the default-mode network (DMN) in APOE X4 carriers to help evaluate AD risk in this otherwise cognitively normal population.
Correspondence: *Maheen M. Adamson, PhD, Psychiatry, Stanford University/VA Palo Alto, 3801 Miranda Avenue, Palo Alto, CA 94587. E-mail: madamson@stanford.edu*

E. GROBER, C. HALL, R. PAULINO, R.B. LIPTON & S. HAHN. Memory Impairment and Executive Dysfunction is Associated with Poor Diabetes Control in Older Adults.
Objective: To evaluate the association between memory impairment and executive dysfunction and glycemic control in older adults with diabetes.
Participants and Methods: Cross-sectional study of adults aged 65 and older from an urban primary care clinic with a diagnosis of diabetes mellitus who participated in a dementia screening program. Most patients were African American or Latino. Glycosylated hemo-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

globin level (HbA1c) was used to define diabetic control as good (HbA1c<7) or poor (HbA1c>=7). Episodic memory was measured by quartile of free recall scores on the Free and Cued Selective Reminding Test (FCSRT). Executive function was measured using an ordinal composite score derived from animal fluency and months backward.
Results: Of 170 diabetic patients, 104 (61%) met the definition of poor control. Binary logistic regression models predicting glycemic control, showed that compared to the best memory statum, the odds of poor glycemic control were highest for those in the worst quartile of memory performance (OR= 4.38; 95% CI: 1.58, 12.09). Patients in intermediate statum did not differ statistically from those in the highest quartile. Compared to the best executive function stratum, patients not in the highest quintile of executive function were more likely to have poorer glycemic control (OR=2.50; 95% CI: 1.18, 5.30). There was evidence that an interaction between memory and executive function predicted glycemic control. Glycemic control was unrelated to education.
Conclusions: Memory impairment and executive dysfunction were associated with poor glycemic control. Though causal inferences are not robust in a cross-sectional study, the evidence suggests that cognitive dysfunction may interfere with diabetes management.
Correspondence: *Ellen Grober, PhD, Neurology, Albert Einstein College of Medicine/Montefiore Medical Center, 1300 Morris Park Avenue, For 125, Bronx, NY 10462. E-mail: egrober@montefiore.org*

B. ALEXANDRA, V. WHITEHEAD, R. PILON, G. ARSENAULT-LAPIERRE & H. CHERTKOW. Does the Pattern of Autobiographic Memory Loss in MCI and Alzheimer's Disease Support the Multiple Trace Theory or the Standard Consolidation Model?
Objective: Previous studies have produced inconsistent results concerning the two components of autobiographical memory – personal semantic memory and episodic memory. Results in subjects with mild cognitive impairment (MCI) and Alzheimer's disease (AD) have varied concerning the existence of a temporal gradient in retrograde amnesia. These results have important theoretical implications regarding Multiple Trace Theory vs. Standard Consolidation models of long term memory (LTM). We investigated whether this variability arises from differences in the methods used in assessing autobiographical memory.
Participants and Methods: We examined patterns of memory impairment in 20 healthy elderly controls, 20 MCI subjects and 10 AD subjects using the Autobiographical Memory Interview (AMI) of Kopelman, and the Autobiographical Interview (AI) of Levine
Results: On the AMI, AD subjects were significantly impaired on both components of autobiographical memory – episodic memory and personal semantics –with episodic memory showing a significant though gentle temporal gradient sparing childhood memories. Using the AI test, subjects with AD showed impaired recall of episodic details (but not personal semantics), again with a gentle temporal gradient. Differences between the two interview methods (fewer epochs in the AMI; fewer memories per epoch in the AI) were found to have a significant impact on the pattern of findings; fewer epochs in the AMI brought out the temporal gradient, and fewer memories per epoch (in the AI) diminished it.
Conclusions: These data show the importance of technical details of the different tests in favouring one vs. another LTM theory. The data are not purely compatible with either theory.
Correspondence: *Howard Chertkow, M.D., Neurology, McGill University, Room 408, Lady Davis Institute, 3755 Cote St. Catherine Road, Montreal, QC H3T1E2, Canada. E-mail: howard.chertkow@mcgill.ca*

C. GROTE, R. BYRNE, J. ZUKERMAN, M. SMITH, A. KANNER & M. BROOK. Memory and Seizure Outcome After Tailored Temporal Lobe Resection.
Objective: To measure changes in memory function following tailored temporal lobe resection for treatment of intractable seizures, and to determine if these outcomes are different than those reported by other epilepsy surgery centers using standardized or "en bloc" resection techniques.
Participants and Methods: 30 patients underwent left (LT) and 27 had right
(RT) tailored temporal lobe surgery. These patients also completed neuropsychological and "Wada" testing before surgery, as well as repeat neuropsychological testing at an average of six months after surgery.
Results: Surgery resulted in 73% of the LT patients, and 83% of the RT patients achieving an Engel Class I (seizure free) outcome. The LT group achieved verbal memory scores similar to those obtained pre-operatively, but significantly better postoperative visual memory scores. The right temporal lobe patients achieved significantly improved postoperative scores on measures of both verbal and visual memory.
Conclusions: Tailored temporal lobe resection led to a significant reduction in seizures, and, on average, either no change or an improvement in memory function. In contrast, reports from centers using "en bloc" resections report that approximately 40% of those patients had a significant
decline in verbal memory following left temporal resections. Implications will be discussed.
Correspondence: *Christopher Grote, PhD, Behavioral Sciences, Rush University Medical Center, 1645 W. Jackson, Chicago, IL 60521. E-mail: christopherlgrote@yahoo.com*

C. WIERENGA, S.I. DEV, N.H. STRICKER, A.J. JAK, K.J. BANGEN, J.T. GRAVANO, A. MCCAULEY, T.T. LIU, G.G. BROWN, D.P. SALMON & M.W. BONDI. Does Increased Resting Cerebral Blood Flow Correspond to Better Cognitive Performance in MCI?
Objective: Adults with mild cognitive impairment (MCI) show altered resting cerebral blood flow (CBF). We sought to characterize these CBF changes and their association with cognition.
Participants and Methods: Using pulsed arterial spin labeling (ASL) MR imaging acquired for the whole brain, resting CBF was measured in 20 MCI patients, 12 Alzheimer's disease (AD) patients, and 40 cognitively intact adults matched for age, education and Framingham Stroke Risk Profile. Voxel-wise gray matter CBF was compared among groups and correlations between neuropsychological performance and mean CBF in clusters of voxels with significant group differences were performed.
Results: MCI patients had increased CBF in the right hippocampus and left caudate compared to controls and AD, increased CBF in right angular gyrus and temporal pole compared to controls, and increased CBF in left inferior frontal gyrus, left hippocampus, and regions of the right temporal lobe compared to AD. Increased CBF in the angular gyrus corresponded to better executive and memory performance in controls but worse performance in MCI. CBF in frontal and temporal regions was positively correlated with executive functioning and memory for MCI but was negatively correlated with memory in AD.
Conclusions: Findings provide support for dynamic pathological processes in the brain associated with the transition from normal cognition to AD. Correlations between CBF and cognitive performance suggest a neurovascular compensatory response to cognitive decline that is evident in both MCI and AD. However, results suggest that an increase in CBF does not always benefit cognition and may herald future decline.
Correspondence: *Christina Wierenga, Ph.D., UCSD, 3350 La Jolla Village Drive, 151B, San Diego, CA 92161. E-mail: cwierenga@ucsd.edu*

C.C. LOACANO, J.L. WOODARD, A. RAHMAN, P.E. MAY, E.E. RICHARDSON, M. SEIDENBERG, M.A. LANCASTER, M.A. MATTHEWS, A.L. JUDD & A.S. GIRGIS. Semantic Memory Processes in Healthy Aging: Contrasting Familiarity versus Knowledge.
Objective: Studies of semantic memory typically focus on simple familiarity judgments (e.g., famous vs. unfamiliar). The deeper and more

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

detailed aspects of the semantic memory network are usually not investigated. In this study, we contrasted accuracies and reaction times for famous name familiarity judgments with more detailed decisions on identifying the occupational categories, interpersonal associations, and works attributed to specific individuals.
Participants and Methods: Twenty-five younger adults between 18 and 35 years of age and 24 older adults between 65 and 82 years of age participated in this study. Participants completed a computer-based task in which they differentiated famous from unfamiliar names. Participants also completed a forced choice task in which they identified the correct occupational category, interpersonal association, or work attributed to each target name. Accuracies and reaction times were recorded.
Results: Older adults' reaction times and accuracies were superior for names that were learned early in life relative to recently famous names. Younger adults were more accurate for recently famous names than for enduring famous names, but no differences in reaction times were observed. For both groups, familiarity decisions were made most quickly, followed by occupational category decisions. Attribute and associative decisions had the slowest reaction times.
Conclusions: Access to more detailed semantic knowledge can be demonstrated using forced choice recognition for categorical, attribute, and associative decisions. Older adults' reaction time and accuracy differences between information learned earlier in life and information learned more recently support the age of acquisition hypothesis, or the accumulation of semantic knowledge across the lifespan.
Correspondence: *John L. Woodard, Ph.D., Psychology, Wayne State University, 5057 Woodward Ave., 7th Floor, Detroit, MI 48202. E-mail: john.woodard@wayne.edu*

S.D. HAN, K. ARFANAKIS, D.A. FLEISCHMAN, S.E. LEURGANS, E.R. TUMINELLO, E.C. EDMONDS & D.A. BENNETT. Resting-State Functional Connectivity Differences Associated with Mild Cognitive Impairment in a Community Sample.
Objective: Recent work has suggested that functional connectivity of the Default Mode Network (DMN), a network of functionally associated brain regions during rest, may be sensitive to Alzheimer's disease progression. Recent work has also suggested that the posterior cingulate cortex (PCC) may serve as a "hub" for the DMN. Using the PCC as a "hub", we investigated whether resting-state functional connectivity differences exist between participants with mild cognitive impairment (MCI) and older adults without cognitive impairment in a clinical-pathological cohort study of aging and dementia.
Participants and Methods: One hundred and sixty-six older adults without cognitive impairment (mean age=81.54, male/female=43/123, mean MMSE=28.81) and forty-four participants with MCI (mean age=86.57, male/female=10/34, mean MMSE=26.97) from the Rush Memory and Aging Project were scanned using a resting-state functional MRI Spiral in/out sequence. A 5 mm radius spherical seed region of interest was prescribed in the posterior cingulate cortex (PCC, MNI coordinates: x=-5, y=-46, z=26) to quantify functional connectivity of the Default Mode Network after removal of 6 head motion parameters, white matter signal, global mean signal, and cerebrospinal fluid as nuisance variables.
Results: After controlling for age, gender, and education, voxel-wise differences ($p<0.001$) in functional connectivity were observed such that MCI participants showed less connectivity between the PCC and two regions: the right hippocampal region (z-score=3.65) and the left insula region (z-score=3.81). Furthermore, connectivity values in these regions correlate with episodic memory performance.
Conclusions: A reduction in the functional connectivity of specific portions of the DMN was observed in MCI participants when compared to older adults without cognitive impairment. Changes in the functional connectivity of these pathways may be associated with encroaching Alzheimer's disease.
Correspondence: *S. D. Han, PhD, Behavioral Sciences, Rush University Medical Center, 1653 W. Congress Parkway, Chicago, IL 60612. E-mail: Duke_Han@rush.edu*

Invited Symposium: New Technologies in Neurorehabilitation

Chair: John DeLuca

10:45 a.m.–12:15 p.m.

J. DELUCA. New Technologies in Neurorehabilitation.
Symposium Description: Neurorehabilitation is enjoying a new era of advances in technology, which promises to redefine how assessment and treatment are conducted in various rehabilitation populations. This symposium is structured to provide a sampling of such advances, geared toward treatment of disorders of the brain by internationally recognized experts. Newly identified biomarkers and neuromodulatory therapies will become common forms of treatment. Virtual Reality has advanced dramatically and will become a primary tool used in the assessment and treatment of various disorders of the brain. Advances in prism adaption training designed to improve post stroke spatial neglect will become common in rehabilitation programs. Lastly, advances in functional and structural neuroimaging are paving the way for new and exciting ways to examine changes in brain function resulting directly from rehabilitation interventions. This is clearly an exciting time to be working in the area of brain injury rehabilitation.
Correspondence: *John DeLuca, PhD, Research Center, Kessler Foundation, 1199 Pleasant Valley Way, West Orange, NJ 07052. E-mail: jdeluca@kesslerfoundation.org*

R. ZAFONTE. New Technologies in Neurorehabilitation.
Objective: Over the past decade, an exciting evolution of biologic and technologic therapies has begun to develop that will change the face of neurorehabilitation. Therapeutic plans will become more person specific and focus on interventions that enhance the natural recovery process and avoid strategies that slow recovery. Cellular and growth factor based therapies will allow us to target specific deficits as well as provide broad facilitation. Neuromodulatory therapies will redefine the milieu for patients by allowing targeted enhancement or inhibition. Activity based programs will facilitate regrowth and enhance the utilization of masked pathways. Finally medications will be targeted by gender, genome and injury pattern to better allow for maximal effect. It is however, unlikely that one intervention will provide all the answers, rather a portfolio of therapies will be needed to produce the desired results.
Correspondence: *Ross Zafonte, 125 Nashua Street, 2nd Floor, Boston, MA 02114. E-mail: RZAFONTE@PARTNERS.ORG*

A. RIZZO. Virtual Reality and Neuropsychology: A Brief Review of the Future.
Objective: Virtual reality (VR) technology has undergone a transition in the past 10 years that has taken it from the realm of expensive toy and into that of functional technology. Revolutionary advances in the underlying VR enabling technologies have supported development resulting in more powerful, low-cost PC-driven VR systems. Such advances in technological "prowess" and accessibility have provided the hardware platforms needed for the conduct of human research and treatment within more usable, useful and lower cost VR systems. Much like an aircraft simulator serves to test and train piloting ability under a variety of controlled conditions, VR systems have been developed to present simulations that target human cognitive, emotional and functional processes that are relevant for assessment and rehabilitative purposes. VR applications are now being developed and tested which focus on component cognitive processes including: attention, executive functions, memory, and spatial abilities. Functional training scenarios have also been designed to test and teach instrumental activities of daily living such as street-crossing, automobile driving, meal preparation, supermarket shopping, use of public transportation, and wheelchair navigation. This emerging computer-driven simulation technology appears to be well matched to the assessment and rehabilitation needs of persons with various forms of Central Nervous System dysfunction.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Albert "Skip" Rizzo, 12015 Waterfront Drive, Playa Vista, CA 90094-2536. E-mail: arizzo@usc.edu*

A.M. BARRETT & K.M. GOEDERT. Translating Prism Adaptation for Post-Stroke Neglect - Baby Steps to the Clinic.
Objective: Over six million stroke survivors, in 2010, cost US medical systems an estimated $73.7 billion. Reducing the care burden of spatial neglect would likely decrease US stroke healthcare costs. Can a fashionable spatial neglect treatment, prism adaptation training (Rossetti, 1998), address that need? We review 47 studies from PubMed, PsycInfo, reference lists, and our own collections, and suggest spatial neglect disability affected by prism adaptation training may be motor exploratory (not dorsal visual, as others suggested). However, studies lacked 1) theoretically meaningful patient stratification 2) adequate brain lesion location analysis 3) patient stratification by stroke severity, or associated neuropsychological deficits 4) proof that any dose-response evaluation supported study treatment protocols 5) evaluation of how post-stroke recovery stages influence response 6) mechanism-specific outcome measures, as well as functionally relevant, short- and long-term outcomes. In short, tremendous research investment in prism adaptation treatment left fundamental clinical questions about implementing treatment, untouched. Responsible prism adaptation research must clarify when, how, and for whom prism adaptation training will be optimally effective. We suggest that better theoretical tools—spatial, rather than visual cognitive brain-behavior models—and appropriate standards in future prism adaptation protocols, may move treatment science forward.
Correspondence: *Kelly M. Goedert, 400 South Orange Avenue, South Orange, NJ 07079. E-mail: kelly.goedert@shu.edu*

J.H. RICKER. Neuroimaging Technologies in Neurorehabilitation Research.
Objective: Advances in neuroimaging have clearly changed the way that brain function, dysfunction, and rehabilitation are being conceptualized and studied. In addition to complementing existing behavioral and psychometric approaches to neuropsychological research, functional imaging technologies have allowed for novel inferences that cannot necessarily be made through other approaches to studying brain-behavior relationships. This talk will provide an overview of contemporary functional neuroimaging techniques (e.g., functional magnetic resonance imaging and positron emission tomography) and will also include newer techniques and approaches (e.g., diffusion tensor imaging and functional connectivity analyses) that are investigational but clearly promising in neurorehabilitation populations. There will also be review of functional neuroimaging studies in three major adult neurorehabilitation populations: traumatic brain injury, stroke, and multiple sclerosis. Finally, future research issues will be addressed through discussion of methodological and technical concerns related to neurorehabilitation, as well as how imaging research from the cognitive and clinical neurosciences may inform the rehabilitation process.
Correspondence: *Joseph H. Ricker, 1400 Locust Street, Pittsburgh, NJ PA. E-mail: ricker@pitt.edu*

Invited Symposium: Preclinical Changes in Huntingtons

Chair: Jane Paulsen

10:45 a.m.–12:15 p.m.

J.S. PAULSEN, E. AYLWARD, D. EIDELBERG, S.M. RAO & D.L. HARRINGTON. Preclinical Changes in Huntingtons.
Symposium Description: Following the presentation of the four experts, Dr. Paulsen will review the importance of biomarkers and refined clinical markers for the field of HD and other brain diseases. She will present additional data on the role of neuropsychology in the advancement of clinical diagnosis, translational research and experimental therapeutics. The discussion will encourage input from other experts in similar fields of study and encourage all those in attendance to maximize the role of the cognitive expert in the diagnosis of disease, as well as the design and implementation of clinical research and outcomes in clinical trials.
Correspondence: *Jane S. Paulsen, PhD, Psychiatry, Neurology, Neuroscience & Psychology, The University of Iowa, Carver College of Medicine, 500 Newton Road, 1-305 MEB, Iowa City, IA 52242. E-mail: jane-paulsen@uiowa.edu*

J.S. PAULSEN. Introduction to PREDICT-HD: A 10-year study of biomarkers and refined clinical markers in preclinical HD.
Objective: PREDICT-HD is a NIH- and CHDI-funded prospective, longitudinal study. The current symposium will provide summaries from four co-investigators in the PREDICT-HD project whose measures have suggested robust indicators of disease that may be studied further as possible markers of disease detection and progression. Such measures can be essential for clinical trials. The talks will progress from the utility of structural imaging to functional imaging and from cognitive activation imaging to cognitive performances alone.
Participants and Methods: Over 1200 participants at risk for Huntington's disease (HD) conducted at 32 sites in Australia, the United Kingdom, Germany, Spain, Canada, and the United States. Annual standardized examinations of clinical neuropsychology, cognitive science, motor ratings, psychiatric interviews, self- and proxy-report surveys, as well as Magnetic Resonance Images, blood and urine acquisition, and medical history and treatments are obtained. DNA data is used to determine an "estimated" age of disease diagnosis, according to previously acquired analyses based on retrospective data of the association among the length of the HD mutation (based on a trinucleotide repeat), current age, and age of clinical diagnosis based on motor manifestations.
Results: Findings to date have suggested that cognitive, imaging, and even motor and psychiatric data can reveal dysfunction at least 15 years earlier than previously detected.
Conclusions: The presenters will encourage the audience and the field to examine the utility of various measures and markers and their utility for the advancement of this field and the advancement of clinical trials in all brain diseases.
Correspondence: *Jane S. Paulsen, Department of Psychiatry, 1-305 MEB, The University of Iowa, Iowa City, IA 52242. E-mail: jane-paulsen@uiowa.edu*

E. AYLWARD. Structural Imaging in Preclinical HD.
Objective: Cross-sectional and longitudinal MRI data from the PREDICT-HD study of preclinical Huntington's disease (HD) will be presented.
Participants and Methods: Baseline data are available from 491 adults who carry the gene mutation for HD but who did not exhibit diagnosable manifestations of the disease at the time of study enrollment, and 166 control subjects, offspring of parents with HD who themselves have tested negative for the gene mutation. Longitudinal data (two or more scans, each two years apart, covering 2 to 8 years) will be presented to document significant volume changes in striatum and regional gray and white matter during the prodromal period.
Results: Striatal volumes and volumes of specific cortical and white matter regions, as well as measures of cortical thickness, are significantly correlated with specific cognitive and clinical measures, as well as with estimated years to diagnosis. Data from 85 participants who were diagnosed with HD sometime during the course of the study will be compared with data from age- and CAG-matched individuals whose motor impairments were not severe enough to warrant HD diagnosis. The effect of CAG repeat length on rate of striatal atrophy will also be discussed.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: These results suggest that MRI measures of striatal and white matter volume may be useful biomarkers for future clinical trials in preclinical HD. Methodological advances in multisite data acquisition and analysis will be presented, including multi-site validation of diffusion tensor imaging (DTI) and shape analysis methods applied to structural imaging data.
Correspondence: *Elizabeth Aylward, Seattle Children's Research Institute, Center for Integrative Brain Research, 1900 Ninth Ave, Room 1026, Seattle, WA 98101. E-mail: elizabeth.aylward@seattlechildrens.org*

D. EIDELBERG. Metabolic Brain Networks in Preclinical HD.
Objective: To examine longitudinal changes in brain metabolism, dopaminergic function, and volume in preclinical Huntington's disease (pHD) and early symptomatic HD (sHD) patients.
Participants and Methods: We scanned 12 preclinical HD mutation carriers (estimated years-to-onset: 10.3 years) with serial PET imaging with [18F]-fluorodeoxyglucose (FDG) and 11C-raclopride (RAC), MRI measurements of caudate/putamen volume, and clinical assessments at baseline, 1.5, 4, and 7 years. Five additional patients with sHD (disease duration: 3.0 years) were scanned once. Network analysis of the metabolic data from the first three time points was conducted using ordinal trends canonical variate analysis (OrT/CVA).
Results: This analysis revealed a significant spatial covariance pattern relating to disease progression (HD-OrT) characterized by decreasing metabolic activity in striatal, thalamic, insular, prefrontal, cingulate and occipital areas, with concurrent increases in cerebellar, pontine, orbitofrontal and temporal regions. This HD-OrT pattern expression increased in individual pHD subjects over time, and was elevated in the sHD patients. RAC PET showed linear decreases in caudate and putamen D2 receptor binding over time. MRI showed significant longitudinal loss of caudate/putamen tissue volume. Increased HD-OrT pattern expression in the pHD and sHD subjects remained significant after regional volumetric loss was corrected in the same subjects. The HD-OrT pattern expression progressed at a faster rate than the striatal D2 receptor binding and volume loss in the pHD subjects.
Conclusions: These results suggest that the HD-OrT patrern may improve the accuracy of predictions of symptom onset in preclinical HD. This network measure may prove valuable in the objective assessment of new disease-modifying therapies for HD.
Correspondence: *David Eidelberg, North Shore - LIJ Health System, 350 Community Drive, Manhasset, NY 11030. E-mail: DEidelbe@NSHS.edu*

S.M. RAO. Functional Imaging in Preclinical HD.
Objective: In this presentation, I will summarize preliminary analyses from a two-site (Cleveland Clinic and University of Iowa) longitudinal study of gene-positive (GP) preclinical HD participants and demographically matched gene-negative (GN) controls using advanced functional neuroimaging techniques (task-activated and resting state fMRI and diffusion tensor imaging). The goal of the project is to provide a comprehensive understanding of the pattern and natural history of neurodegeneration of frontostriatal brain circuitry in preclinical HD using activation tasks that govern a range of executive functions, including time perception, conceptual reasoning, motor timing, and response inhibition. These tasks have previously been shown to activate dorsolateral prefrontal, motor/premotor, and lateral orbitofrontal circuits in healthy participants. This presentation will focus on results from an event-related fMRI study using the Stop Signal task. fMRI results for the CI condition indicated that the GP group under-activated the anterior and posterior cingulate, superior frontal gyrus, thalamus, and cerebellum relative to the GN group; for the II condition, additional under-activation of the right middle frontal gyrus (BA44) was observed in the GP group.
Participants and Methods: The sample consisted of 38 GP and 34 GN participants. A functional ROI approach was used to compare groups on Correct (CI) and Incorrect (II) Inhibitions.
Results: The GP group had a significantly lower SSRT than the GN group (p=.04), indicating poorer inhibitory control.
Conclusions: These results suggest that impairments in inhibitory control in individuals during the preclinical stage of HD are mediated by under-activation of brain circuitry involving thalamo-cortical and cerebellar circuits.
Correspondence: *Stephen M. Rao, Schey Center for Cognitive Neuroimaging, Cleveland Clinic, 9500 Euclid Avenue/U10, Cleveland, OH 44195. E-mail: RAOS2@ccf.org*

D.L. HARRINGTON. Cognitive Neuroscience Approaches in Preclinical HD.
Objective: This presentation will summarize findings from PREDICT-HD that investigate cognitive symptoms in preclinical Huntington's disease (HD) using a cross-sectional methodology. The main objective is to discuss approaches to identifying tests of cognition that are sensitive indices of disease burden and proximity to clinical diagnosis. I will start by discussing preliminary findings.
Participants and Methods: A data reduction method identified six domains of cognition from a large battery of neuropsychological tests administered to 572 gene-positive (GP) preclinical HD participants. Derived scores for each domain correlated with disease burden.
Results: After adjusting for disease burden in a log-logistic accelerated failure time model, only two cognitive domains collectively predicted time to HD diagnosis. These results suggest overlap among some cognitive domains, possibly in shared process associated with similar pathology.
Conclusions: To investigate this prospect, preliminary findings will be presented from a study that examined the correlation between performances in different cognitive domains with abnormal brain morphometry. The domains included visuomotor, temporal, and emotion processing, verbal learning, and verbal working-memory. Abnormal morphometry was identified by comparing 512 GP preclinical HD participants with 168 gene-negative controls using a vertex-by-vertex approach. Performances in the cognitive domains were then correlated with structural abnormalities. The results show that performances in different cognitive domains are associated with unique and common structural pathology. Cortical pathology unrelated to the cognitive performances will also be reported. Finally, I will discuss how the above findings drive the selection of new tests that fill gaps in the cognitive assessment of preclinical HD.
Correspondence: *Deborah L. Harrington, University of California-San Diego, Departrment of Radiology, San Diego, CA 92093. E-mail: dharrington@ucsd.edu*

Poster Session 3: Aging, Dementias, Executive Functions

10:45 a.m.–12:15 p.m.

Aging

C. AMBLE, A. BEISER, S. SESHADRI, J. HIMALI, P. WOLF, C. DECARLI & R. AU. Impact of Physical Activity on Brain Aging: Framingham Offspring Study.
Objective: Physical activity is associated with many measures of good health and has been linked to both preventing and attenuating progression of dementia. Little research, however, has examined the impact of physical activity on brain morphology in those who are not demented. The current study investigates the link between physical activity and brain imaging in a community-based cohort.
Participants and Methods: A self-report questionnaire of daily physical activity was administered to Framingham Heart Study Offspring participants as part of a regular health examination from 1987-1991 (Exam 4) and 1998-2001 (Exam 7). A Physical Activity Index (PAI) was calculated at each exam using time spent at various levels of exer-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

tion. 2,052 Exam 7 attendees also agreed to have a brain MRI scan from 1999-2005. We related PAI to MRI measures, adjusted for age, sex and time to MRI, using linear regression for total brain volume (TCBV), hippocampal brain volume (HPV), and white matter hyperintensity volume (WMH), and logistic regression for presence/absence of silent cerebral infarcts (SCI).
Results: PAI was significantly associated with TCBV (p=0.003, Exam 4; p<0.001, Exam 7) and with HPV (p=0.006, Exam 4 only). PAI was not linearly related to either WMH or SCI.
Conclusions: Higher levels of physical activity were associated with larger TCBV and HPV, suggesting that exercise may have a neuroprotective effect.
Correspondence: *Catherine Amble, Framingham Heart Study, 73 Mt. Wayte Ave, Suite 2, Framingham, MA 01702. E-mail: catherine.amble@gmail.com*

R.A. DIXON, C.M. DE FRIAS, B.P. WHITEHEAD & G. MCFALL. Does Cognitive Status Modulate Memory Aging: Comparing Cognitively Elite, Normal, and Impaired Older Adults.
Objective: In the Victoria Longitudinal Study (VLS) we have recently extended our studies of normal and cognitively impaired older adults to include cognitively healthy or elite groups In this study, we examined whether Cognitively Elite (CE), Cognitively Normal (CN), and Cognitively Impaired (CI) older adults differed in performance on episodic (e.g., word recall), semantic (e.g., vocabulary), and working (e.g., computational span) memory tasks.
Participants and Methods: We examined both cross-sectional and 3-year longitudinal data. We computed within-sample norms independently for both waves (Wave 1 initial n=570, age 53-90 years), stratifying for age and education, on five cognitive reference tests (e.g., verbal fluency, reasoning, speed). Cognitive Status groups (Wave 1) included: CE (n=77; all scores above reference means), CN (n=276; all scores -1.5 SD to +1.5 SD), and CI (n=117; -1.5 SD on one or more reference tests).
Results: First, concurrent analyses showed significant Wave 1 Cognitive Status differences for all three domains of memory, with CE outperforming CN, which outperformed CI. Second, two-wave analyses showed substantial longitudinal stabilities for CE (CE-CE Stable = 60.8%; CE-CN = 39.2%), CN (CN-CN Stable = 76.5%; CN-CI = 17.9%), and CI (CI-CI Stable = 73.1%; CI-CN = 26.9%) groups. Third, examining memory performance for Cognitive Status X Stability groups revealed that the CE-CE Stable and CN-CN Stable groups performed better than their corresponding (CE-CN and CN-CI) status declining groups. The CI-CN Improving group performed better than the CI-CI Stable group.
Conclusions: Both concurrent Cognitive Status and Status (In)Stability influence level of memory performance and memory change.
Correspondence: *Roger A. Dixon, PhD, Psychology, University of Alberta, P217 Biological Sciences, Edmonton, AB T6G 2E9, Canada. E-mail: rdixon@ualberta.ca*

L.M. GUIDOTTI BRETING, J. NOVITSKI, K.A. NIELSON, J.L. WOODARD, S.M. RAO & M. SEIDENBERG. Temporal Gradient for Famous Names in Young and Older Participants.
Objective: Analysis of the accuracy and speed to recognize famous people from different time epochs is commonly used for studying the temporal gradient (TG) in remote memory retrieval. The memory representation for familiar people is thought to be composed of both an episodic (autobiographical) and a semantic component. However, little is known about the TG for these two components. We compared the TG for both autobiographical and semantic components between young and older participants.
Participants and Methods: 16 young (Mage=25) and 16 older (Mage=73) cognitively intact participants made familiarity judgments about famous names from a recent time period (2000-2008) and an enduring time period (initially famous in the 1960's but present in the public eye today). They then provided factual information (semantic) and an autobiographical episode (episodic) for correctly recognized famous names. A Group x Epoch (2x2) ANOVA (controlling for age and education) was conducted for name recognition accuracy and reaction time, semantic information, and autobiographical details.
Results: Younger adults were more accurate and faster in recognizing famous names and provided more semantic information and details about autobiographical events for the recent epoch ("reversed TG"), while the older adults showed the "traditional" TG. The older adults were more accurate and faster in recognizing names and providing more semantic and episodic details for the enduring time epoch. All group by epoch interactions were significant (p's<.05).
Conclusions: TG for semantic and autobiographical components are different for young and older adults. Additional work is being conducted to better understand the cognitive and neural substrates of these age differences.
Correspondence: *Leslie Guidotti Breting, Ph.D., Psychology, Rosalind Franklin University of Health and Sciences, 1100 W. Cornelia Ave, Unit #133, Chicago, IL 60657. E-mail: leslie.guidotti@my.rfums.org*

N. HANTKE, K.A. NIELSON, J.L. WOODARD, S. DURGERIAN, M. SEIDENBERG, J.C. SMITH, A. BUTTS, M.A. LANCASTER, M.A. MATTHEWS & S.M. RAO. Comparison of Semantic and Episodic Memory Activation in Predicting Cognitive Decline in Older Adults.
Objective: Recent studies suggest that task-activated fMRI may be a viable biomarker for predicting future cognitive decline in cognitively intact older adults. The choice of activation tasks, however, may influence the accuracy of prediction. In the current study, we contrasted the relative sensitivity of baseline brain activation patterns derived from semantic memory (SM) and episodic memory (EM) tasks in predicting decline on neuropsychological measures of episodic memory after an 18-month retest interval.
Participants and Methods: 78 older participants (mean age = 73; 57 female) underwent two event-related fMRI tasks: SM task involved discrimination of famous vs. unfamiliar names; EM task involved recognition of old vs. new names. After an 18-month follow-up interval, 27 participants declined by at least 1 SD on neuropsychological testing. Logistic regression was conducted on fMRI indices, derived from principal components analysis, to examine the relative accuracy of SM vs. EM in predicting decline; presence of an APOE ε4 allele was also entered into the models.
Results: The SM task + APOE model accounted for 28.5 percent of the variance (R2 = 0.285; C=0.787) with both cortical (p=.01) and hippocampal (p=.03) components significant. The EM task + APOE model accounted for 21.2 percent of the variance (R2 = 0.212; C=0.711) with none of the fMRI components being significant predictors.
Conclusions: Results of the study indicate that SM task activation is superior to EM activation for predicting cognitive decline after an 18-month retest period. These results have implications for using fMRI as a biomarker for enriching prevention studies for Alzheimer's disease.
Correspondence: *Nathan Hantke, M.S., Marquette University, P.O Box 1881, Milwaukee, WI 53201. E-mail: Nathan.Hantke@mu.edu*

C.E. JACKSON, P.J. SNYDER, J.E. RYAN & P.T. MARUFF. Massed Versus Spaced Visuospatial Learning and Memory in Healthy Young and Older Adults.
Objective: Animal and human literatures have demonstrated the benefits of spaced, compared to massed, learning for enhanced encoding and recall. Using a within-subject, cross-over design, this study compared the effect of massed and spaced training on visuospatial memory for healthy young adults and cognitively healthy older adults.
Participants and Methods: Fourteen young adults (M = 28.9 years, SD = 10.2, 6 females) and thirteen older adults (M = 73.1 years, SD = 5.7, 9 females) were screened for physical, psychiatric, and cognitive

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

health. Participants completed a visuospatial computer-administered paired associate learning task and word-list learning task (CogState, Ltd.) Under the massed paradigm, individuals completed learning trials in immediate succession. Under the spaced paradigm, individuals completed learning trials with 15 minute delays between each trial. Participants completed a 24-hour delayed recall for both tasks under both conditions.

Results: Data required a log10 transform for normalization. An ANCOVA [between-subjects factor: condition (massed, spaced); covariate: performance on final learning trial] revealed that, for young adults, controlling for performance on the final learning trial resulted in a significant difference in the number of errors on the spaced compared to the massed condition on the delayed recall trial, $F(1,27)=5.94$, $p=0.02$, partial $\mu 2=0.19$. Older adults failed to demonstrate a significant difference between conditions, $F(1,25)=0.20$, $p=0.659$, partial $\mu 2=0.01$.

Conclusions: These results indicate that, after controlling for performance on the learning trials, young adults benefit more from spaced training on a visuospatial task than older adults.

Correspondence: *Colleen E. Jackson, M.S., Psychology, University of Connecticut, 406 Babbidge Rd., Unit 1020, Storrs, CT 06269. E-mail: colleen.jackson@uconn.edu*

A. GENTILE, N.G. CANTWELL, S. MUKUNDA, M. DOMBEK, B. PATEL & A.L. JEFFERSON. Neuropsychological Outcomes for Minimally Invasive and Traditional Coronary Artery Bypass Graft Surgery.

Objective: Coronary artery bypass graft (CABG) surgery is associated with cognitive changes in older adults. Robotic-assisted minimally-invasive CABG is a relatively newer technique with enhanced medical outcomes, as compared to traditional CABG via sternotomy, including shorter hospitalizations and fewer post-surgical complications. The current study preliminarily compares neuropsychological outcomes for patients undergoing traditional versus robotic CABG.

Participants and Methods: Six traditional (64±7 years, 33% female) and 12 robotic (66±7 years, 33% female) CABG patients underwent a comprehensive neuropsychological protocol (Mini-Mental State Examination, Trail Making Test Parts A & B, Animal Naming, California Verbal Learning Test-II, Digit Symbol, Color-Word Interference Test) immediately preceding and two weeks following surgery. Pertinent medical information was extracted from patient charts.

Results: Comparisons using t-tests yielded only one significant between-group difference in which traditional CABG patients performed worse post-operatively on Trail Making Test Part A, as compared to the robotic CABG patients ($p=0.03$). No additional between-group differences were observed for the remaining neuropsychological measures (all p-values>0.10).

Conclusions: These preliminary data suggest a modest between-group difference, such that patients undergoing traditional CABG via sternotomy perform worse on a measure of information processing speed post-surgery as compared to patients undergoing robotic CABG surgery. Examination of a larger cohort, including longitudinal follow-up, is necessary to identify and characterize cognitive impairment (if any) following robotic versus traditional CABG surgery.

Correspondence: *Angela L. Jefferson, PhD, Boston University School of Medicine, 72 East Concord Street, B-7800, Boston, MA 02118. E-mail: angelaj@bu.edu*

A.L. JEFFERSON, J.J. HIMALI, A. BEISER, S. SESHADRI, E.J. BENJAMIN, C. O'DONNELL, W.J. MANNING, P.A. WOLF & R. AU. Left Ventricular Ejection Fraction and Neuropsychological Functioning in the Framingham Heart Study.

Objective: Heart failure (HF) is associated with neuroanatomic and neuropsychological changes and is a risk factor for Alzheimer's disease (AD) and cerebrovascular disease. We hypothesized that both HF and left ventricular ejection fraction (LVEF), a clinical staging tool for cardiac function, would be associated with pre-clinical brain magnetic resonance imaging (MRI) and neuropsychological markers of ischemia and AD in the community.

Participants and Methods: Brain MRI, cardiac MRI, neuropsychological, and laboratory data were collected on 1123 Framingham Heart Study Offspring participants free from clinical stroke or dementia (40-89 years, 67±9; 54% women). Clinical HF and continuous and categorical cardiac MRI-assessed LVEF were related to brain aging markers, encompassing multiple neuropsychological domains and brain MRI variables.

Results: Multivariable-adjusted linear regression showed an association between HF and visuospatial memory ($p=0.01$) and abstract reasoning ($p=0.01$). In multivariable-adjusted linear models, LVEF was not associated with any brain aging variable (all p-values>0.15). Analyses relating LVEF quintiles to cognition yielded a U-shape association, such that the lowest and the highest ejection fraction levels were associated with worse cognitive performance for multiple measures, including visuospatial memory (p-values<0.03) and visual organization (p-values<0.02).

Conclusions: Although our observational cross-sectional data cannot establish causality, they suggest that HF is associated with cognitive measures of accelerated brain aging, which is supported by prior literature. More importantly, we observed relatively low and very high LVEF is associated with worse cognitive performance, though the mechanism for this U-shape association remains unclear.

Correspondence: *Angela L. Jefferson, PhD, Boston University School of Medicine, 72 East Concord Street, B-7800, Boston, MA 02118. E-mail: angelaj@bu.edu*

M. JURADO, M. SERRANO, M. MONROY, J. LOPEZ & M. ROSSELLI. Executive functions across the adult lifespan.

Objective: Objective: The main purpose of the present study was to investigate EF change across the adult lifespan. It has been proposed that age-related deficits in executive function are mediated by changes in processing speed (PS; Salthouse, 1996) and an additional goal of the present study was to investigate the contribution of PS to EF across the adult lifespan.

Participants and Methods: Participants and Methods: 176 subjects between de ages of 18 and 91 participated in this study and were assessed on measures of PS, and three executive tasks of planning (D-KEFS Tower Test), set-shifting (WCST), and attentional control and inhibition of prepotent responses (CPT-II). Subjects were divided into 4 age groups [18-39 (n = 65), 40-59 (n = 34), 60-79 (n = 58), 80-91 (n = 19).

Results: Results: Set-shifting showed earlier decline with significantly different performance between the youngest group and the three older groups, $F(3,165) = 7.50$, $p < .001$; planning showed decline beginning in the sixth decade, $F(3,171) = 5.43$, $p <.001$; attentional control showed decline beginning in the seventh decade, $F(3,163) = 7.91$, $p < .001$. Regression analyses demonstrated that while PS did not make any significant contributions to performance of EF tasks in the youngest age group, starting in middle age, PS was able to significantly predict attentional control, ≥= .401, $t(1,23)=2.102$, $p=0.47$, and planning, ≥= -.455, $t(1,23)=-2.451$, $p=.022$, but not set-shifting. In old age, all EF task performance was predicted by PS including planning, ≥= -.421, $t(1,47)=-3.285$, $p=0.002$, set-shifting, ≥=-.477, $t(1,47)=-3.719$, $p <.001$, and attentional control, ≥ .540, $t(1,47)=4.393$, $p < .001$.

Conclusions: Conclusion: EF show differential trajectories of decline and the influence of processing speed varies across the adult lifetime. While young adult performance on EF tasks is not mediated by PS, as adults age executive performance is affected by accompanying age-related changes in PS.

Correspondence: *Maria-Beatriz Jurado, Florida Atlantic University, 3200 College Ave., Davie, FL, FL 33314. E-mail: mjurado@fau.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

M.A. MATTHEWS, S. DURGERIAN, M. SEIDENBERG, K.A. NIELSON, J.L. WOODARD, J.C. SMITH, M.A. LANCASTER, A.M. BUTTS, N. HANTKE & S.M. RAO. Cortical and Subcortical Volumetric Differences between Cognitively Stable and Declining Older Adults.

Objective: Increased atrophy in the hippocampus and entorhinal cortex, as measured from MRI scans, is commonly observed in Mild Cognitive Impairment. Whether atrophy can predict future cognitive decline in asymptomatic older individuals is unclear. We compared cortical and subcortical MRI volumes between asymptomatic participants who subsequently showed memory decline after an 18 month retest interval (Declining) to subjects who remained cognitively intact (Stable).

Participants and Methods: 73 cognitively asymptomatic subjects (mean age=73.14) were administered the Rey Auditory Verbal Test, Mini-Mental State Exam, and Dementia Rating Scale twice separated by 18 months. Residualized change scores were calculated. The Declining group (n=27) showed a minimum 1 SD reduction from baseline on at least one test; the Stable group (n=46) scored within 1 SD of baseline scores. An automated program (Freesurfer) was used to obtain gray matter volumes. Hippocampal volumes were manually traced.

Results: Total whole brain gray matter volumes did not differ between groups. In contrast, the Declining group demonstrated smaller volumes in the left ($p<.001$) and right ($p<.007$) hippocampi derived from manual tracings. When comparing Freesurfer derived regions of interest, the Declining group showed significantly greater atrophy only in the left amygdala ($p=.02$) compared to the Stable group.

Conclusions: These data suggest the presence of subtle focal MTL atrophy in asymptomatic older individuals who subsequently demonstrate significant memory decline. The results also suggest that manually traced measures of hippocampal volumes are more sensitive to detecting group differences than an automated parcellation system.

Correspondence: *Monica A. Matthews, Rosalind Franklin University of Medicine and Science, 1146 S. Church St, Lombard, IL 60148. E-mail: monica.matthews@my.rfums.org*

J. OOSTERMAN & J. VAN DAMME. The Role of Strategy Use in the Age-related Decline in Associative Memory.

Objective: Recent studies have pointed to possible beneficial effects of strategy use to diminish the age-related decline in associative memory. It is unclear however whether this reflects a compensatory mechanism or whether a lack of strategy use is a main cause of the decline in memory. If the age-related decline is indeed due to a lack of strategy use, then elderly people should benefit more from a strategy than younger participants. Also, as executive functions are crucial for strategy use, better executive functioning should be associated with better associative memory performance. Hence, we focused on the effectiveness of a visual imagery strategy in improving associative memory (face-name associations) together with neuropsychological predictors of memory performance.

Participants and Methods: Two studies were performed. First, different age groups (18–30, 31–50, 51–64, 65+) were included and the beneficial effect of strategy use was examined as a function of age. In the second study, the effectiveness of the visual imagery strategy was examined in younger (age 18-40) and older (age 60-85) participants together with neuropsychological predictors of task performance.

Results: The first study showed an improvement in associative memory in both the youngest and the oldest age groups. This effect, however, did not differ between the two age groups. In the second study, we corroborated the improved associative memory performance following the visual imagery strategy. Again, this improvement did not differ between the younger and older participants. The main predictor of associative memory performance was episodic memory; this association was most pronounced in the older age group.

Conclusions: We did not find evidence that the associative memory decline in aging is due to a lack of strategy use nor did we find evidence that diminished executive functioning underlies the age-related decline in associative memory.

Correspondence: *Joukje Oosterman, Radboud University Nijmegen, Montessorilaan 3, Nijmegen 6500 HE, Netherlands. E-mail: j.oosterman@donders.ru.nl*

A.M. POREH. Analysis of Cognitive Aging Using Reliability Theory.

Objective: The present study demonstrates that the three parameter Weibull's Cumulative Distribution Function, which has been used extensively since 1951 in reliability studies, can also be used to quantitatively describe and characterize the mean decay of cognitive abilities across the human lifespan as they are depicted on commonly used neuropsychological tests.

Participants and Methods: Normative data collected for the Trail Making Test, verbal fluency, and Rey Auditory tests was analyzed using curve fitting algorithms.

Results: This preliminary study shows that knowledge of values of the three parameters that characterize the decay of a given cognitive ability makes it possible to calculate the decay curve of that ability. Moreover, it depicts the relative resilience of what are postulated to be modular functions associated with each ability.

Conclusions: The study provides new insights regarding the concept of brain reserve capacity and modularity of the mind. It proposes that the application of Weibull's distribution adapted from mechanical and electrical engineering might explain the exponential decline and resiliency of certain cognitive functions, and can potentially help explain brain reserve capacity. The study also demonstrates the importance of using nonlinear regression models, rather than tabulated age based norms, for assessing cognitive abilities.

Correspondence: *Amir M. Poreh, Ph.D., Psychology, Cleveland State University, 2121 Euclid Avenue, Cleveland, OH 44115. E-mail: aporeh@yahoo.com*

A. RAHMAN, J.L. WOODARD, L.S. MILLER, P. MARTIN, A. DAVEY & L.W. POON. Normative Data for the Fuld Object Memory Evaluation in Octogenarians and Centenarians.

Objective: Although the Fuld Object Memory Evaluation (FOME) is commonly used with older adults, little normative data exist for octogenarians and virtually no data exist for centenarians. In this study, we established normative values for immediate learning indexes from the FOME for octogenarians and centenarians. We also investigated whether higher dementia prevalence in centenarians could account for their lower performance on FOME measures.

Participants and Methods: Eighty octogenarians and 244 centenarians from the population-based Georgia Centenarian Study completed the FOME as part of a larger neuropsychological evaluation. Total and trial-to-trial performance on the storage, retrieval, repeated retrieval, and inefficient reminder FOME indexes were assessed for centenarians and octogenarians. Following stratification by dementia status, cognitively intact and impaired individuals' performance within each age group was then compared.

Results: As a group, and for cognitively intact participants only, octogenarians performed significantly better than centenarians on all summary and trial-to-trial FOME measures.

Cognitively impaired participants showed no age group differences on any FOME measure. Cognitively intact octogenarians and centenarians failed to benefit from additional learning trials after Trial 3 for storage and Trial 2 for retention and retrieval. Inefficient reminders showed no change across learning trials. Demented participants gained virtually no benefits of repeated learning trials.

Conclusions: Octogenarians outperformed centenarians on all FOME measures for the overall group and for cognitively intact participants. Both groups showed little improvement beyond the third learning trial. However, cognitively impaired participants showed virtually no age group differences. Increased dementia prevalence in centenarians does not account for their reduced FOME memory performance.

Correspondence: *Annalise Rahman, B.S., Wayne State University, 229 East Webster Road, Royal Oak, MI 48073. E-mail: ec9198@wayne.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

T.M. HARRISON, S. WEINTRAUB, M. MESULAM & E. ROGALSKI. The Neuroanatomy of SuperAging: Increased of Cortical Thickness in the Anterior Cingulate Cortex.

Objective: While atrophy and cognitive decline are accepted features of normal aging, they may not describe all healthy elderly individuals. The SuperAging program has identified a cohort of individuals over age 80 who score at least average for a 50-year-old on episodic memory tests, and are at least normal for their age on the Boston Naming Test, Categorical Fluency and Digit Span. In the present study, SuperAgers were compared to a younger, cognitively-matched group to identify neuroanatomical features of SuperAging.

Participants and Methods: Structural MRI scans from 10 SuperAgers (aged 80- 90) and 17 middle-aged adults (aged 50- 64) were acquired on a 3T scanner and processed using FreeSurfer's surface-based method of estimating cortical thickness. Cortical thickness was compared across the entire surface of both hemispheres using an FDR correction at 0.05.

Results: The resulting maps showed no cortical thinning in the SuperAger group compared to the younger controls in either hemisphere. Surprisingly, an area in the left anterior cingulate cortex (ACC) was significantly thicker in SuperAgers than in controls. Because the ACC is often associated with executive functioning, the SuperAgers' performance on Trail Making Test part B was analyzed. Results revealed a strong correlation ($r=0.758$, $p=0.01$).

Conclusions: The lack of significant thinning in the SuperAgers is remarkable because of the age difference between the SuperAger and control cohorts, and the expectation that cortical thinning occurs with advancing age. The significant correlation between the cingulate and Trails-B performance suggests that executive functioning, as mediated by the cingulate, may play a role in maintaining the SuperAgers' superior memory performance.

Correspondence: *Emily Rogalski, Northwestern University, 320 E Superior St, Searle 11, Chicago, IL 60611. E-mail: erogalski@gmail.com*

Y. ROGALSKI, L. ALTMANN, J. REILLY & J. ROSENBEK. Levels of Processing Effects on Text Memory in Older Adults.

Objective: Older adults have difficulty remembering details from what they have read. The Levels of Processing theory (Craik and Lockhart, 1972) maintains that deep and elaborate encoding results in better long-term memory of information. Read-Attentively-Summarize-Review (RASR) is a deep and elaborate study method that incorporates retrieval practice into study. RASR was compared to a shallower technique involving rereading. We predicted that older adults using RASR would retain more information after a 24-hour delay than those using rereading.

Participants and Methods: Healthy older adults were randomized into the RASR (23 participants) or the rereading groups (21 participants). All participants read and immediately recalled a baseline passage. Participants then studied two other passages using one of the techniques. Only one studied passage was tested immediately but all passages were tested after a 24-hour delay.

Results: Repeated measures ANOVAs were used. We found no differences between groups on baseline (unstudied) passages tested immediately [$p=.33$] or after a delay [$p=.85$].

On studied passages, the RASR group immediately recalled 13.66 more propositions than the rereading group [$p<.01$] and recalled 9.71 more propositions after a delay [$p=.03$]. A main effect of testing condition was found [$p<.01$], that is, both groups remembered more after a delay if they had been tested previously on their recall.

Conclusions: Results of the current research suggest that older adults instructed in deep, elaborate study techniques that emphasize recall can improve delayed retention of text details compared to rereading. These findings, while preliminary, provide fertile ground for research in aging and rehabilitation.

Correspondence: *Yvonne Rogalski, Ph.D., Speech Language Pathology and Audiology, Ithaca College, 953 Danby Rd, Smiddy Hall, rm. 204H, Ithaca, NY 14850. E-mail: yrogalski@ithaca.edu*

S.A. ROGERS & D.A. LOWE. Does a Change in Spirituality Impact Cognitive Functioning Among Older Adults?

Objective: Emerging research has examined the way religiousness and spirituality change throughout the course of certain disorders, such as frontotemporal dementia. Less is known about the relationship between cognitive functioning and changes in spirituality in a normal aging population. This study seeks to examine the way changes in spirituality may influence the cognitive functioning of older adults.

Participants and Methods: Sixty-nine older adults (M age = 79.88, SD = 10.31) completed a comprehensive neuropsychological battery. They also indicated if their spirituality or religiousness has changed, when the change began, and the type of change (e.g., switch in faith, deepening of existing faith, or loss of faith).

Results: According to t-test analyses, those who experienced any type of change in spirituality or religiousness performed better than those without such a change on WMS-III Logical Memory I and Visual Reproduction I, CVLT-II Total Trials 1-5 and Long Delay Free Recall, Stroop Word Reading, Animals, and the Boston Naming Test, $ps < .05$. Cognitive functioning did not appear to vary according to the different types of change, but there was a positive correlation between the time since the change and performance on Stroop Word Reading and Color Naming, as well as Rey-O 30' delay, $ps <.03$.

Conclusions: These results suggest that those who experience some type of change in their religiousness or spirituality seem to demonstrate stronger cognitive functioning than those without this change, particularly in memory, language processing speed, and semantic language skills. Cognitive functioning did not seem to vary according to the type of change in religiousness or spirituality, which suggests that any form of change, be it a deepening, loss, or switch in faith, is associated with stronger cognitive performance. Further research is needed to explain these findings, such as their relation to degree of engagement with life, but they have important implications for interpreting the cognitive performance of older adults.

Correspondence: *Steven A. Rogers, Ph.D., Psychology, Westmont College, 955 La Paz Road, Santa Barbara, CA 93108. E-mail: sarogers@westmont.edu*

B.A. SPRINGATE, K. PAPP, R.F. KAPLAN, D. WAKEFIELD, N. MOSCUFO & L. WOLFSON. Hippocampal Volume, White Matter Hyperintensities and Cognition in the Healthy Elderly.

Objective: Age-related changes in brain morphology have been linked to memory loss, declines in executive functioning (EF) and slower reaction time (RT), but few studies have examined these longitudinally. This study examined changes in hippocampal volume (HV) and frontal white matter hyperintensities (WMH) over two years and corresponding changes in memory, EF and RT.

Participants and Methods: Eighty-one healthy adults aged 75-90 ($M=81.71$, $SD=4.00$) completed a neuropsychological test battery, including the RBANS, Trails Making Test, Stroop Test and CalCAP, and a quantitative brain MRI at baseline and at two-year follow-up. We used multiple regression to predict cognitive change with age, education, and changes in HV and WMH as predictor variables.

Results: Age and education explained 2-6% of variance for memory measures. Declines in HV independently predicted list learning and story recall ($\geq=0.429$, $p<0.001$ and $\geq=0.317$, $p<0.01$, respectively) with a trend toward predicting list recall ($\geq=0.221$, $p=0.06$). Increases in frontal WMH did not significantly add to the prediction of any memory measures.

For EF, age and education predicted 3-13% of variance. Decreased HV predicted a decline in Trails B performance ($\geq=-0.273$, $p<0.05$) and a trend toward slower Stroop Color-Word scores ($\geq=0.195$, $p=0.08$). Increases in frontal WMHs only showed a trend toward predicting slower reaction time ($\geq=0.205$, $p=0.10$).

Conclusions: Memory declines and some decreases in EF in the healthy elderly appear to be more affected by HV loss than increased WMH.

Correspondence: *Beth A. Springate, MA, Psychology, University of Connecticut, 406 Babbidge Road, Unit 1020, Storrs, CT 06269. E-mail: beth.springate@uconn.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

J. SUK, J. CHEY & S. KIM. Proportional Reasoning Task: A neuropsychological test sensitive in detecting decline in higher cognitive function in older adults with low educational background.
Objective: Evaluating higher cognitive functions, such as conceptualization or reasoning ability, of the older adults with low levels of education could be difficult due to their poor performances on the traditional neuropsychological tests. Typically based on verbal and figure concepts, performance on these types of tests are frequently influenced by education. As an alternative assessment tool, we developed the Proportional Reasoning Task (PRT), an equivalence matching task based on numerosity and quantity, since concept of quantity is known to be less sensitive to education. In a previous study, we administered the PRT to healthy older adults with various educational backgrounds, and found that even the participants with limited educational background could understand and could perform the task adequately. In this study, we examined the performances of PRT in two types of dementia patients, Alzheimer's disease (AD) and frontotemporal dementia (FTD), and compared them to the healthy older adults' results in the previous study.
Participants and Methods: Forty eight patients participated, who were categorized into four groups; AD with less than 6 years of formal education (n=12), AD with 6 years or more than 6 years of education (n=12), FTD with less than 6 years of education (n=12), and FTD with 6 years or more than 6 years of education (n=12).
Results: The study showed that all patient groups performed worse than chance level (33.3%), the criteria for adequate performance. Also, the performances of patient groups with different education levels were not significantly different.
Conclusions: These results support the clinical validity of PRT as an evaluation tool for higher cognitive functioning of older adults, especially for those with limited education.
Correspondence: *Jungsuh Suk, Seoul National University, 16-M428, Seoul National University, Daehakdong, Seoul 151-741, Republic of Korea. E-mail: hiei4@snu.ac.kr*

P. CHAMARTHY, J. WILLIAMSON & K.M. HEILMAN. The Right Hemisphere Aging Hypothesis and Right-Left Spatial Distractibility.
Objective: The brain often receives more information than it can simultaneously process and attention is the mechanism by which the brain decides which information requires further processing. There are several studies suggesting that the right hemisphere deteriorates with age faster than does the left (right hemi-aging hypothesis). The purpose of this experiment was to determine if aging impacts shifts in global and focal attention in response to lateralized distracting stimuli.
Participants and Methods: 12 healthy older (mean age = 70 + 6.7) and younger
(mean age = 21 + .669) subjects were given 240mm horizontal lines, with or without lateral distractors and asked to quadrisect the line on either the right or left side (8 trials per side).
Results: Older
subjects significantly deviated toward the end of the line with distractors on either the left or right side when performing left sided quadrisections ($p < .05$), and they deviated toward the right end of the line with rightward distractors when performing right sided quadrisection ($p < .05$). Younger subjects deviated to the end of the line only when quadrisecting the line at the right with right sided distractors ($p < .05$).
Conclusions: Older subjects were more susceptible
to distractors on either side when performing left quadrisections (causing focal deviation). Both older and younger subjects were impacted by right sided distractors when performing a quadrisection task on the right side (again, causing focal deviation). These results are consistent with a right-hemi aging hypothesis.
Correspondence: *John Williamson, Ph.D., Neurology, University of Florida, 8114 SW 53rd Place, Gainesville, FL 32608. E-mail: john.williamson@neurology.ufl.edu*

M.A. SUGARMAN, J.L. WOODARD, K.A. NIELSON, J. SMITH, M. SEIDENBERG, S. DURGERIAN, A.M. BUTTS, N. HANTKE, M.A. LANCASTER, M.A. MATTHEWS & S.M. RAO. Prediction of Future Cognitive Decline using Brief Measures of Physical and Cognitive Activity in Healthy Older Adults.
Objective: Participation in physical and cognitively stimulating activities have been proposed as protective factors that may delay onset of Alzheimer's disease, although findings are clearly mixed. In this study, we investigated whether brief screening measures of physical and cognitive activities can predict future cognitive change. We also attempted to validate these measures against measures of fMRI semantic activation, hippocampal volume and Apolipoprotein E (APOE) e4 allele status.
Participants and Methods: Seventy-eight healthy, cognitively intact, older adults (M age=73 years, SD=4.9 years) underwent neuropsychological evaluation (Mattis Dementia Rating Scale-2, Rey Auditory Verbal Learning Test) at baseline and after 18 months, and residualized change scores were computed. Participants also completed the Stanford Brief Activity Scale (Stanford) and the Rush Cognitive Activity Survey (Wilson et al., 1999). APOE genotyping, manually traced hippocampal volumes, and fMRI semantic memory activation during a famous name recognition task were also performed.
Results: Neither physical activity nor frequency of participation in cognitively stimulating activities were associated with future cognitive change, semantic memory activation, or hippocampal volumes. When APOE genotype was considered, a logistic regression model revealed an interaction between physical activity and APOE genotype. A protective effect of physical activity against cognitive decline for APOE e4 positive participants was observed. No significant effects were observed for cognitive activities.
Conclusions: Brief screening measures of physical and cognitive activity did not predict future cognitive change and were not related with fMRI semantic activation or hippocampal volume. However, for APOE e4 positive participants, higher physical activity scores on the Stanford appeared to be protective against future cognitive decline.
Correspondence: *Michael A. Sugarman, BS, Psychology, Wayne State University, 10505 Borgman Ave, Huntington Woods, MI 48070. E-mail: mike.sugarman@wayne.edu*

F.S. AHMED & L.S. MILLER. Social Cognition in Aging: Exploring the Relationship Between Proverb Interpretation and Theory of Mind.
Objective: The ability to understand the belief state of another person is referred to as Theory of Mind (ToM). Though much of ToM literature has focused on children, there is growing interest in ToM among older adults. The ability to understand and interpret proverbs has often been used as a measure of the executive process of verbal abstraction. Given the abstract nature of both ToM and proverb interpretation, it seems likely that there will be a relationship between these two processes. Further, does verbal abstraction abilities alone account for the process of mentalizing? This preliminary study explored this relationship in a geriatric population.
Participants and Methods: Twenty independently-living older adults from the community participated in this study. They were administered the Strange Stories test and the Proverb Test from the Delis-Kaplan Executive Function System (D-KEFS). The Strange Stories test is a measure of ToM that requires participants to understand the motivation behind a character's actions. The D-KEFS Proverb Test measures the ability to explain, with accuracy, the abstract messages that are inherent in proverbs.
Results: Regression analyses examined the predictive ability of proverb interpretation on ToM performance. Proverb interpretation accounted for 34% of the variance in performance on the Strange Stories test ($p < .05$)
Conclusions: Results indicate that ToM performance is related to basic verbal abstraction abilities. It did not, however, fully explain ToM ability. This study appears to indicate that, in an older adult population, the ability to think abstractly is an important but not exclusive process necessary to take on another person's perspective.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Fayeza S. Ahmed, M.S. Psychology, Psychology, University of Georgia, 139 Psychology Building, University of Georgia, Athens, GA 30602. E-mail: ahmedfs@gmail.com*

U. DÍAZ, C. BUIZA, D. FACAL, M. GONZÁLEZ, N. GALDONA, E. URDANETA & J. YANGUAS. Cognitive Interventions in the Old Age: Background Characteristics that Influence Engagement and the Role of Cognitive Reserve.

Objective: Engaging in mental stimulating activities may be considered one direct strategy to increase brain reserve, enhancing compensation for brain pathology. Moreover, the level of engagement with the environment (including physical, cognitive and social activity) has been suggested to influence cognitive health in the elderly.

Participants and Methods: An incidental population (N=138, mean age: 70.16, SD: 6.58) underwent a neuropsychological, physical, emotional and quality of life related assessment. Subsequently, each subject voluntarily decided whether (or not) they wanted to participate in a group-format memory training program of 6 months duration and 1-hour session/week. Prior to cognitive intervention, characteristics of both groups at baseline (G1: voluntary participants, G2: voluntary non-participants) were examined.

Results: Baseline cognitive differences in favor of G1 were found (p<.01=**; p<.05*): Digit-Span-Backwards (t=-3.46**), RAVLT (t=-2.37*), WAIS-III Blocks (t=-3.98**) and Letter-Verbal-Fluency (t=-2.78**). Also, differences in some physical and emotional measures emerged: Tinetti-Balance-test (t=-2.41*), Barthel-Index (t=-2.02*), TMMS-24 Emotional-Attention-subscale (t=2.37*) and PANAS Negative-Affect-subscale (t=2.28*). Finally, it was also found that G1 had lower age (t=2.06*), more years of education (t=-4.31**) and had learnt more languages during their life, both during childhood (t=-2.67**) and adulthood (t=-2.63*).

Conclusions: In our sample, there was a higher likelihood to engage in cognitive activities for subjects with lower age, better educational level, bilinguals, and with better cognitive, emotional and functional abilities. These results are in line with the increasing evidence that cognitive reserve is promoted by factors like education or bilingualism, which increase the likelihood of the subject to engage in healthier lifestyle activities throughout the lifespan, enhancing therefore their current cognitive performance.

Correspondence: *Cristina Buiza, Graduate, Research, Fundación Instituto Gerontológico Matia-INGEMA, Camino de los Pinos, 27, Donostia-San Sebastián 20018, Spain. E-mail: cristina.buiza@ingema.es*

U. DÍAZ, D. FACAL, M. GONZÁLEZ, C. BUIZA, B. MORALES, C. SOBRINO, E. URDANETA & J. YANGUAS. The Use of Bilingualism and Occupational Complexity Measures as Proxies for Cognitive Reserve: Results from a Community-Dwelling Elderly Population in the North of Spain.

Objective: Cognitive reserve is the ability of the brain to tolerate the effects of greater amounts of dementia-related neuropathology, prior to crossing the threshold in which the clinical symptomatology becomes evident. Besides educational attainment, some of the most studied variables which try to explain this mechanism are bilingualism and occupational complexity. Our goal in this study was to assess whether measures of bilingualism and occupational complexity had any relationship with the current cognitive performance of 100 community-dwelling older adults (age range: 50-90; mean=71.1, sd=6.79).

Participants and Methods: Neuropsychological assessment including RAVLT, Digit-Symbol Test, Trail-Making-Test, the language interview from the Bilingualism Aphasia Test-Spanish version (Paradise, 1993) was administered. Occupational Complexity was assessed with a scale created by our research group (Buiza et al, 2010), that includes specific items related to the job the person has performed.

Results: Comparing Spanish-monolinguals (n=71) and Spanish-Basque bilinguals (n=29), a statistically significant difference was observed in the measure of forgetfulness of the RAVLT (χ^2=-3.20, p<.001), meaning that bilingual elders forgot a lesser amount of words after a delay interval. Also, those people that had to take relevant decisions in their jobs had significantly better verbal memory (RAVLT-1: χ^2=7.465, p<.05; RAVLT-5: χ^2 = 8.54, p<.05) and delayed memory (χ^2=6.22, p<.05). No significant differences were found between these measures and other cognitive tests administered.

Conclusions: As an initial approach, simple bilingualism and occupational complexity measures, such as those used in this study, may be used as proxies for cognitive reserve. Further research should clarify the potential role of bilingualism and increasing work complexity as protective factors against the development of cognitive impairment.

Correspondence: *Cristina Buiza, Graduate, Research, Fundación Instituto Gerontológico Matia-INGEMA, Camino de los Pinos, 27, Donostia-San Sebastián 20018, Spain. E-mail: cristina.buiza@ingema.es*

U. DÍAZ, A. NAVARRO, M. GONZÁLEZ, C. SOBRINO, E. URDANETA & J. YANGUAS. Technological System Adapted to the Cognitive and Perceptual Capabilities of Disabled and Elderly People: Presenting the GUIDE Project.

Objective: It is very important to check the feasibility of a product which technical complexity has to be adapted to elderly people with mild to moderate vision and hearing impairments, mobility difficulties and/or Age Associated Memory Impairment who may not be familiar with new technologies.

GUIDE is a new research project co-founded by the 7FP Framework Program of the European Union. The main objective is to fulfil the individual accessibility needs at home, with the characteristics above mentioned, through the provision of a development toolbox and adaptive multimodal user interfaces which take into account the specific neuropsychological and perceptual skills of each user profile.

Participants and Methods: In order to achieve information about the characteristics and needs of users regarding the interaction with the system, a user requirement analysis has been planned, comprising a comprehensive assessment including: a questionnaire developed for this study and a comprehensive cognitive assessment composed of: Weschler Memory Scale (WMS-III), Memory Complaint Questionnaire (MAC-Q), Trail Making Test form A, RAVLT, Purdue Pegboard, WAIS-III Digit Symbol subtest, and Gibson Spiral Maze. This assessment will be administered to a expected sample of minimum 40 people from 4 different disability profiles: visually impaired, hearing impaired, mobility impaired and Age-Associated Memory Impairment.

Results: The User Requirement definition phase has to be correctly planned for obtaining a wide comprehension of the final user needs and capacities, and therefore, for the correct design and success of the development of the system.

Conclusions: Further studies on the influence of cognitive and perceptual skills in the use and management of new technologies are needed with good evaluated and selected samples.

Correspondence: *Cristina Buiza, Graduate, Research, Fundación Instituto Gerontológico Matia-INGEMA, Camino de los Pinos, 27, Donostia-San Sebastián 20018, Spain. E-mail: cristina.buiza@ingema.es*

C. BUIZA, U. DÍAZ, D. FACAL, M. GONZÁLEZ, N. GALDONA, A. GARCÍA, A. NAVARRO, E. URDANETA & J. YANGUAS. The More Responsible, the Less Complainer: Subjective Memory Complaints, Cognitive Performance and Personality Traits in the Elderly.

Objective: It has been suggested that the study of cognition and aging might advance by introducing personality constructs when explaining age-related changes and differences in cognitive performance. Many recent studies have reported an inconsistent relationship between cognitive performance and subjective memory complaints (SMCs), whereas depression and some personality traits are consistent correlates of SMCs.

Participants and Methods: An incidental sample of 240 older adults (mean age: 73.14, SD: 7.25, range 60-100) performed an extensive neuropsychological battery. Also, personality traits (NEO-PI-R), mood (Goldberg Anxiety and Depression Scale), quality of life (COOP-WONCA Charts) and SMCs (Memory Complaint Questionnaire) were measured.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The overall sample was divided into 2 groups, regarding the presence/absence of informed SMCs. Depression (t=-2.85, p<.01) was higher in those who reported SMCs (t=-2.85, p<.01). Those without SMCs had higher scores in quality of life (t=-2.63, p<.01), extraversion (t=2.81, p<.01), openness (t=2.31, p<.05), and responsibility (t=3.05, p<.01); and showed a better immediate memory (t=2,33, p<.05) and semantic fluency (t=2.90; p<.01).
Conclusions: In our study, SMCs are related with psychological variables (quality of life, personality traits, and mood), but with few neuropsychological measures. The results are consistent with the current trends reported in other studies and highlight the importance of considering mood and personality aspects, since they can affect perception of the elderly people everyday functioning.
Correspondence: *Cristina Buiza, Graduate, Research, Fundación Instituto Gerontológico Matia-INGEMA, Camino de los Pinos, 27, Donostia-San Sebastián 20018, Spain. E-mail: cristina.buiza@ingema.es*

Dementia (Alzheimers)

C. BUIZA, M. GONZÁLEZ, I. MONTORIO & J. YANGUAS. Neuropsychological Assessment in the Severely Demented Patients with Alzheimers Disease. Validation of the Severe Cognitive Impairment Profile (SCIP) into Spanish.
Objective: There is a lack of neuropsychological assessment instruments for severe dementia in Spanish. We have translated and validated the Severe Cognitive Impairment Profile (SCIP) (Peavy, 1996), a comprehensive scale for the neuropsychological assessment in severe dementia. It is composed of 8 subscales (Behavior, Attention, Memory, Language, Conceptualization, Arithmetics, Visuospatial and Motor functioning). Offers an overall score (0-245 points) and scores for each subscale, forming a cognitive profile. It has shown very good psychometric properties in the original validation study and does not show "floor-effect" assessing severely impaired patients.
Participants and Methods: A validation study of the SCIP-Spanish version has been performed in a sample of 133 Alzheimers Disease patients, with Reisbergs GDS scores of 5 to 7.
Results: Test-retest and inter-rater reliability coefficients were obtained for the total SCIP-Score (r=.94, p<.01 and r=.99, p<.01 respectively) and for each SCIP-subscale ranging respectively: .88-1.00 (p<.01), and .72-.97 (p<.01). Internal consistency was analyzed (Cronbachs alpha=.85 for SCIP-Score, .76-.91 for the subscales).For construct validity, correlation with MEC was analyzed (r=.74, p<.01) and ANOVA analysis with multiple comparisons between groups showed differences between the 3 GDS levels (F=93.34, p<.01). The Principal Components Analysis on the 8 subscales showed a single-factor structure of the scale that explains 66.18% of the variance.
Conclusions: The Spanish validation of the SCIP has showed very good psychometric properties, indicating that is a valid and reliable test, that is able to discriminate between different severity groups. Its internal structure shows it as a very compact scale measuring a single construct.
Correspondence: *Cristina Buiza, Graduate, Research, Fundación Instituto Gerontológico Matia-INGEMA, Camino de los Pinos, 27, Donostia-San Sebastián 20018, Spain. E-mail: cristina.buiza@ingema.es*

C. BUIZA, M. GONZÁLEZ, I. MONTORIO & J. YANGUAS. Predictive Power over the Level of Severity in Advanced Alzheimers Disease of the Severe Cognitive Impairment Profile (SCIP).
Objective: To explore the predictive power of the subscales of the Spanish validation of the Severe Impairment Cognitive Profile (SCIP) (Peavy, 1996) in advanced Alzheimers Disease to differentiate between Reisbergs GDS levels 5 and 6.
Participants and Methods: The Spanish validation of the SCIP, a comprehensive scale for the neuropsychological assessment in severe dementia, composed of 8 subscales (Behavior, Attention, Memory, Language, Conceptualization, Arithmetics, Visuospatial and Motor functioning) has been used to assess a sample of 133 Alzheimers Disease patients, with Reisbergs GDS scores of 5-6.
Results: A discriminant analysis (Outcome variable: GDS; Predictor variables: each of the 8 SCIP subscales) was performed to evaluate the predictive power of each of the cognitive functions over GDS scores of 5 and 6. The analysis revealed a discriminant function that explains 47.6% of the variance, canonical R2=.69. The function significantly differentiates the GDS levels, η=.52, χ^2=76.88, p=.00. The correlations between outcomes and discriminant function revealed that the variables with higher discriminant power are: Conceptualization (r=.83), Visuospatial (r=.71), Attention (r=.69), Arithmetics (r=.66), Memory (r=.65) and Language (r=.60).
Conclusions: The cognitive dimensions measured with the 8 SCIP subscales are sensitive to differentiate between levels of general functioning in advanced Alzheimers Disease. The results support the Spanish version of the SCIP as a valid instrument to assess the cognitive functioning of people with severe dementia and its power to classify subjects into different levels of impairment.
Correspondence: *Cristina Buiza, Graduate, Research, Fundación Instituto Gerontológico Matia-INGEMA, Camino de los Pinos, 27, Donostia-San Sebastián 20018, Spain. E-mail: cristina.buiza@ingema.es*

A. BONNER-JACKSON, O. OKONKWO & G. TREMONT. Buffer Effect of Apolipoprotein χ2 on Functional Decline in Mild Cognitive Impairment and Alzheimer's Disease.
Objective: Recent work has demonstrated the potentially protective effects of the apolipoprotein (APOE) e2 allele on cognitive functioning in individuals at risk for developing Alzheimer's disease (AD). However, little is known regarding the effect of e2 genotype on rate of change in daily functioning over time. The aim of the current study was to examine the relationship between APOE genotype and change over time in ability to perform daily activities.
Participants and Methods: Participants were 225 healthy controls, 381 individuals with MCI, and 189 individuals with AD who participated in the Alzheimer's Disease Neuroimaging Initiative (ADNI) study. Participants underwent APOE testing at baseline along with neuropsychological evaluation and functional report by an informant (Functional Activities Questionnaire). Neuropsychological and informant measures were also collected at 12- and 24-month follow-up. Individuals with at least one APOE-e2 allele were included in the e2 group. Individuals without an e2 allele were included in the non-e2 group.
Results: Overall, individuals with at least one APOE-e2 allele showed less functional decline over time and better performance on neuropsychological measures than those without an e2 allele, even after controlling for education and premorbid IQ. When diagnostic groups were examined individually, presence of the e2 allele continued to be associated with slower functional decline, although the relationship was no longer statistically significant in most cases, likely due to reduced statistical power.
Conclusions: Our findings suggest that the APOE-e2 allele provides a buffer against significant changes in daily functioning over time and is associated with better neuropsychological performance across a number of measures.
Correspondence: *Aaron Bonner-Jackson, Brown University, 593 Eddy Street, Providence, RI 02903. E-mail: aaronbonnerjackson@gmail.com*

M.T. WAGNER, L.A. BRENNER & A.J. WALKER. The Sensitivity of the Clinical Diagnosis of Amnestic MCI Confirmed by CSF Biomarkers and Longitudinal Follow-up.
Objective: A recent publication with associated editorial in the Archives of Neurology demonstrated that CSF biomarkers can determine if MCI is preclinical Alzheimer disease (AD) with high certainty (Meyer, et al., 2010; Herskovits & Growdon, 2010). We sought to test the sensitivity of neuropsychological diagnosis of amnestic MCI thought to be preclinical AD.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: A subset of patients presenting with a memory disorder, in which neuropsychological examination resulted in a diagnosis of preclinical AD, underwent subsequent CSF assay to obtain tau and beta-amyloid42 biomarker signature of AD. A total of 33 patients were identified; 29 had follow-up to confirm or refute cognitive progression. All cases had standard diagnostics to rule out other explanations of cognitive loss including MRI and metabolic panel.
Results: Mean age 64.9 (SD 7.4). 29/33 cases had follow-up. 27 of the 29 cases with longitudinal follow-up had progression, whereas 25/29 (86.2%) showed progression consistent with AD. Overall CSF AD signature was positive in 24/33 (72.7%), equivocal in 8/33 (24.2%), negative in 1/33 (.03%). Of the cases with adequate follow-up, the clinical diagnosis of AD at the MCI stage was 86.2% and CSF diagnosis was 72.0%.
Conclusions: While there is ample data demonstrating that AD can be effectively diagnosed clinically in advanced stages of dementia and now in the MCI stage with CSF, this study demonstrated that the AD neuropsychological phenotype can clinically identify AD in the MCI stage with 86.2% sensitivity as compared to 72.0% by CSF diagnosis.
Correspondence: *Laurie A. Brenner, M.A., Neurology, Medical University of South Carolina, MUSC Rutledge Tower, Charleston, SC 29403. E-mail: brenner@musc.edu*

A.M. BRICKMAN, F.A. PROVENZANO, J. MURASKIN, V.A. GUZMAN, J.J. MANLY, N. SCHUPF, Y. STERN, T.R. BROWN & R. MAYEUX. Distribution of MRI-derived white matter hyperintensities in mild cognitive impairment.
Objective: Small vessel cerebrovascular disease, visualized as white matter hyperintensities (WMH) on MRI, has been linked to age-associated cognitive dysfunction, but whether it is related to Alzheimer's disease (AD) is unclear. This study examined the regional distribution of WMH among older adults with amnestic mild cognitive impairment (aMCI), who are at greatest risk for developing AD.
Participants and Methods: High-resolution MRI was acquired in 717 non-demented, older (80.0+/5.5.8) and ethnically diverse adults from upper Manhattan. Participants were evaluated medically and neuropsychologically, and classified as normal controls (n=528) and amnestic MCI (aMCI single/multiple domain; n=99), previously shown to be up to 4.3 times more likely to progress to AD than controls. Lobar (frontal, temporal, parietal, occipital) WMH volumes were quantified on FLAIR MRI scans with in-house developed software. We compared the regional distribution of WMH between the two groups with a mixed-design general linear model, controlling for large infarct and relevant demographic variables.
Results: A Group by Region interaction revealed that the aMCI group had significantly greater WMH volume in frontal and parietal lobes, but similar amounts of WMH in temporal and occipital lobes.
Conclusions: White matter hyperintensities volume is elevated in frontal and parietal lobes among those with aMCI and at greatest risk for AD. Mechanistic links between small vessel cerebrovascular disease and AD should continue to be evaluated.
Correspondence: *Adam M. Brickman, Ph.D., Taub Institute, Columbia University, 630 West 168th Street, New York, NY 10032. E-mail: amb2139@columbia.edu*

L.R. CLARK, D.M. SCHIEHSER, D.P. SALMON, D.C. DELIS & M.W. BONDI. Predicting Global Cognitive Decline in Older Adults Using Executive Function Measures.
Objective: Decline in executive function (EF) has been implicated in prodromal stages of Alzheimer's disease (AD) and may mark those destined for further cognitive decline. We sought to determine if EF predicts subsequent global cognitive decline in non-demented older adults and to identify components of EF most strongly associated with such decline.
Participants and Methods: Longitudinal study participants were characterized as decliners (n=12) if they demonstrated Reliable Change Indices of decline in Dementia Rating Scale scores over one year or non-decliners if no such decline occurred (n=56). EF was assessed one year prior to decline using the Delis-Kaplan Executive Function Scale to measure verbal fluency switching, spatial fluency switching, planning, inhibition/switching, and number-letter switching. Multivariate analysis of variance evaluated group differences on EF measures and logistic regression (LR) assessed the ability of significant EF measures to predict decline.
Results: The combined dependent variables resulted in a significant main effect for group ($p<.001$). Decliners performed worse on three measures: inhibition/switching ($p<.001$), number-letter switching ($p<.01$), and verbal fluency switching ($p<.01$). LR indicated overall model fit ($p=.002$), with inhibition/switching as the single significant contributor to the model (sensitivity=67%, specificity=79%). A second LR demonstrated that EF significantly added to the prediction of decline beyond that accounted for by episodic memory alone (overall model $p=.001$, sensitivity=64%, specificity=83%).
Conclusions: Results indicate that EF measures are useful in predicting global cognitive decline. These findings suggest subtle changes in frontal system function may occur in prodromal AD and be most evident on higher-order EF tests measuring dual-task requirements.
Correspondence: *Lindsay R. Clark, Clinical Psychology, San Diego State University/University of California, San Diego, 4573 Florida Street, Apt 3, San Diego, CA 92116. E-mail: ltermini@gmail.com*

N.C. CORONADO, H. CUNNINGHAM, A. FREEDLAND, S. COSENTINO, D. BOWERS, M. OKUN, D. PENNEY, D. LIBON & C. PRICE. Considerations for MoCA Clock: Improved Diagnostic Efficacy with Rater Training and Addition of the Copy Condition.
Objective: We compared the reliability and value of the Montreal Cognitive Assessment clock drawing subtest (MoCA; only clock drawing to command, 0 to 3 scoring critera) relative to another scoring approach (Cosentino et al., (2002) criteria; requires clock drawing to command and copy, uses error analysis).
Participants and Methods: We assessed accuracy of intra and inter-rater reliability for both methods and whether command condition alone would differentiate dementia (n=231) from normal controls (n=50), as a subgroup of cortical (Alzheimer's disease, n=73) and subcortical dementias (ischemic vascular dementia, IVD, n=25; Parkinson's disease with dementia, PDD n=18). Three novice raters scored four sets of clock drawings (40 clocks per set) for inter-rater analysis, and two sets for intra-rater. Raters then completed clocks for dementia patients and controls.
Results: MoCA inter-rater reliability was low to moderate (ICC=28-.58) despite four separate clock sets. Cosentino inter-rater was high on the first trial (ICC = .86-.92). Establishing intra-rater required two trials for the MoCA, but only one for Cosentino. Command conditions alone for both criteria were poor at classifying dementia (MoCA = 43.3%; Cosentino=56.5%) and dementia subgroups. When command and copy clocks were scored with both criteria, expected cortical-subcortical patterns emerged for two groups: There was expected command to copy improvement for AD (both $p<.001$), expected failure to improve for PDD (both $p>.50$), but differing results for IVD (MoCA, command<copy; Cosentino, command=copy).
Conclusions: We conclude that a) rater training is a necessary component for reliable MoCA clock scoring, and b) addition of the copy condition is critical for clinical utility.
Supported by: K23NS60660 (CP) and K23NS60660-2S1 (summer supplement)
Correspondence: *Nicole C. Coronado, University of Florida, 1210 SW 11th Ave APT C301, Gainesville, FL 32601. E-mail: nicole591989@ufl.edu*

S.A. COSENTINO, J. METCALFE & Y. STERN. Deconstructing Awareness Deficits in Alzheimer's Disease: Failure to attend, detect, or integrate?
Objective: Disordered awareness of memory loss is commonly seen in individuals with Alzheimer's disease (AD) and objective metamemory testing is a means of deconstructing this clinical phenomenon (Cosentino et al., 2007). The goal of the current study was to examine the specific metacognitive errors which contribute to awareness deficits in AD.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: 19 individuals with mild AD received clinical ratings of awareness, and completed a comprehensive battery of objective metamemory and neuropsychological tests. Three metamemory test conditions were administered to determine if awareness deficits reflect a fundamental failure to attend to memory performance, detect memory failures, or integrate feedback about memory failures.
Results: 47% of participants (n = 9) were clinically rated as unaware of their memory loss. Consistent with our previous results, despite comparable global cognition (F = .33, p = .58), the unaware group achieved lower metamemory scores [mean(SD) = -.37(.56)] than individuals clinically rated as aware [mean(SD) = .76(.16); F = 30.52, p < .01]. Moreover, simply directing attention to memory performance in the unaware group improved metamemory predictions [mean(SD) = .37(.67)] to the same extent as allowing retrospective evaluation of memory performance [mean(SD) = .17(76)], or explicitly providing feedback about memory performance [mean(SD) = .30(53)].
Conclusions: Metamemory testing captures clinical variability in self-awareness in AD, and suggests that a primary failure to attend to one's performance (i.e., engage in systematic self-evaluation) may contribute to this variability. Improved understanding of the deficits which constitute disordered awareness will assist healthcare professionals and caregivers, and may ultimately facilitate enhanced self-awareness in individuals with AD.
Correspondence: *Stephanie A. Cosentino, Ph.D., Sergievsky Center, Columbia University Medical Center, 630 West 168th Street, P&S Mailbox 16, New York, NY 10032. E-mail: sc2460@columbia.edu*

J.D. DAVIS, G.D. PAPANDONATOS, M.A. LINDSAY, S.L. KNOTT, E.K. FESTA, W.C. HEINDEL, P.P. BARCO & B.R. OTT. Road Test and Naturalistic Driving Behavior in Older Adults with and without Memory Loss: Environment Matters.
Objective: The road test is the gold standard for determining driving safety, but it is unclear how the road test relates to home driving skills. The study objective was to relate the road test procedure to naturalistic driving in healthy older adults and in patients with mild memory loss.
Participants and Methods: Thirty-eight healthy older adults and 42 patients with very mild dementia completed an on-road driving test and two weeks of naturalistic, home driving assessment. Home driving was video taped and reviewed by a professional driving instructor. Driving ability on the road test and in the naturalistic setting was rated on error severity and a global rating of pass, marginal, or fail.
Results: Patients were more likely to receive a pass without restrictions in their home environment compared to the road test, but more errors were detected in the home environment. Error scores between settings were only modestly correlated (Spearman's =.39, p<.001). Factor analyses of the on-road and naturalistic assessment indicated that the core driving skills necessary for safe performance may differ across driving environments.
Conclusions: Patients with very mild dementia performed better in their home setting than during an on-road test. On-road testing was related to home driving, but different behaviors may be required for adequate performance in each setting. Development of road tests that maximize the driving skills required in the home setting may improve the ecological validity of the road test in older drivers.
Correspondence: *Jennifer D. Davis, Ph.D., Psychiatry, Rhode Island Hospital/Brown Medical School, 593 Eddy Street, Providence, RI 02806. E-mail: jdavis3@lifespan.org*

M. ENNOK, K. EPLER & ÜLLA. LINNAMÄGI. What are Intrusions Made Of?
Objective: Intrusions – recall of not presented items in a memory test has been considered a clinical marker for Alzheimer's disease (AD). However, intrusion errors are present also in other neurological disorders and they are observed even in normal controls. The aim of this study is to examine the qualitative features of intrusion errors in AD patients and control subjects.
Participants and Methods: Participants were 26 AD patients (MMSE 25-18) and 20 demographically matched healthy controls (MMSE >26). All subjects were administered the Auditory Verbal Learning Test. Erroneously recalled words that were not presented in the target list were scored as semantic, phonemic, unrelated, recurring or other intrusions. Words recalled from the wrong list were scored separately as contamination errors.
Results: Although the proportions of subjects making intrusion errors in both groups were comparable, the number of intrusions was higher in AD group. Most of the produced intrusions were of the unrelated type (without any obvious semantic of acoustic similarity to the list words). AD patients also tended to produce more recurring intrusions (repetition of the same error on a subsequent trial). Phonemic intrusions were rare but they were observed only in AD patients.
Conclusions: In our small sample study intrusions ocurred in both AD patients and controls. However the pattern of mistakes was somewhat different. Most of the intrusions were of the unrelated type ("wild guesses") but AD patients showed a tendency to repeat their errors that hint to a difficulty in modifying their response set. Patients also produced phonemic intrusions that indicate poor encoding and reliance to the extraneous features in memorizing.
Correspondence: *Margus Ennok, MSc, Department of Neurology and Neurosurgery, University of Tartu, L. Puusepa 8, Tartu 51014, Estonia. E-mail: margus.ennok@ut.ee*

S.M. FLANNERY, R.G. DEASON, E.T. CREHAN, B.A. ALLY & A.E. BUDSON. Impaired Response Shift: Using Interruptions and Event-related Potentials to Study Liberal Response Bias in Alzheimer's Disease.
Objective: Patients with Alzheimer's disease (AD) have a greater tendency to respond "old" to unstudied items, leading to a liberal response bias. One hypothesis is that this liberal response bias may be due in part to the inability to monitor responses or implement necessary criterion changes. In a prior study, we manipulated the percentage of old items to appear during the test phase (either 30%, 50%, or 70%). Both young adults and healthy older controls appropriately shifted their response bias to accommodate their expectation of 50% old words in the 30% and 70% conditions, but patients with AD did not. In a new series of experiments using the same 30%, 50%, or 70% portion of old items, we modified the original experiment in two ways in order to determine what might help AD patients shift their response bias appropriately.
Participants and Methods: . In the first experiment we are examining whether the impaired awareness of AD patients' response patterns is in part responsible for their liberal response bias. During two interruptions, we ask the participant the number of old and new items that they have seen. AD patients may lack awareness of their response patterns and, indeed, the pilot data shows that the guesses by participants are almost at chance. We also are using event-related potentials (ERPs) to determine the neural correlates of shifting response bias.
Results: Running of pilot participants is in progress. Early results show in the interruption experiment that guesses on amount of old/new items are almost at chance. Early pilot ERP data will be available for the INS meeting.
Conclusions: Together, these two ways of monitoring the process in ADs will provide different ways of revealing why AD patients are unable to appropriately adjust response.
Correspondence: *Sean M. Flannery, B.A., Center for Translational Cognitive Neuroscience, 173 H Street, Apartment 1, South Boston, MA 02127. E-mail: sflann@bu.edu*

L.R. KAPLAN, J. LY, O.M. NIKELSHPUR & N.S. FOLDI. The Relationship of Daily Function to Attention and Global Cognition in Alzheimer Disease (AD).
Objective: Complex instrumental activities of daily living (IADL) and basic activities of daily living (BADL) are typically impaired in Alzheimer disease (AD). It is unclear how attention versus global cognitive impairments influence functional decline. We hypothesized that performance on attention would predict functional impairment, but be more sensitive to IADL change.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Twenty-seven newly-diagnosed participants with AD were assessed on (1) global cognition: Mattis Dementia Rating Scale; (2) attention: a) RT on simple detection, b) covert orienting, c) speed and errors on executive attention, DKEFS-Trails Condition-4; (3) caregiver ratings of IADL/BADL: Modified Lawton-Brody.
Results: Forty eight percent of the participants had only IADL impairment, while remaining participants had both IADL and BADL deficits. There were no differences in demographic or cognitive status between those with and without BADL deficits. Linear regression revealed that while there was a unique contribution of errors on Trails-condition 4 to IADL, $p > .05$, accounting for 24 % of the variability, global cognition contributed heavily to BADL, $p > .05$, accounting for 45% of the variability.
Conclusions: IADL impairments are primary functional deficits in early AD, and as hypothesized, a measure of executive attention best predicted the variable daily demands of IADL. In contrast, BADL was best predicted by a global cognitive measure. As global cognitive scores did not predict the more variable IADL impairment, these findings suggest that measures of higher executive attention are more sensitive to IADL, and may better inform clinicians and caregivers of potential daily task difficulty for patients with early AD.
Correspondence: *Nancy S. Foldi, Ph.D., Department of Psychology, Queens College - CUNY, 65-30 Kissena Blvd., NSB E318, Flushing, NY 11367. E-mail: nancy.foldi@qc.cuny.edu*

L.L. FRAKEY, S. SALLOWAY, M. BUELOW & P. MALLOY. A Double-Blind Study of Modafinil for the Treatment of Apathy in Individuals with Alzheimer's Disease.
Objective: This study examined the effects of modafinil on apathetic symptomatology, performance of activities of daily living (ADLs), and caregiver burden in individuals with Alzheimer's disease (AD).
Participants and Methods: 23 participants with a diagnosis of mild or moderate probable AD and clinically elevated symptoms of apathy were urn randomized into the Experimental (modafinil 200 mg daily) or Control (placebo) groups. All participants were also receiving stable doses of a cholinesterase inhibitor medication (CHI). Participants completed assessments at baseline and after 8 weeks of treatment. Outcome measures included the Frontal Systems Behavior Scale (FrSBe)- Family Report, the Lawton and Brody Activities of Daily Living Scale (ADLQ), the Direct Assessment of Functional Status (DAFS), and the Zarit Burden Interview.
Results: Both the Experimental and Control groups showed reductions in apathy on the FrSBe between baseline and final assessments and there was no significant additional reduction in apathy with modafinil. Groups did not show significant changes in ADL performance (ADLQ and DAFS) over time. Finally, marginally significant correlations were observed between reductions in apathy and decreased caregiver burden.
Conclusions: The addition of modafinil to the standard of care treatment (CHI) did not result in significant additional reductions in apathy or improvements in ADL functioning. The reduction in reported apathy observed in both groups between baseline and final assessments was likely due to placebo effect. However, reductions in perceived apathetic symptomatology were correlated with reductions in reported caregiver distress and burden.
Correspondence: *Laura L. Frakey, Ph.D., Memorial Hospital of Rhode Island, 111 Brewster St, Pawtucket, RI 02860. E-mail: lfrakey@gmail.com*

E. FRANCHOW, Y. SUCHY, K. KUSS, M. KRAYBILL & P. WILLIAMS. Beyond Education: Personality and Social Contributions to Cognitive Reserve.
Objective: Cognitive reserve (CR), typically operationalized as semantic knowledge (Stern 2002), is a well-known protective factor against clinically-evident declines associated with neurodegenerative disorders such as Alzeheimer's disease. Higher education is among the most well-known contributors to CR (Garibotto, Borroni et al. 2008), but recent research also suggests that CR is strengthened by a variety of lifestyle factors, including social stimulation (Barnett and Sahakian 2010). The current study investigates the differential contribution of education, personality, and social factors to CR among community-dwelling older adults.
Participants and Methods: 73 healthy adults aged 60 and older (62% female) completed the Information subtest of the WAIS III (Wechsler, 1997) as an estimate of CR and the Openness scale from the NEO Personality Inventory Revised (NEO PI-R) (Costa and McCrae, 1995). Additionally, participants provided information on the number of social contacts in a typical week.
Results: A series of hierarchical regressions with Information raw scores as the criterion variable and years of education, number of personal contacts per week, and Openness as predictors showed that whereas education accounted for a significant amount of variance [R squared = .275, $F(1,71)=26.941$, $p<.001$], Openness accounted for an additional 4.2% of variance above and beyond education [Fchange $(1,70)=4.23$, $p=.042$], and number of contacts per week contributed an additional 5.7% of variance beyond the other variables [Fchange $(1,69)=6.25$, $p=.015$].
Conclusions: These results lend support to emerging evidence that social and personality factors, along with educational background, contribute to cognitive abilities that may delay the behavioral expression of dementia.
Correspondence: *Emilie Franchow, BS, Psychology, University of Utah, 2168 Wyoming Street, Salt Lake City, UT 84109. E-mail: emilie.franchow@psych.utah.edu*

A.L. STEFANATOS, J.M. MINGER, C. SETER, A.S. LIBON, D.J. LIBON & T. GIOVANNETTI. Script Knowledge in Dementia: Comparison between Dementia Subtypes and Relations to Everyday Task Performance.
Objective: Degraded task knowledge has been proposed as a cause for omissions (e.g., failure to execute step) in everyday tasks; this assertion has not been rigorously tested. We assessed task knowledge with a script test in participants with Parkinson's disease (PD; n = 20), PD dementia (PDD; n = 18) and Alzheimer's disease (AD; n = 14). We hypothesized that 1) participants with AD would demonstrate worse script performance 2) script performance would be related to omissions but not commissions (e.g., inaccurate step execution) on a performance-based everyday action test.
Participants and Methods: The script task required participants to generate the steps necessary to perform 5 everyday tasks (e.g., toast). Output was coded for total words and steps, crux steps, non-crux steps, off-task steps, and perseverative steps. Performance of the same 5 tasks was evaluated using the Naturalistic Action Test; omission and commission errors were coded.
Results: Inter-rater reliability for script scoring was strong (Cohen's kappa=.92). PD participants generated significantly more words than the AD group [$F(2, 48)=3.77$, $p=.03$] and significantly more total steps and crux steps than both dementia groups[$F(2, 48)>14.41$, $p<.01$ for both]. The PD group generated more non-crux steps than the AD group [$F(2, 48)=2.91$, $p=.06$]. The three groups did not differ in off-task steps, but the PDD group showed a non-significant trend for more perseverative steps (M PDD=1.0, M PD=.72, M AD=.43). Performance-based errors of omission were related to crux ($r=.54$, $p=.01$) and non-crux steps ($r=.39$, $p=.03$). Correlations between commissions and script variables were nonsignificant ($r's < .19$).
Conclusions: AD participants were not uniformly more impaired in script generation. While AD patients demonstrated terse script knowledge, PDD patients committed more perseverative steps. As predicted, degraded script knowledge was associated with a failure to execute steps in everyday tasks.
Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

H. GROSSMAN, D. LIBON, R. NAGELE, L. MATZEL, P. GROSSMAN & P. CLIFFORD. The Effects of Blood-Brain Barrier Breach on Amyloid Deposition and Cognitive Function: A Vascular Model for Intraneuronal Amyloid Deposition in Alzheimer's Disease.

Objective: Mounting evidence in humans suggests a critical role for intraneuronal accumulation of A≥ peptide in AD pathology. The A≥ peptide is a naturally occurring phenomenon in human serum. Given the well-documented link between vascular disease and AD, and the demonstrated prevalence of blood-brain barrier (BBB) dysfunction, the blood may serve as a source of the A≥ peptides that accumulate in neurons in the AD brain. Using mice the present study sought to test the hypothesis that a BBB breach would result in intraneuronal amyloid accumulation with concomitant impairment on measures of memory and executive control.

Participants and Methods: 12 mice were subjected to chronic application of pertussis toxin (PT) followed by soluble A≥42 into the venous blood to test whether disruption of the BBB results in intraneuronal amyloid accumulation and cognitive impairment. Control groups treated solely by PT (n=12) or A≥42 (n=8) were also evaluated, as well as a vehicle control (n=10). All animals were evaluated with experimental paradigms assessing memory and executive control.

Results: The PT/A≥42 group demonstrated BBB perturbation and intraneuronal amyloid with associated AD-like pathological features. Between-group analyses of cognitive performance found that this group exhibited greater impairment on measures assessing acquisition of novel information than controls ($p < .05$); greater impairment in the long-term retention of newly acquired information ($p < .01$); and increased susceptibility to interference on paradigms assessing selective attention ($p < .01$).

Conclusions: These data suggest that a breach in the BBB, i.e., a vascular route to amyloid, may be a mechanism resulting in intraneuronal accumulation of amyloid observed in AD.

Correspondence: *Henya Grossman, M.S., Psychology, Rutgers University, 152 Frelinghuysen Rd, Piscataway, NJ 08854. E-mail: hennja@hotmail.com*

W.N. HAVINS, K.A. AGBAYANI, P.J. MASSMAN & R.S. DOODY. Cognitive Reserve as a Moderator for the Relationship between Depression and Cognitive Functioning in Alzheimer's Disease.

Objective: Depression in Alzheimer's disease (AD) has been shown to negatively impact cognition in domains that include attention and concentration, motor speed, and timed visuospatial skills. It was hypothesized that cognitive reserve would moderate this relationship between depressive symptomatology and cognitive functioning.

Participants and Methods: Archival data was obtained from the Baylor College of Medicine Alzheimer's Disease and Memory Disorders Center in Houston, Texas. Subjects were 1,141 patients with a diagnosis of probable AD. Patients were administered a full neuropsychological battery for dementia that included measures of global cognitive functioning, attention and concentration, verbal fluency, memory, and confrontational naming at their most recent annual evaluation.

Results: An ordinary least squares regression model was used to predict performance on neuropsychological tests from Geriatric Depression Scale (GDS) scores and AMNART estimated IQ scores. AMNART was a statistically significant predictor of performance on all neuropsychological measures tested ($p < .001$). However, it only significantly moderated the impact of GDS scores on Visual Search and Attention Test (VSAT) time (R-squared = .17, $p < .05$) and Alzheimer's Disease Assessment Scale (ADAS) scores (R-squared = .14, $p = .05$). Although they were not substantially different, the correlation between GDS scores and ADAS scores was stronger in patients with low cognitive reserve ($r = -.075$) than high cognitive reserve ($r = .034$). The correlations between GDS and VSAT time showed the opposite pattern for patients with low and high cognitive reserve, ($r = .00029$, $r = .120$, respectively).

Conclusions: These results demonstrate that the relationship between depression and impaired cognition in AD is not absolute; it may be positively or negatively impacted by an individual's cognitive reserve. Findings contribute to an understanding of the link between depression and dementia and the role of cognitive reserve in AD.

Correspondence: *Whitney Havins, B.A., University of Houston, 2308 Watson, Houston, TX 77009. E-mail: whavins615@gmail.com*

W.N. HAVINS, L. HARIK, P.J. MASSMAN & R.S. DOODY. Differential Recall of Nouns and Verbs in Patients with probable Alzheimer's Disease.

Objective: Although research has demonstrated the impact of Alzheimer's disease (AD) on confrontational naming and immediate recall, little research has explored whether AD-related language decline differentially affects immediate recall of nouns and verbs. It was hypothesized that: 1) performance on the Boston Naming Test (BNT) would correlate with noun recall on the Logical Memory (LM) subtest of the Wechsler Memory Scale, 2) the proportion of nouns and verbs recalled would be higher in mild AD patients than in moderate AD patients, and 3) AD severity would have a differential impact on noun and verb recall.

Participants and Methods: Archival data for 1,030 patients from the Baylor College of Medicine Alzheimer's Disease and Memory Disorders Center were analyzed. Inclusion criteria were a diagnosis of probable AD and an MMSE score greater than 10 at patients' most recent annual evaluation. LM immediate recall scores were transformed into both totals and proportions of nouns and verbs recalled.

Results: Mild AD patients demonstrated significantly higher total and proportional recall than moderate AD patients. All patients recalled a significantly higher proportion of verbs than nouns. However, the same analyses on noun and verb totals revealed that all patients recalled more nouns than verbs. A mixed-model ANOVA predicting proportion of words recalled from disease severity and word type was statistically significant (R-squared=.31, $p < .0001$). The same model showed significant main effects for severity and word type, as well as an interaction effect ($p < .0001$). The results with noun and verb totals were nearly identical. Lastly, scores on the BNT were not significantly correlated with either totals or proportions of nouns and verbs recalled in either group.

Conclusions: These data suggest that the progression of AD exerts its effects unequally on noun and verb recall. Additionally, the fact that BNT scores and noun recall were not correlated suggests that memory impairment in AD dramatically interferes with word recall.

Correspondence: *Whitney Havins, B.A., University of Houston, 2308 Watson, Houston, TX 77009. E-mail: whavins615@gmail.com*

H. IMBEAULT, N. BIER, L. GAGNON, H. PIGOT, S. GIROUX, N. MARCOTTE & T. FÜLÖP. Electronic Organizer for Persons with Alzheimer's Disease: First Demonstration of Independent Use of the AP@LZ.

Objective: To help people with Alzheimer's disease (AD) in their daily lives, we modified an electronic organizer. The AP@LZ was developed on a cell phone with five functionalities: 1) Appointments, 2) Personal, 3) Medical, 4) Contacts, and 5) Notepad. Although the organizer's interface was simplified, learning to use it still presents a challenge for persons with AD (remembering when, why and how to use it). Hypothesis: Early AD patients can learn to use the AP@LZ using their preserved capacities and specific learning methods.

Participants and Methods: M.P., 70 years old, in the early stages of AD. Learning was based on the Sohlberg and Mateer (1989) method, combined with errorless learning: 1) acquisition, 2) application, and 3) adaptation. During learning tests, emphasis was placed on motor responses.

Results: M.P. gradually improved his results through the different phases: acquisition, sessions 1 to 8: 33-94%; application, sessions 9 to 13: 86-93%; and adaptation, sessions 14 to 19: 100%. He has now been using the AP@LZ in his daily life for over 2 months. He no longer checks his calendar but prefers to use his organizer, which is always to hand. He says he can manage his appointments and activities better. He can also make and receive phone calls with the AP@LZ.

Conclusions: As shown with a traditional (paper-and-pencil) organizer in persons with AD (Rouleau et al., 2006; Lefèbvre et al.,

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

2006), the method of Sohlberg and Mateer combined with errorless learning proved effective with the AP@LZ. M.P. was able to use his preserved memory processes to acquire the knowledge needed to use an electronic organizer independently in his daily life. The next step in this study is to test the AP@LZ with persons at more advanced stages of AD.

Correspondence: *Hélène Imbeault, Dr, Centre de rechercher sur le vieillissement-CSSS/IUGS, 1036 rue Belvédère Sud, Sherbrooke, QC J1H 4C4, Canada. E-mail: helene.imbeault@Usherbrooke.ca*

A. JOUK & H. TUOKKO. A Reduced Scoring System for the Clock-Drawing Test Using a Population-Based Sample.

Objective: The Clock-Drawing Test (CDT) is a commonly used neuropsychological screening tool for dementia. However, researchers and clinicians have yet to reach a consensus on which scoring system to use. This project examined whether or not a recent procedure (developed by Lessig and her colleagues in 2008) which identified six critical errors needed for dementia detection in a clinic-based sample would produce similar results in a Canadian population-based sample.

Participants and Methods: Clock-drawings from 356 participants (80 with dementia, 276 healthy controls) from the Canadian Study on Health and Aging were analyzed using logistic regression and Receiver Operating Characteristic curves to reduce the CDT's scoring system to the fewest critical errors needed for dementia detection. The calculated sensitivity and specificity of this new scoring system was then compared to other commonly used scoring system available today.

Results: The new scoring system reduced the Lessig system down even further to include five critical errors: missing numbers, repeated numbers, number orientation, extra marks, and number distance, and produced a sensitivity of 81% and a specificity of 68%.

Conclusions: The results from this study improve our current state of knowledge concerning the CDT by validating the simplified scoring system proposed by Lessig and her colleagues among a more representative sample and broaden its use for a general clinician working with a wide-ranging population. This project provides further evidence in support of a simple and reliable dementia-screening tool.

Correspondence: *Alexandra Jouk, University of Victoria, #212-1050 Richardson St, Victoria, BC V8V 3C5, Canada. E-mail: ajouk@uvic.ca*

R.P. KESSELS, A. VAN DOORMAAL & G. JANZEN. Landmark Recognition in Alzheimer's Dementia: Spared Implicit Memory for Objects Relevant for Navigation.

Objective: In spatial navigation, landmark recognition is crucial. Specifically, memory for objects placed at decision points on a route is relevant. Previous fMRI research in healthy adults showed higher medial-temporal lobe (MTL) activation for objects placed at decision points compared to non-decision points, even at an implicit level. Since there is evidence that implicit learning is intact in amnesic patients, the current study examined memory for objects relevant for navigation in patients with Alzheimer dementia (AD).

Participants and Methods: 21 AD patients participated with MTL atrophy assessed on MRI (mean MMSE=21.2, SD=4.0), as well as 20 age- and education-matched non-demented controls. All participants watched a 4-min video showing a route through a virtual museum with 20 objects placed at intersections (decision points) and 20 at simple turns (non-decision points). The instruction was to pay attention to the toys (half of the objects) for which they were supposedly tested later. Subsequently, a recognition test followed with the 40 previously presented objects among 40 distracter items (both toys and non-toys).

Results: Results showed a higher accuracy for non-toys placed at decision points compared to non-decision points, both for the controls ($t(19)=1.7$, $p<0.05$) and the AD patients ($t(20)=4.5$, $p<0.0005$). No landmark effect was found for the toy objects (controls: $t(19)=1.0$, AD: $t(20)=0.3$).

Conclusions: Our findings indicate that AD patients with MTL damage have implicit memory for object information relevant for navigation. No decision point effect was found for the attended items. Possibly, focusing attention on the items occurred at the cost of the context information in AD, whereas the controls performed at an optimal level due to intact memory function.

Correspondence: *Roy P. Kessels, PhD, Department of Medical Psychology, Radboud University Nijmegen Medical Centre, PO Box 9101, Nijmegen 6500 HB, Netherlands. E-mail: r.kessels@mps.umcn.nl*

A.K. LAMARRE, P. POORZAND, S.N. GROSSMAN, J. JANG, M. GROWDON, M. SOLLBERGER, B.L. MILLER & K.P. RANKIN. Dissociable Patterns of Personality Change Emerge Over the Course of Neurodegenerative Disease.

Objective: Though neuropsychiatric inventories are typically used to measure symptoms like anxiety and depression in neurodegenerative disease patients, personality measures of neuroticism may provide a more fine grained characterization. Furthermore, these symptoms appear to wax and wane with disease progression, but are not typically quantified longitudinally across disease stages. Using the Neuroticism factor of the Big Five personality model, we examined anxiety, angry hostility, depression, and self-consciousness at different disease stages both within and between neurodegenerative diseases.

Participants and Methods: Informants completed the NEO-PI-3 and Clinical Dementia Rating (CDR) Scale describing 136 subjects' current and pre-morbid personality at 1-2 annual timepoints, totalling 237 questionnaires (Behavioral variant frontotemporal degeneration [bvFTD; n=39]; typical Alzheime.r's disease [AD; n=34], atypical/mixed AD [AD-Mix; n=20], older normal controls [NC; n=43]).

Results: Random coefficients modelling estimated neuroticism facets at three early stages (pre-morbid; CDR=0.5, very mild; CDR=1.0, mild). Anxiety and Depression scores increased significantly from pre-morbid levels in all patient groups. At CDR=1.0, ADMix exhibited significantly higher levels of Anxiety and Depression than bvFTDs, and their scores were clinically abnormal (>1.5 SD above mean). In a double dissociation, only bvFTDs exhibited significantly increased angry hostility scores, whereas only AD and ADMix displayed significantly elevated self-consciousness scores.

Conclusions: Significant, new-onset increases in neuroticism typically occur early in the major neurodegenerative diseases. However, only by examining specific neuroticism facets at different stages of disease did divergent patterns of progression become apparent across patient groups. It is possible that personality measures may be more precise and sensitive markers for staging behavior symptoms than traditional neuropsychiatric assessments.

Correspondence: *Amanda K. LaMarre, PhD, Neurology, University of California, San Francisco, 350 Parnassus Avenue, Suite 905, San Francisco, CA 94143-1207. E-mail: alamarre@memory.ucsf.edu*

S. LANTING, M.E. O'CONNELL, M. CROSSLEY & D. MORGAN. Examining the Utility of the Repeatable Battery for the Assessment of Neuropsychological Status Effort Index (RBANS-EI) in a Heterogeneous Dementia Sample: Does Memory Matter?

Objective: Silverberg et al. (2007) developed an internal validity indicator for the RBANS (RBANS-EI) and validated this measure on a heterogenous sample of cognitively impaired patients and then in mild TBI. Recent research with cognitively impaired medically ill older adults indicates that the cutoffs generated in the initial validation studies may not be useful with this population (Hook et al., 2009). This study examines the utility of the RBANS-EI in older adults diagnosed with dementia in an interdisciplinary Memory Clinic.

Participants and Methods: 110 clinically referred, non-litigating, older adults completed the RBANS as part of a standardized battery. The mean age of the sample was 74.9 and 65% were female. The mean scores for screening measures were below cut-off (3MS=70.2; MMSE=22.5). The EI was calculated by converting the raw scores for Digit San and List Recognition subtests to weighted scores based on Silverberg et al. (2007) and then summing the two weighted scores to generate the EI.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Almost half (47.3%) of our sample was classified as having a suspicious RBANS-EI despite all participants performing above chance on a forced choice test (Grasshoppers and Geese semantic associations test in development; Lanting et al., 2007). Associations between EI and RBANS index scores unrelated to Digit Span or List Recognition demonstrated that immediate memory was a significant predictor, accounting for 39% of the variance in the EI.
Conclusions: With the current RBANS EI cut-score guidelines, almost half of our sample was classified as putting forth insufficient effort. Memory performance was significantly correlated with suspect effort scores, suggesting that the current cut scores may yield increased false positives in a dementia sample due to memory impairment.
Correspondence: *Shawnda Lanting, University of Saskatchewan, 9 Campus Drive, Saskatoon, SK S7N 5A5, Canada. E-mail: shawnda.lanting@usask.ca*

A. LARCO, C.M. FLORES, B. MILOYAN, C.M. FUNES & J. RAZANI. Using the California Verbal Learning Test as a Predictor of AD Patient's Functional Ability.
Objective: Alzheimer's Disease (AD) is characterized by memory problems and daily functional impairments. Tests of memory, such as the California Verbal Learning Test (CVLT), have demonstrated great ability for diagnoses of AD and other types of dementia. The purpose of this study was to understand how well CVLT-II Short Form (CVLT-II SF) outcome scores correlate with and predict AD patients' functional abilities.
Participants and Methods: 46 patients in the mild stages of AD were recruited. The CVLT-II SF and the Direct Assessment of Functional Status test (DAFS) were administered to all patients. The CVLT-II SF is a 9-item list learning memory test in which participants are provided with 4 learning trials. They are then required to recall the list after a brief (30-sec) delay and again after a long (10-minute) delay. Participants are also provided with cues (the category of a particular item) and a recognition (yes/no) paradigm to assist with item retrieval. The DAFS is a performance-based task that assesses 5 areas of functioning: orientation to person, place and time, communication skills, ability to identify driving signs and rules (referred to as "Transportation"), financial skills, and shopping ability. Bivariate correlation analyses revealed strong relationships between CVLT free delay, CVLT cued recall, and CVLT total learning and all 5 areas of DAFS.
Results: Results show that CVLT total is the best predictor of poor functioning in all 5 areas of DAFS (orientation, communication, transportation, financial skills, shopping ability), followed by CVLT free delay (orientation, communication, transportation, shopping ability), and CVLT cued recall (orientation, communication, financial skills, shopping ability).
Conclusions: CVLT has been shown to be a useful instrument for assessing aspects of memory. This study demonstrates that specific outcome scores could also assist with predicting functional abilities in AD patients.
Correspondence: *Andrea Larco, California State University, Northridge, 10065 De Soto Ave #304, Chatsworth, CA 91311. E-mail: andrea.larco.48@my.csun.edu*

D.A. LOWE & S.A. ROGERS. Mood, Personality, and Family History of Dementia in Older Adults.
Objective: Family history of dementia is a risk factor for cognitive impairment, but little research has considered the potential impact on non-cognitive variables. This study examines differences in mood and personality between older adults either with or without a family history of dementia.
Participants and Methods: One hundred sixty older adults (M age = 79.33, SD = 10.40) completed a neuropsychological battery, including the MMSE, Geriatric Depression Scale (GDS), and Beck Anxiety Inventory (BAI), which measured gross cognitive functioning, state depression, and state anxiety, respectively. The NEO-FFI was administered to assess five factors of personality: neuroticism, extroversion, openness, agreeableness, and conscientiousness. Fifty-five participants reported a family history of dementia and 105 indicated no such history.
Results: ANCOVAs controlling for age, education, and MMSE indicated that those with a family history of dementia had significantly higher BAI and NEO-FFI Neuroticism scores than those with no family history, ps < .01, with a trend in the same direction for GDS, p = .06. Those with a family history of dementia were more likely to endorse select somatic symptoms of anxiety on the BAI, ps < .04.
Conclusions: A family history of dementia seems to be associated with increased levels of anxiety, neuroticism, and depression, even after partialling out the effects of age, education, and gross cognitive functioning. The particular symptoms of anxiety among those with a family history seem to be more somatic in nature, such as numbness, difficulty relaxing, and a racing heartbeat. A family history of dementia, then, may be a risk factor not just for cognitive impairment but also for anxiety, neuroticism, and depression.
Correspondence: *Deborah A. Lowe, Department of Psychology, Westmont College, 955 La Paz Road, Santa Barbara, CA 93108. E-mail: deborah.a.lowe@gmail.com*

P. MASSMAN, C. BURROWS, J. HALL & R. DOODY. Cortisol Levels in Alzheimer's Patients are Related to Premorbid Functioning and Rate of Progression.
Objective: Chronic activation of the HPA axis and the resultant high cortisol levels can lead to damage to the hippocampus and perhaps other brain regions; and to memory and cognitive dysfunction. We investigated if AD patients with higher cortisol levels would have lower estimated premorbid intellectual ability and a more rapid rate of cognitive decline.
Participants and Methods: Data were gathered from 181 patients with a diagnosis of probable AD (mean age=77.4, mean years of education=14.0, mean MMSE=19.2) who were enrolled in the Texas Alzheimer's Research Consortium (TARC). Serum cortisol was measured using multiplexed immunoassay human Multi-Analyte Profile. APOE genotype was also determined. Estimated level of premorbid verbal intellectual ability was assessed using the AMNART formula. Physicians systematically gathered information from caregivers regarding duration of patients' symptoms, and an estimated rate of MMSE decline prior to the initial visit was calculated: (30 - MMSE score)/duration.
Results: Serum cortisol levels were correlated significantly with both AMNART IQ scores (r=-0.31, p<.001) and with estimated rate of MMSE decline prior to the initial visit (r=0.21, p<.01). This latter relationship was moderated by APOE status: in patients with no e4 alleles, the correlation was 0.37 (p<.001); and in patients with 1 or 2 e4 alleles, it was 0.09 (p>.35).
Conclusions: AD patients with higher cortisol levels had lower AMNART IQ scores, suggesting that patients with lower premorbid ability may have less success in coping with stress. In addition, non-e4 carriers with higher cortisol levels exhibited a faster rate of cognitive decline, suggesting that cortisol levels may partly contribute to progression in these patients, at least early in the disease.
Correspondence: *Paul Massman, Ph.D., Psychology, University of Houston, Dept. of Psychology, Heyne 126, Univ. of Houston, Houston, TX 77204-5022. E-mail: pmassman@uh.edu*

L.D. MEDINA, Y. RODRIGUEZ-AGUDELO, D. GESCHWIND, P. GILBERT, J.L. CUMMINGS & J.M. RINGMAN. Familial Alzheimer's Disease and Propositional Density: The Nun Study Revisited.
Objective: The Nun Study identified a connection between literacy in early life and memory decline in late life. Specifically, lower propositional density (p-density) in young adulthood was associated with poorer cognitive function and Alzheimer's disease (AD) decades later. Persons at risk for autosomal dominant and fully penetrant mutations causing early onset familial AD (FAD) provide a unique opportunity to study the earliest changes related to AD, including the predictive nature of early life literacy.
Participants and Methods: Thirty five non-clinical persons at risk for FAD were asked to write brief biographical sketches from which p-density (the ratio of unique ideas to words in the text) was calculated. Regression analysis was used to examine the relationship among p-density, FAD mutation status, and apolipoprotein E (APOE) genotype.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Mutation status did not account for a significant amount of variance in p-density (t = -1.115, p>0.05). However, the presence of the APOE E4 allele was significantly associated with p-density (t = -2.989, p=.004) and accounted for nearly 23% of variance in the outcome variable (R2 = 0.228, ≥ = -0.06 ±0.019) with APOE E4 carriers having lower p-density.
Conclusions: Although no statistical differences existed in p-density between FAD mutation carriers and non-carriers, individuals who were APOE E4 positive had significantly lower p-density scores than those who were APOE E4 negative. While pathogenic autosomal dominant AD-causing mutations may not be related to linguistic abilities in early life, the association between decreased p-density and AD risk may be mediated by the presence of the APOE E4 allele.
Correspondence: *Luis D. Medina, BA, Clinical Psychology, SDSU/UCSD Joint Doctoral Program in Clinical Psychology, 6475 Alvarado Road, Suite 104, San Diego, CA 92120. E-mail: medinal@rohan.sdsu.edu*

B. MILOYAN, C. LATAILLADE, C. FLORES, A. LARCO & J. RAZANI. Attention and Executive Functioning Predict Financial Ability in Alzheimer's Disease.
Objective: Recent studies have shown that measures of attention and executive functioning are useful in predicting Activities of Daily Living (ADLs; Razani, et al., 2007; Farias, et al., 2003). Financial skills have been associated with measures of attention and executive functioning in patients with late life depression (Mackin & Arean, 2009). However, not much is known about how measures of attention and executive functioning relate to specific components of financial capacity in patients with Alzheimer's Disease (AD).
Participants and Methods: A sample of 46 patients participated and were administered a neuropsychological test battery that included the Wisconsin Card Sorting Test (WCST), Digit Span, Trail Making Test Part B (TMT-B), Stroop Test Interference (ST-I), FAS, and D-KEFS Tower Test, as well as the Direct Assessment of Functional Status (DAFS), which assessed participants' financial abilities; such as (a) identifying currency, (b) counting currency, (c) writing a check, and (d) balancing a checkbook.
Results: Bivariate correlations revealed significant relationships between overall financial ability and WCST errors (r=.46), Digit Span (r=.47), TMT-B (r=.36), ST-I (r=.46), FAS (r=.46), and Tower Test (r=.50). Stepwise regression demonstrated that Digit Span significantly predicted participants' ability to write checks (accounting for approximately 22% of the variability), WCST followed by Digit Span and TMT-B predicted participants' ability to balance a checkbook (accounting for approximately 52% of the variability).
Conclusions: These findings indicate that measures of attention and executive functioning account for financial ability in Alzheimer's Disease, and are useful in predicting more complex aspects of financial ability such as writing a check and balancing a checkbook.
Correspondence: *Beyon Miloyan, Psychology, California State University, Northridge, 8741 Darby Ave., 18, Northridge, CA 91325. E-mail: b.miloyan@gmail.com*

P.J. MOBERG, N. HTI LAR SENG, K.J. MANNING, J.B. WALKER, D. ROALF, J. RICK, S.E. ARNOLD, J. DUDA & R.L. DOTY. Olfactory Dysfunction in Neurodegenerative Disease: A Meta-Analytic Investigation of Alzheimer's, Parkinson's and Huntington's Diseases.
Objective: Olfactory dysfunction has been well-described in a variety of neurodegenerative diseases. A comprehensive meta-analysis of the English-language literature examining olfactory functioning in patients with Alzheimer's disease (AD), Parkinson's disease (PD), and Huntington's disease (HD) was undertaken. This study sought to detail the magnitude and scope of any psychophysical olfactory deficits, and to identify possible moderator variables.
Participants and Methods: An extensive literature review concerning olfactory function in AD, PD, and HD patients and healthy controls published before August 2010 was conducted via online databases (PubMed, Embase and PsycINFO) and reference lists from review articles. This literature search yielded 229 studies which were deemed suitable for meta-analysis.
Results: The meta-analysis revealed a large deficit in olfactory abilities (d=-1.83, CI=-1.27/-1.48) in patients with neurodegenerative disease, irrespective of diagnosis, and several factors that moderated the observed impairment. Specifically, psychophysical task type, medication status, sex, and other clinical and demographic factors were significant moderators.
Conclusions: Deficits in olfactory perception represent a robust finding in patients suffering from neurodegenerative disease and appears to be moderated by certain task, clinical and demographic factors. Future directions for research on chemosensory dysfunction in neurodegenerative and neuropsychiatric illness are discussed.
Correspondence: *Paul J. Moberg, PhD, Psychiatry, University of Pennsylvania, 10 Gates, HUP, 3400, Spruce Street, Philadelphia, PA 19104. E-mail: moberg@upenn.edu*

A. MOUSSARD, I. PERETZ & E. BIGAND. Music as an aid to learn new verbal information in Alzheimer's disease: A case study.
Objective: The goal of this study is to determine if music can improve verbal memory in Alzheimer's patients. In normal subjects, verbal information (i. e., words or texts) is not necessarily better learned when it is sung as compared to being spoken. The melodic component often represents an additional load for learning, creating a dual task situation (Racette & Peretz, 2007). However, if the tune is – or becomes – familiar, the preexisting representation of the familiar melody can provide support for associating new verbal information (Purnell-Webb & Speelman, 2008).
Participants and Methods: Our study compare, in a mild Alzheimer's disease patient, different learning conditions of an unknown text: spoken, and sung on an unfamiliar, mild familiar, and high familiar melody. Moreover, the spoken and unfamiliar sung conditions are relearned 4 times again (with one week interval between each), and once again after 4 weeks.
Results: The results show that the excerpts sung on a mild or highly familiar melody are better learned than the unfamiliar one. Moreover, while the spoken condition seams to be better performed than the condition sung on the unfamiliar melody for the first learning session, this seams to be reversed over the relearning sessions, especially after the 4 weeks delay, where the sung condition become significantly better memorized. Moreover, the sung condition lead to better delayed recall (10 minutes).
Conclusions: We discuss these results depending on their therapeutic implications for dementia.
Correspondence: *Aline Moussard, Université de Montréal, 4310 Christophe Colomb, appt 17, Montréal, QC H2J 3G3, Canada. E-mail: aline.moussard@umontreal.ca*

M.A. MUMAW, T.Z. KING, H. MAO, L. WANG & F. GOLDSTEIN. Executive Functioning Fully Mediates the Relationship Between White Matter Integrity and Activities of Daily Living in Alzheimer's Disease and Normal Aging.
Objective: Aging is associated with lower prefrontal white matter integrity (WMI), particularly in individuals with Alzheimer's disease (AD). Additionally, deficits in executive functioning and performance of instrumental activities of daily living (IADLs) have been associated with white matter pathology and become more impaired as AD progresses. Deficits in executive functioning are hypothesized to mediate the relationship between WMI and IADLs.
Participants and Methods: An untimed measure of executive functioning (Similarities) and a rating of IADL performance (Functional Activities Questionnaire) were obtained on twenty right-handed individ-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

uals with probable AD (mean age=75.7; education=12.9yrs), determined by NINCDS-ADRDA guidelines, and 10 healthy controls (HC, mean age=67.8; education=17.0yrs). Fractional anisotropy (FA) values, the measure of WMI, in the dorsolateral prefrontal cortex (DLPFC), were obtained using diffusion tensor imaging on 3T whole body MRI scanner (Siemens) with 20 directions. DLPFC ROIs were manually drawn in BrainVoyager QXv.2.1.2. Mediation analyses with bootstrapping, controlling for age and education, were employed.
Results: The AD group had lower FA in the left (p=.01) and right (p=.03) DLPFC relative to the HC group. Significant associations were found between better IADL performance and higher left (p=.04) and right (p=.005) DLPFC FA values. Better IADL performance and better performance in executive functioning were positively associated (p<.001). Executive functioning fully mediated the relationship between FA values of right DLPFC FA and IADLs (B=.761; CI-133.6 to-5.7)
Conclusions: Our results support previous findings of lower prefrontal WMI in individuals with AD. Additionally, it highlights the important role of executive functioning in mediating the relationship between WMI and the ability to perform IADLs.
Correspondence: *Matthew A. Mumaw, M.A., Psychology, Georgia State University, 1409 Chastain Dr NE, Atlanta, GA 30342. E-mail: mmumaw1@student.gsu.edu*

D.A. NATION, L. DELANO-WOOD, K.J. BANGEN, C.E. WIERENGA, A.J. JAK, D.C. DELIS, D.P. SALMON & M.W. BONDI. Pulse pressure, cognition, and vascular pathology in Alzheimer's disease.
Objective: Elevated pulse pressure (PP) increases risk of dementia. Increased PP may contribute to cognitive decline by exacerbating cerebrovascular disease (CVD). However, it has been hypothesized that PP elevation may interfere with amyloid-beta clearance, suggesting direct effects on Alzheimer's disease (AD). The present study examined whether PP was related to cognition through effects on CVD or AD.
Participants and Methods: Seventy-four patients were diagnosed at autopsy with definite AD, with or without CVD, and no other neurodegenerative diseases. ANCOVA was used to compare AD patients with versus without CVD, with versus without cerebral amyloid angiopathy (CAA), and with higher versus lower Braak and Braak (BB) stage on antemortem PP and Dementia Rating Scale (DRS) measures, controlling for age and education.
Results: Patients with CVD at autopsy exhibited elevated PP relative to those with "pure" AD (p<.01), but PP was unrelated to CAA (p>.2) or BB stage (p>.2). AD patients with CVD displayed better DRS performance (p<.01), but DRS score was unrelated to CAA (p>.2) or BB stage (p>.2).
Conclusions: Elevated PP was related to CVD at autopsy, which was associated with less severe cognitive impairment. Findings suggest that PP may increase the risk of dementia through effects on CVD. Elevated PP was unrelated to AD severity or the presence of CAA, further implying that PP impacts cognition through vascular rather than amyloid-beta clearance mechanisms. Results suggest that elevated PP may have an additive rather than synergistic effect on the risk of Alzheimer's dementia through its association with CVD.
Correspondence: *Daniel A. Nation, Ph.D., Psychiatry, University of California San Diego, School of Medicine, 3350 La Jolla Village Dr., 151B, San Diego, CA 92161. E-mail: dnation@ucsd.edu*

K.V. PAPP, B. SPRINGATE, P.J. SNYDER & R.F. KAPLAN. Preserved Remote Memory and Naming Differentiates Amnestic MCI from Early AD.
Objective: To test the hypothesis that while memory loss is common to both amnestic mild cognitive impairment (MCI) and early Alzheimer's disease (AD), remote memory and naming are relatively preserved in amnestic MCI.
Participants and Methods: We administered the Information subtest of the WAIS-III, the Boston Naming Test (BNT), and a novel measure of recall and recognition of 14 famous faces. The sample included two groups: amnestic MCI [n=37, Mean Age=74.5 (SD=8.6), Mean Education=14.4 years (SD=3.1)] and probable AD [n=26, Mean Age=77.9 (SD=6.9), Mean Education=13.2 (SD=2.4)].
Results: Group membership predicted ability to accurately recall famous faces F(1,36)=22.4, p<.0001, general knowledge F(1,56)=26.4, p<.0001 and name objects F(1,53)=59.9, p<.0001) but not to simply recognize famous faces. MCI patients were able to recall 9.6 out of 14 faces and the AD group recalled on average 4.5 faces. While education level was correlated with general knowledge r(58)=.617, p<.0001 and naming r(55)=.314, p<.05, famous face recall and recognition were not related to education. Using a receiver operator curve (ROC) and a cutoff score of 6, the famous faces task has a sensitivity of .91 and a specificity of .7 in accurately diagnosing AD versus MCI.
Conclusions: Preserved remote memory may help differentiate between MCI and conversion to AD. Given its lack of a relationship with education, the famous faces task may be useful in measuring remote memory in a demographically diverse clinical population.
Correspondence: *Kathryn V. Papp, UCONN, MC 1410, 263 Farmington Ave, Farmington, CT 06030 . E-mail: katepapp@gmail.com*

M. PARIKH, L.S. HYNAN, M.C. GROSCH, L.L. GRAHAM, M.F. WEINER & C. CULLUM. Validity of Videoconference-based Neuropsychological Testing in Dementia.
Objective: Videoconferencing (VC) appears to be a reliable method for administering some neuropsychological tests, although few studies have examined the validity of VC-administered neuropsychological tests to distinguish clinical groups. We compared results from healthy controls to individuals with mild cognitive impairment (MCI) and Alzheimer's disease (AD) on a brief battery of VC-administered neurocognitive measures.
Participants and Methods: Subjects: 50 controls, 11 MCI, and 19 AD. Tests: Digit Span, Hopkins Verbal Learning Test-Revised (HVLT-R), Letter Fluency, Category Fluency, Oral Trail Making Test B (OTMT-B), and 15-item Boston Naming Test (BNT) compared via ANCOVA (covariates=age, education, gender, and depression scores). Covariates significant p<0.15 were included in an adjusted model.
Results: Scores on Digit Span Forward (M-C=6.76, M-MCI=6.46, M-AD=5.63; p=0.005) and Backward (M-C=5.26, M-MCI=5.00, M-AD=3.99; p=0.001), HVLT-R Total (M-C=27.24, M-MCI=23.98, M-AD=13.81; p<0.001), HVLT-R recall (M-C=10.02, M-MCI=7.15, M-AD=1.57; p<0.001), Category Fluency (M-C=20.60, M-MCI=14.92, M-AD=8.82; p<0.001), OTMT-B (M-C=1.48, M-MCI=1.46, M-AD=2.05; p<0.001), and BNT (M-C=14.20, M-MCI=13.98, M-AD=11.74; p<0.001) were significantly different after adjusting for significant covariates. The control sample obtained higher scores than AD across measures, except Letter Fluency. MCIs scored significantly higher than AD on HVLT-R Total and Recall, Category Fluency, OTMT-B, and BNT, and controls scored significantly higher than MCIs on HVLT-R Recall and Category Fluency.
Conclusions: VC-based neuropsychological testing distinguished demented and non-demented groups, thereby supporting the validity of this testing medium. While further investigation is necessary in larger samples across varying levels of impairment and with various diagnoses, these findings suggest that VC technology can be used in the differential diagnosis of dementia.
Correspondence: *Mili Parikh, B.S./B.A., Psychiatry, UT Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, TX 75235-9044. E-mail: mili.parikh@utsouthwestern.edu*

S. PEKKALA, J. HIMALI, D. WIENER, A. BEISER, R. AU, J. KAWADLER, S. SESHADRI, A. MCKEE, S.H. AUERBACH, P.A. WOLF & L.K. OBLER. Lexical Symptoms of Alzheimer's Disease a Decade Prior to Death.
Objective: We examined the trajectory of lexical-access deficits in individuals with neuropathologically determined Alzheimer's disease (AD) and normal controls matched for age, education, and gender.
Participants and Methods: The participants were 23 individuals with AD and 24 controls administered neuropsychological testing regularly

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

in the Framingham Heart Study and autopsied as part of the brain donation program. Three lexical-access measures were employed: the letter verbal fluency task (FAS), the Boston Naming Test (BNT), and a written description of the Cookie Theft Picture (CT). Repeated measures models compared the groups over time using three discreet time-intervals (3±1 years, 5±1 years, and 8±1 years prior to death).
Results: Repeated measures analysis revealed significant group by time interactions on FAS Total-Correct ($p<0.01$), FAS Total-Correct-15-Seconds ($p<0.001$), and CT Target-plus-Additional-Words ($p<0.01$). Cross-sectional time-specific group comparisons indicated that at 8±1 years prior to death, the groups differed significantly on CT Target-Words ($p<0.01$) and CT Target-plus-Additional-Words ($p<0.01$). No differences were found between the groups at 5±1 years prior to death. Only at 3±1 years prior to death, did the groups differ on FAS Total-Correct-15-Seconds ($p<0.01$) and BNT Total-Correct ($p<0.001$).
Conclusions: Impaired language performance is an early indicator of AD, though the nature of the lexical task plays a crucial role in its detection. Our written discourse task revealed lexical-access symptoms close to a decade prior to death, while tasks assessing access to individual lexemes proved to be sensitive at only a few years prior to death.
Correspondence: *Seija Pekkala, Ph.D., Institute of Behavioural Sciences, University of Helsinki, P.O.Box 9, (Siltavuorenpenger 5A), Helsinki 00014, Finland. E-mail: seija.pekkala@helsinki.fi*

R. READY, J.O. CARVALHO, R.C. GREEN, B.E. GAVETT & R.A. STERN. The Structure and Validity of Self-reported Affect in Mild Cognitive Impairment and Mild Alzheimer's Disease.
Objective: This study determined the reliability, validity, and factor structure of self-report emotions in persons with mild AD and mild cognitive impairment (MCI).
Participants and Methods: Participants (AD, n = 73; MCI, n = 159; controls, n = 96) rated current emotions with the Visual Analogue Mood Scales (Stern, 1997).
Results: Exploratory factor analyses on self-report data from controls, MCI, and AD revealed strikingly similar factor structures and item loadings. Persons with AD appear to provide affect data that exhibited a highly convergent structure to that of cognitively intact older adults. Internal consistency reliabilities also were comparable across groups. Persons with AD reported more negative affect (NA) and lesser positive affect (PA) than controls; affect for MCI was intermediate. The emotion that most differentiated the groups was confusion. NA and PA may be more interdependent in AD than for MCI and controls.
Conclusions: Comparisons across controls, mild AD, and MCI using VAMS data is warranted based on the highly similar factor structures in the three groups. Overall, persons with AD reported more NA and specifically more confusion than persons with MCI and controls. Persons with MCI were intermediate between the other groups on several emotion measures and implications for conceptualizations of MCI as a "transitional state" between healthy aging and dementia are discussed. Interventions that target negative mood reduction or positive mood enhancement may have potent effects in AD due to the more bipolar associations between PA and NA than are found in other samples.
Correspondence: *Rebecca Ready, Ph.D., Psychology and Neuroscience, University of Massachusetts, 135 Hicks Way, Tobin Hall, Amherst, MA 01003. E-mail: ready@psych.umass.edu*

B. SCHNEIDER, R.J. MELROSE, D. HARWOOD, M.A. MANDELKERM, A. WALSTON & D.L. SULTZER. Evidence of Frontal Involvement in Visuospatial Reasoning in Alzheimer's Disease: An FDG-PET Study.
Objective: Alzheimer's disease (AD) causes cognitive deficits and impairs functional skills. Visuospatial reasoning, a form of nonverbal problem solving, may be compromised in patients with AD. Damage to the frontal lobes is associated with difficulties in reasoning in non-demented adults; however, it is unclear whether frontal dysfunction promotes impaired reasoning in AD.
Participants and Methods: Seventy-four patients with probable AD were assessed using a neuropsychological battery that included the Mattis Dementia Rating Scale. To examine visuospatial reasoning, patients completed the Identities and Oddities subtest (I&O), in which they were asked to indicate how two shapes were similar, and how one shape was different from a group of shapes. All patients underwent 18F-fludeoxyglucose positron emission tomography (FDG-PET) to measure regional cortical metabolism. Total score on I&O was correlated with metabolic activity across the whole brain using SPM2. Results were considered significant at the voxel level ($p<.001$, uncorrected).
Results: Subjects averaged 77 years of age, 13 years of education, and were in the mild/moderate stages of AD (MMSE: mean=19.5, stdev=5.2). Average performance on I&O was 82 percent correct (Range 0-100%). Results revealed a direct association between I&O and metabolic rate in frontal cortical regions, including the right frontal pole, orbitofrontal cortex, and dorsolateral prefrontal cortex. Associations were also observed in bilateral parietal lobe, right inferior and middle temporal gyri, right posterior cingulate and right occipital lobe.
Conclusions: In AD, reasoning deficits reflect not only difficulties with frontally-based executive processes, but also reflect compromise to posterior areas of the brain implicated in visuospatial analysis.
Correspondence: *Brooke Schneider, PhD, West Los Angeles VA Healthcare Center, 11301 Wilshire Blvd, Los Angeles, CA 90073. E-mail: Brooke.Schneider@va.gov*

T. SHANY-UR, P. POORZAND, S. GROSSMAN, J. JANG, M. GROWDON, B.L. MILLER & K.P. RANKIN. Patterns of Nonverbal Humor Comprehension in Frontotemporal Dementia and Alzheimer's Disease.
Objective: Humor is essential to social communication, and may improve coping with age-related cognitive and physical changes. Humor comprehension involves detecting that something is surprising yet coherent with what preceded it. Older adults make more errors on humor tasks than younger adults, but the effect of neurodegenerative disease on humor comprehension is unknown. We examined nonverbal humor comprehension in subjects with frontotemporal dementia (bvFTD), Alzheimer's disease (AD) and normal controls (NC).
Participants and Methods: 137 older adults (28 bvFTD, 45 AD, 64 NC) selected potential endings to incomplete cartoon strips. Possible options included correct funny (CF), straight forward (SF), humorous nonsequitur (HNS) and unrelated nonsequitur (UNS).
Results: GLMs (controlling for sex, age and MMSE) with post hoc Tukey-Kramer tests revealed both bvFTDs and ADs were less likely than NCs to select CF responses ($p>0.0001$). However, MANCOVAs showed a significant group by error-type interaction ($p=0.0331$). Groups differed in HNS ($p<0.0001$) and UNS ($p<0.0001$), but not SF error scores. ADs made more HNS errors than NCs ($p=0.0007$), but not bvFTDs. Instead, although ADs made more UNS errors than NCs ($p=0.0012$), bvFTDs made more UNS errors than both NCs ($p<0.0001$) and ADs ($p=0.0309$).
Conclusions: These results suggest both AD and bvFTD patients lose capacity to comprehend the logical coherence of a humorous sequence, likely due to cognitive deficits in executive and memory domains. However, bvFTD patients are impaired at recognizing the "surprising" or affective components of humor, while this more basic sense of humor is preserved in AD. This has implications for differential diagnosis and the neuroanatomy of humor.
Correspondence: *Tal Shany-Ur, PhD, Neurology, UCSF, 350 Parnassus, Suite 905, San Francisco, CA 94143-1207. E-mail: tshany-ur@memory.ucsf.edu*

L. SHAUGHNESSY, M.B. MITCHELL & A. ATRI. Diagnostic Accuracy of UDS-Plus Neuropsychological Measures for Amnestic Mild Cognitive Impairment and Alzheimer's Disease.
Objective: To assess and compare the diagnostic accuracy of a battery of neuropsychological tests (UDS-Plus) administered to a National Alzheimer's Coordinating Center (NACC) Uniform Data Set (UDS) par-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ticipating longitudinal cohort for differentiating subjects with normal cognition, amnestic Mild Cognitive Impairment (aMCI) and Alzheimer's disease (AD). We hypothesized that the Free and Cued Selective Reminding Test (FCSRT) (Buschke, 1984) would improve diagnostic accuracy, alone or in combination with UDS neuropsychological measures.
Participants and Methods: Three-hundred-and-nine participants from the Massachusetts Alzheimer's Disease Research Center (MADRC) were classified, per UDS protocol, as older adults with normal cognition (n=173, CDR=0), aMCI (n=42, CDR=0.5), or AD (n=94, CDR□1.0). UDS and MADRC-specific supplementary measures (UDS-Plus) including the FCSRT were administered. Diagnostic accuracy of single and combined UDS-Plus measures was assessed using receiver operating characteristic (ROC) curve analysis.
Results: FCSRT-Free Recall (FCSRT-FR) demonstrated the best accuracy for distinguishing controls from aMCI (AUC = .914) and AD (AUC = .922). Combined performance on FCSRT-FR and Logical Memory II (LM-II) increased diagnostic accuracy for control vs. aMCI (AUC = .938). FCSRT-FR combined with the Boston Naming Test (BNT) increased diagnostic accuracy for controls vs. AD (AUC = .940).
Conclusions: These results provide further support for excellent accuracy of the FCSRT for distinguishing cognitively-intact subjects from those with aMCI and AD. Diagnostic accuracy improved with the addition of LM-II (p=0.04). Inclusion of the FCSRT to the UDS neuropsychological battery may provide an efficient method to increase diagnostic accuracy for identification of early memory impairments, and should be further assessed as a potential screening tool.
Correspondence: *Lynn Shaughnessy, M.A., Massachusett General Hopsital, 57 Mystic St, Arlington, MA 02474. E-mail: Lynn.Shaughnessy@gmail.com*

S. SHIRK, M. MITCHELL & A. ATRI. Uniform Data Set (UDS) Normative Calculator for the Neuropsychological Test Battery.
Objective: To develop a preliminary estimated normative score (i.e., a z score) calculator for the neuropsychological measures of the NIA National Alzheimer's Coordinating Center (NACC) Uniform Data Set (UDS) that adjusts for sex, education, age, and their combination.
Participants and Methods: Predicted z-scores were calculated for the four different models in Weintraub et al. (2009) (3268 subjects UDS-classified as Clinically Cognitively Normal, with CDR=0 and Functional Assessment Questionnaire score 0). Using regression coefficients (Weintraub et al., 2009) and corresponding Root Mean Squared Errors (RMSE), z-scores were approximated as (raw score-predicted mean)/RMSE.
Results: By utilizing previously published models to predict the average of a theoretical population (i.e., point estimation), based on sex, education, age, and their combination with the RMSE, we provide estimates for any individual's score on the UDS neuropsychological tests.
Conclusions: A regression-based estimated-normative score calculator was created to provide UDS clinical researchers with a simple and easily accessible tool for guiding interpretation of an individual's raw score on neuropsychological tests. Although the calculator may provide a close approximation of an individual's relative performance, interpretation of neuropsychological test scores for those who fall in the tail-ends of age and education (particularly those with low-education) distributions should be interpreted with great caution. This simple to use estimated-norms calculator should be validated in additional cohorts of UDS subjects and by other normative analysis methods.
Correspondence: *Steven Shirk, Ph.D., Massachusetts General Hospital, 200 Springs Rd., Bedford, MA 01730. E-mail: sshirk@gmail.com*

F.W. UNVERZAGT, S. GAO, A.M. HAKE, D.A. KAREKEN, K.A. LANE, L.R. MOSER, C.M. CALLAHAN & H.C. HENDRIE. Mild Cognitive Impairment in an Urban Primary Care Environment.
Objective: To determine the frequency of Mild Cognitive Impairment (MCI) subtypes (phenotypic and etiologic) in older adults attending a large, urban primary care clinic.
Participants and Methods: Eligible participants were age 65 years and older, non-demented, and had an informant and underwent comprehensive clinical assessment including documentation of symptom onset and progression, daily function, medications and health history, and cognitive status via psychometric battery. Cases were adjudicated in a consensus diagnosis conference using standard criteria for MCI and dementia.
Results: 199 participants were enrolled over 18 months. The sample was predominantly African American (63%) and female (77%) with average age of 72 years and 11 years of education. Ninety-two participants were diagnosed cognitively normal (CN) and 107 as MCI. The MCI patients had significantly fewer years of education and were over-represented with men and whites (all p's < .01) relative to the CN group. MCI patients were mildly affected (mean MMSE = 26.7 ± 2.5) and had lower scores than CN subjects on Animal Fluency, Boston Naming, Logical Memory, Visual Reproduction, Word List Learning and Delayed Recall, Block Design, and Controlled Oral Word Association (all p's < .01). The most common MCI subtype was multi-domain amnestic (46.7%) followed by single-domain non-amnestic (28.0%), single-domain amnestic (17.8%), and multi-domain non-amnestic (7.5%). The most common presumed single cause of cognitive dysfunction was medical illness (19.6% of cases).
Conclusions: MCI patients from this urban primary care clinic have a wide range of cognitive deficits. The relative frequency of single-domain non-amnestic MCI subtypes is higher than what has been reported in community-based samples and specialty clinic samples. Significant medical co-morbidity may affect the presentation and course of MCI in important ways. Supported by NIH grants: R01 AG026096, R01 AG09956, and P30 AG10133
Correspondence: *Frederick W. Unverzagt, PhD, Psychiatry, Indiana University School of Medicine, 1111 W. 10th Street, Suite PB 218A, Indianapolis, IN 46202. E-mail: funverza@iupui.edu*

B. VAN GELDORP, E.P. KONINGS, I.A. VAN TILBORG & R.P. KESSELS. Associative Working Memory and Subsequent Episodic Memory Formation in Patients with Early Alzheimer's Disease.
Objective: Recent neuroimaging studies have shown that the medial temporal lobe (MTL) is not only important for episodic memory (EM), but also for working memory (WM) processes, especially when multiple features have to be associated. Baddeley's episodic buffer may be the WM component necessary to integrate information as to form long term memories. Yet it is still under debate whether the episodic buffer depends on the MTL. The current study examines associative WM performance and subsequent EM formation in Alzheimer patients with MTL dysfunction. It was expected that patients will not only show deficits in EM formation, but also in associative WM.
Participants and Methods: Twenty patients fulfilling the criteria for early Alzheimer's disease (AD; i.e. Mild Cognitive Impairment or early Alzheimer's dementia; MMSE 17-29, mean age =75.9, SD=7.67) and 21 matched healthy controls (mean age=72.7, SD=7.12) were recruited. A computerized WM task ("Box Task") required participants to search for objects that were hidden in boxes at different locations on a computer screen. A surprise delayed cued-recall test followed after 5 minutes and required participants to relocate the previously seen items to their corresponding locations.
Results: Results from the WM task show that AD patients are impaired on keeping track of recently visited locations (p=.02) and on associating objects and locations (p<.01). On the subsequent EM test, patients are significantly worse than controls in recalling both the spatial layout (p=.02) and the association of objects and locations (p=.02), but are still above chance (respectively, p=.01, p<.01).
Conclusions: These results clearly indicate that AD patients have deficits in the visuospatial sketch pad as well as in associative WM. In addition, AD patients show partially impaired subsequent EM formation, possibly reflecting an episodic buffer deficit. We argue that WM and EM may not be fully independent systems but closely interact, especially when associative information has to be maintained in WM.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Bonnie van Geldorp, MSc, Donders Centre for Cognition, Radboud University Nijmegen, Montessorilaan 3, Room B.02.08, Nijmegen 6525 HR, Netherlands. E-mail: b.vangeldorp@donders.ru.nl*

J.T. WONG, C. LATAILLADE, I. GHAJOYAN & J. RAZANI. The Ability of a Performance-Based Daily Functional Task to Discriminate between Alzheimer's Disease and Controls.

Objective: There are few studies examining classification ability of daily functional tasks. As such the purpose of the present study was to examine the sensitivity and specificity of a performance-based daily functional test in discriminating patients with Alzheimer's disease (AD) from healthy controls.

Participants and Methods: Forty-nine patients with AD and 52 healthy elderly controls were administered neuropsychological tests as well as the Direct Assessment of Functional Status (DAFS) test, an observation-based test of activities of daily living. The DAFS assesses areas such as orientation, communication, financial, transportation, and shopping with 14 distinct subscales.

Results: Logistic regression revealed that of the DAFS subscales, all but the ability to identify currency and shopping with a list significantly classified AD and controls. However, while the specificity rates (classifying controls as "normal" or "healthy") for most subscales were in the 80, 90, or 100 percent range, sensitivity rates (classification of AD as patients) were much lower. The tasks that were most impressive in accurately classifying patients were shopping from free recall and balancing a checkbook. Sensitivity for shopping within a recognition paradigm and writing a check were also adequate, but all other DAFS tasks classified AD patients with approximately 50% or less accuracy.

Conclusions: The present study reveals that AD and controls do in fact display discernable differences in performance on specific tasks and that this information may be quite useful for healthcare professionals when planning treatment.

Correspondence: *Jennifer T. Wong, MA, Psychology, University of Detroit Mercy, 7007 1/2 West Manchester Avenue, Los Angeles, CA 90045. E-mail: jenniferwong1@cs.com*

C.G. WONG, M. GRISS, K. BLANK, G. PEARLSON & M. ASSAF. Abnormal Connectivity of the Default Mode Sub-networks in Normal Aging and Patients with Memory Decline.

Objective: Previous studies have shown abnormal functional connectivity (FC) of the default mode network (DMN) in patients with Alzheimer's disease (AD) and mild cognitive impairment (MCI). The DMN includes brain regions that are more active during rest compared to active-state tasks. The current study compared resting FC of the DM sub-networks (DM-SNs) in patients with cognitive decline to healthy controls (HC) and examined the correlation between connectivity strength and cognitive abilities in different domains, including memory, attention and language.

Participants and Methods: Eleven AD and amnestic-MCI patients and 11 age-matched HC underwent functional MRI (fMRI) resting scans and neuropsychological testing. Imaging data were analyzed using independent component analysis (ICA), which is a multivariate data-driven approach that identifies temporally coherent networks, providing a natural measure of FC.

Results: Two-sample t-tests showed decreased connectivity in the posterior cingulate cortex (PCC) and bilateral inferior parietal lobule (IPL) and increased connectivity in the medial prefrontal cortex (MPFC) in patients compared to HC. Importantly, posterior regions (i.e. PCC and IPL) showed positive correlations between the strength of connectivity and memory, attention and language domain scores while frontal areas (i.e. MPFC) showed negative correlations between connectivity and attention and language domain scores.

Conclusions: Posterior and anterior regions of the DMN show different patterns of abnormal connectivity in AD/MCI patients and distinct relationships with cognitive impairment. Since AD neuropathology begins in posterior regions and spreads later in the disease to frontal areas, our results suggest that in MCI and early AD, pathologic changes in posterior regions are being compensated for by the MPFC.

Correspondence: *Christina G. Wong, Olin Neuropsychiatry Research Center, 200 Retreat Ave, Hartford, CT 06106. E-mail: cwong@harthosp.org*

M. LAROCCA, D. YI, M.J. WRIGHT, E. TENG, J.N. CHIANG, N.N. LIZARRAGA, A.M. VARVARYAN, P.H. LU & E. WOO. Learning Potential in Mild Cognitive Impairment.

Objective: Poor encoding and recall of verbal information are common in mild cognitive impairment (MCI), the risk state for dementia. The impact of learning potential (i.e., rate of learning across trials) on strategy use and recall needs to be determined. The current study examined whether learning potential affects semantic clustering and recall consistency in MCI.

Participants and Methods: 86 participants with MCI (Age; M = 71.43, SD = 8.58; Education; M = 15.73, SD = 2.83) and 77 healthy older controls (Age; M = 68.45, SD = 8.23; Education; M = 16.92, SD = 2.84) were administered a list-learning test. Consistent with previous research, "learners" were defined as participants who earned z-scores □ 0 on the learning slope score, while "non-learners" were those who earned z-scores < 0. Semantic clustering and recall consistency scores were obtained.

Results: For recall consistency, a 2 (diagnostic group) x 2 (learning group) ANOVA revealed that learners were more consistent in their recall than non-learners. For semantic clustering, a similar analysis indicated that controls clustered the words more than MCI participants. All other main effects and interactions were nonsignificant.

Conclusions: Our findings indicate that individuals with MCI who benefit from repetition at learning similar to controls are more consistent in the information they recall. However, the ability to benefit from repetition does not result in greater strategy use in either group. These findings indicate that there are quantitative differences between MCI and normal aging in specific memory functions.

Correspondence: *Ellen Woo, UCLA, 10911 Weyburn Ave., Suite 200, Los Angeles, CA 90095. E-mail: ewoo@mednet.ucla.edu*

J. SUHR & A. ISGRIGG. Development and Initial Validation of an Alzheimer's Disease (AD) Worry Scale.

Objective: Anxiety is associated with inaccurate self-report of memory in older adults. We report on the development and initial validation of an AD Worry Scale to assess AD-specific chronic anxiety in older adults.

Participants and Methods: Adults age 50 and above participated as part of a free memory screen. None showed signs of dementia as determined by interview and RBANS. The AD Worry Scale, developed based on existing worry and anxiety literature, was included in the 2-hour screening battery.

Results: The scale showed good internal consistency. High AD worry was associated with higher depression. In those with low AD worry, memory complaints were related to worse performance on memory tasks, while in those with high worry, memory complaints were related to better performance. AD worry was higher in those with a first degree relative with AD. Among those without familial risk for AD, high AD worry was not related to belief that AD is genetic and not related to age, but was related to higher self-reported memory concerns. However, in those with a first degree relative with AD, high AD worry was related to belief that AD is genetic and to younger age, but was not related to self-reported memory concerns.

Conclusions: As expected, AD worry was associated with familial AD risk, was related to other psychological constructs, and showed differential effects on several variables associated with AD. Assessment of AD worry may be useful within a memory screening battery. Results have implications for interventions in older adults concerns about AD.

Correspondence: *Julie Suhr, Psychology, Ohio University, 200 Porter Hall, Athens, OH 45701. E-mail: suhr@ohio.edu*

Executive Functions/Frontal Lobes

M. BRAASCH & J. SUHR. The Effects of Age and Working Memory Ability on Frontal Lobe Oxygenation During Working Memory Tasks.

Objective: The frontal lobe hypothesis of aging states that the frontal lobes, along with frontal lobe-mediated cognitive processes such as work-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ing memory (WM) are more vulnerable to the effects of aging. Prior research on the relationship of age to frontal lobe activation during WM tasks has yielded conflicting results, potentially due to failure to control for task difficulty or for WM ability of participants. We assessed dorsolateral frontal lobe (DLFL) oxygenation during WM tasks in young and older adults with both poor and good working WM.
Participants and Methods: Both older and younger adults completed screening testing to determine whether they had generally poor or good WM skills (using subtests of the WAIS-IV) relative to the WAIS-IV reference group. Those with either poor or good WM were further tested on an n-back and a Stroop task, while DLFL oxygenation was measured using near-infrared spectroscopy.
Results: There was no main effect for age on changes on DLFL oxygenation on either WM task. There was a main effect for WM ability on DLFL oxygenation on both tasks. On the n-back, those with poor WM showed greater increase in DLFL oxygenation relative to those with good WM, while on the Stroop, those with poor WM showed a decrease in DLFL oxygenation relative to those with good WM.
Conclusions: Results are consistent with an inverted U pattern of activation related to overall task difficulty, and suggest the importance of considering WM capability when assessing for functional brain changes in aging.
Correspondence: *Julie Suhr, Psychology, Ohio University, 200 Porter Hall, Athens, OH 45701. E-mail: suhr@ohio.edu*

G.E. BALAN MARIN, J. SALVADOR-CRUZ & C. ARMENGOL. Assessment of Executive Function with The Executive Multilingual Test "20 Fruit" in a Sample of Mayan Children.
Objective: To determine the time of execution of a regional sample of Mayan-speaking children.
Participants and Methods: We applied the "20 Fruit" to 70 students of elementary school (35 boys and 35 girls), in the range of 6-12 years, in the state of Yucatan, Mexico. All the children were from low-middle socioeconomic level.
Results: We applied the t test for independent samples in order to correlate the variables (time, correct answer and self-correction) with sex. The results indicated no statistically significant differences between the sexes with respect to time and self-correction ($p > 0.05$). However, the subscale 2, both correct and incorrect responses were significantly different ($\times = 0.023$) between boys and girls.
Conclusions: There were no significant differences between boys and girls in relation to execution time and self-correcting the task. However, when comparing each subtest independently with sex, only subtest 2 showed significant differences in correct and incorrect answers. There are no significant differences in the other subtests.
Correspondence: *Geny E. Balan Marin, Licenciada en Psicologia, Universidad Autonoma de Mexico, 3 Cerra de Tlalayote Manzana D Lote 2, Mexico Distrito Federal 14070, Mexico. E-mail: geny_balanm@hotmail.com*

P. BANERJEE, M.J. STRUBE, D.K. GRANGE, R.D. STEINER & D.A. WHITE. Strategic Processing in Children with Phenylketonuria: A Three-Year Longitudinal Study.
Objective: We explored the development of strategic processing in children with early-treated phenylketonuria (PKU) by examining clustering and switching during phonemic fluency performance.
Participants and Methods: Seventy children (24 PKU, 46 controls) from 7 to 18 years of age were administered two phonemic (letters S, F) fluency tasks at three time points over three years. Number of total words, number of subcategory clusters, number of words in subcategory clusters, and number of switches between subcategories were analyzed as a function of age.
Results: Hierarchical linear growth curve modeling revealed significant Group x Age at First Measurement interactions on the Level 1 intercept and on the Level 1 slope for the number of total words ($p < .01$), number of switches ($p < .05$), and number of words in clusters ($p \Lambda .01$). A main effect of age was also observed for the number of clusters ($p = .01$).
Conclusions: For total number of words, number of switches, and number of words in clusters, the control children showed a consistent, positive slope over the three time points regardless of starting age; however, children with PKU showed a slope that was more positive for younger than older ages. In other words, younger children with PKU made gains in strategic processing over the three-year period that were comparable to those of controls whereas older children with PKU made slower or negligible gains compared to controls, suggesting an early plateau in the development of strategic processing. These results indicate that evaluation and possible rehabilitation of strategic processing should be considered as children with PKU age.
Correspondence: *Pia Banerjee, MA, Psychology, Washington University in St. Louis, 1 Brookings Drive, Campus Box 1125, St. Louis, MO 63130. E-mail: pbanerjee@wustl.edu*

B.C. BAUGHMAN, J.C. YOUNG, E.M. CROUSE, N.T. YEHYAWI, A.G. DOWD & L.K. HENNESSEY. Exploring Judgment in Geriatric Veterans: Factor Structure of the Test of Practical Judgment (TOP-J).
Objective: The Test of Practical Judgment (TOP-J, Rabin et al., 2007) is an open-ended, clinician-administered measure of judgment in older adults. During initial piloting with 45 normal controls, confirmatory factor analysis suggested that a 15-item version fit surprisingly well with a single-factor model; however, the measure was pared down during development to a 9-item version due to negative or small loadings of six items. Nevertheless, discarded items appear to reflect important aspects of judgment that may vary across populations. The present study explored the factor structure of the full, 15-item version in a geriatric veteran population that has different demographic characteristics than the Rabin, et al. normative sample.
Participants and Methods: The TOP-J was administered during routine neuropsychological examinations to a mixed clinical sample of geriatric veterans (n=118; Age M=75.71, SD=8.12; Education M=11.70, SD=3.43).
Results: Exploratory factor analysis was conducted with Principle Components Analysis extraction with Varimax rotation. A stable five-component solution was identified and accounted for 56% of the variance. Rotated factors appeared to reflect 1) complex medical and financial reasoning, 2) financial awareness & ethical decision making, 3) social-environmental risk assessment, 4) social awareness/cognition, and 5) personal safety.
Conclusions: Data suggest that, for our larger clinical sample, judgment appears to be truly multidimensional. While unexplained variance remains, the TOP-J's five-factor solution appears to capture multiple aspects of judgment in our larger clinical sample of older veterans. Clinical implications and future research directions are also addressed.
Correspondence: *Brandon C. Baughman, Ph.D., Psychology Section, Memphis VA Medical Center, 1030 Jefferson Ave. #116A, Memphis, TN 38014. E-mail: the.baughman.b@gmail.com*

L.M. BOWEN & M.R. BASSO. The Relationship Between the FrSBe and Verbal Fluency Components in Patients with MS.
Objective: Executive function deficits occur commonly in multiple sclerosis (MS). However, the relationship between objective measures of executive function and behavioral markers of executive dyscontrol is not well established. We previously demonstrated a modest relationship between some executive function measures and impaired behavior in MS patients using the Frontal Systems Behavior Scale (FrSBe; Basso et al., 2008). However, we found no relationship between verbal fluency and FrSBe scores. In this study, we sought to determine whether sub-domains of verbal fluency predict executive dysfunction.
Participants and Methods: 90 MS patients and 28 controls participated. MS diagnoses were verified using the McDonald criteria. The sample was 75% female and 90% Caucasian. Participants were recruited from the community and administered the FrSBe self-report form and

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

the Delis-Kaplan Executive Function System (D-KEFS) verbal fluency measure. Verbal fluency components, clustering and switching, were scored according to Troyer et al.'s (1997) guidelines. The FrSBe is a validated measure of dysexecutive behavior consisting of a total score and subscales for Apathy, Disinhibition, and Executive Dysfunction.
Results: Pearson's correlations showed that the FrSBe was significantly related to some verbal fluency indices. We found that total score on the semantic fluency task, clustering on the phonemic task, and accuracy score on the category switching task correlated modestly with Apathy and Executive Dysfunction (correlations ranging from -.24 to -.16). No fluency index correlated with Disinhibition.
Conclusions: As expected due to shared dorso-lateral and dorso-medial substrates, we found a significant relationship between Apathy and Executive Dysfunction and semantic fluency, category switching fluency, and phonemic clustering. No relationship was found with Disinhibition, again, as expected given its presumed orbital substrate. These findings provide construct validity for the FrSBE. Implications for future research are discussed.
Correspondence: *Lacy M. Bowen, Psychology, University of Tulsa, 800 South Tucker Drive, Tulsa, OK 74104. E-mail: lacy-bowen@utulsa.edu*

K.M. HARRELL, E.J. MARCO, L.K. PAUL, E.H. SHERR & W.S. BROWN. Verbal and Design Fluency in Agenesis of the Corpus Callosum.
Objective: Individuals with Agenesis of the Corpus Callosum (AgCC) have shown deficits in inhibition and cognitive switching, but further analyses indicated that slower processing speed made a substantial contribution to overall performance (Marco, et al., in review). This project further investigated executive function and processing speed in AgCC utilizing the Verbal Fluency (VF) and Design Fluency (DF) subtests of the Delis-Kaplan Executive Function System.
Participants and Methods: Individuals with complete or partial AgCC (N= 36, age = 26.89 +/- 13.58, FSIQ = 96.94 +/-13.25) were administered the VF and DF. Healthy controls (HC) matched for gender, age, and FSIQ (N=57, age = 27.68+/-15.57, FSIQ = 98.84 +/- 10.74) were selected from the D-KEFS normative data set for comparison.
Results: MANOVA of VF scores revealed a trend towards an overall group difference (Pillai's Trace = .101, $F(4, 87) = 2.43$, $p = .053$), with poorer AgCC group performance on Category Fluency, Category Switching: Correct, and Category Switching: Accuracy. No differences were noted on contrast measures or error performance. MANOVA of DF scores indicated poorer overall performance by the AgCC group (Pillai's trace = .145, $F(5, 87) = 2.96$, $p < .05$). Further analysis revealed the AgCC group performed better than HC's overall on the contrast and error measures associated with the DF subtest.
Conclusions: Individuals with AgCC showed deficits in both verbal and non-verbal response generation, but were normal with respect to number of errors. It appears that slower processing speed is the primary contributor to these outcomes.
Correspondence: *Warren S. Brown, Ph.D., Fuller Graduate School of Psychology, Travis Research Institute, 180 N. Oakland Ave, Pasadena, CA 91101. E-mail: wsbrown@fuller.edu*

M. BUELOW & J. SUHR. Risky Decision Making in Smoking and Non-Smoking College Students.
Objective: This study examined risky decision making, determined by the pattern of selections on the Iowa Gambling Task (IGT), among smoking and non-smoking college students.
Participants and Methods: 136 undergraduate students (48 male; age range 18-33), of whom 70 were non-smokers and 66 were current smokers, participated in the study. 31 of the smokers abstained from smoking overnight prior to the study. All participants completed a demographics questionnaire, the IGT, and a series of other measures as part of a larger study. Performance on the IGT was broken into percentage of selections for each of the four decks (A, B, C, D) across two blocks (Trials 1-40, Trials 41-100).
Results: Abstinent smokers selected more from Deck A during Block 2 than did either ad libitum smokers or non-smokers. No group or block differences were found for Deck B or Deck C. Selections from Deck D significantly increased as the task progressed, regardless of smoking status. Additional analyses indicated ad libitum smokers made fewer selections from Deck A and more from Deck B on Block 2 than did abstinent smokers.
Conclusions: The results provide evidence for a nicotine withdrawal-related reward deficit driving Deck A selections among abstinent but not ad libitum smokers. Limited support was found of a Deck B preference among healthy control participants.
Correspondence: *Melissa Buelow, Ph.D., Psychiatry and Human Behavior, Alpert Medical School of Brown University, Memorial Hospital of Rhode Island, Medical Rehabilitation Department, 111 Brewster Street, Pawtucket, RI 02860. E-mail: mbuelow@gmail.com*

J.O. CARVALHO, M.T. BUELOW, R.E. READY & J. GRACE. Construct Validity of the Revised Frontal Systems Behavior Scale (FrSBe).
Objective: The Frontal Systems Behavior Scale (FrSBe) was recently revised based on results of exploratory and confirmatory factor analyses. This study explored the construct validity of the revised FrSBe in a mixed neurologic sample by investigating the associations between FrSBe scores and cognitive and functional abilities.
Participants and Methods: Participants were informants (e.g., family members, caregivers) for 494 adult neuropsychology outpatients. Revised FrSBe scores were correlated with the Dementia Rating Scale-2nd edition (DRS). In linear regressions, activities of daily living (ADLs) were predicted from revised FrSBe scores, controlling for cognition.
Results: Revised FrSBe Total was significantly and negatively correlated with DRS performance. Revised FrSBe Apathy and Dysexecutive subscales also negatively correlated with DRS total. Revised FrSBe Apathy and Dysexecutive subscales negatively correlated with DRS Attention, Initiation/Perseveration, and Conceptualization; revised FrSBe Dysexecutive also negatively correlated with DRS Memory. Revised FrSBe Disinhibition was negatively associated with DRS Conceptualization. Regressions indicated that revised FrSBe Apathy was a significant predictor of ADL functioning.
Conclusions: Results support the validity of the revised FrSBe. Mild to moderate correlations between revised FrSBe and DRS scores suggest that the revised FrSBe measures information consistent with putative frontal systems cognitive subtests, but the behaviors measured by the FrSBe also are partially independent of cognitive abilities. Regression analyses suggest that revised FrSBe Apathy scores are significantly associated with basic and instrumental ADLs. Results are consistent with previous findings from the original FrSBe (Boyle et al., 2003). Overall, measuring frontal systems behaviors may provide important insights into a patient's ability to complete their daily activities.
Correspondence: *Janessa O. Carvalho, Warren Alpert Medical School, Brown University, Box G-BH, Providence, RI 02912. E-mail: janessa_carvalho@brown.edu*

J.O. CARVALHO, R.E. READY & J. GRACE. Confirmatory Factor Analysis of the Frontal Systems Behavior Scale (FrSBe).
Objective: The Frontal Systems Behavior Scale (FrSBe) is a 46-item questionnaire that measures behaviors associated with frontal-subcortical dysfunction; specifically, apathy, disinhibition, and dysexecutive behaviors in adult neurologic populations (Grace & Malloy, 2001). This study aimed to revise the FrSBe by removing unreliable or poorly understood items. Item removal was guided by qualitative (cognitive interviewing) and quantitative (i.e., a previous exploratory factor analysis) data. Potential revised scales were evaluated and compared for best model fit via confirmatory factor analysis (CFA).
Participants and Methods: Informants of 494 adult neuropsychology outpatients completed the FrSBe. Cognitive interviewing (CI; Knafl et al., 2007) determined if 10 healthy informants interpreted FrSBe items consistently with the intended meanings. CFA determined the best fitting model.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The best fitting CFA model removed 10 weak FrSBe items and notably improved model fit statistics compared to the original model. Two items had weak loadings in the CFA and were inaccurately interpreted by 40% of participants from CI, and eight items were removed due to weak loadings as determined by the current study and a previous EFA (Stout et al., 2003). Removed items were evenly distributed among subscales (Disinhibition= 4, Dysexecutive= 3, Apathy= 3).
Conclusions: Removing problematic items from the original FrSBe will result in a briefer measure, and could produce a stronger tool to measure behavioral abilities in various adult neurologic samples. Future reliability and validity analyses will compare the revised to the original scale to determine if the shorter measure is at least equal to or better than its predecessor in terms of psychometric properties.
Correspondence: *Janessa O. Carvalho, Warren Alpert Medical School, Brown University, Box G-BH, Providence, RI 02912. E-mail: janessa_carvalho@brown.edu*

N.M. DIAS, A. MENEZES, B.T. TREVISAN, S. GODOY & A.G. SEABRA. Executive Functioning In Brazilian Children And Correlations With Auditory And Visual Working Memory Measures.
Objective: Executive functions (EF) are a set of abilities whose function is to regulate and control complex and goal oriented behaviors. Among the functions that compose this construct, the planning is frequently referred like a complex ability, because involve other EF and, moreover, put strong demand on the working memory process (WM). A test typically used to assess the planning is the Tower of London Test (ToL), which also is considered a complex measure of the executive functioning. The objective of this study was to investigate the relation between the visual and auditory WM and ToL performance.
Participants and Methods: The participants were 129 children (41.1% male), aged 10 to 14 years (M = 12.56 and SD = 1.18), students of 5th to the 8th grades of the elementary school, evaluated individually in the Auditory Working Memory Test and the Visual Working Memory Test, beyond the ToL.
Results: Pearson correlation analysis between the measures showed significant correlation, although low, between the WM measures and the ToL performance. The resultant regression analysis model showed that the WM measures can explain until 11.2% of the variance in the planning test. Contrary to the expectations, the auditory measure of WM had bigger explanatory power than the visual one, explaining by itself until 8.3% of the ToL performance.
Conclusions: Although significant, the contribution of the WM to the performance in the planning task was enough modest, what can be taken as indicative of that other abilities, executive and not-executive, can participate in the ToL resolution.
Sponsor: FAPESP, CNPq, MackPesquisa.
Correspondence: *Natália M. Dias, post graduate, Development Disabilities Program, Mackenzie Presbiterian University, José Gomes Street, n.03 - Cx. Postal = 45, Itatiba 13250-970, Brazil. E-mail: natalia_mdias@yahoo.com.br*

S.W. DUVALL, S.J. ERICKSON, P.C. MACLEAN & J.R. LOWE. Executive Function in Very Low Birth Weight Preschoolers and its Relationship with Current and Perinatal Medical Factors.
Objective: Executive function (EF) is emerging as an important predictor of outcome in children born very low birth weight (VLBW). The purpose of the current study was to better understand the medical severity factors that influence executive function abilities in preschoolers born VLBW.
Participants and Methods: Executive function abilities, as measured by the Behavior Rating Inventory of Executive Function- Preschool Version (BRIEF-P), Bear Dragon, Gift Delay Peek, and the Block Design subtest from the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), as well as perinatal medical severity factors (birth weight, gestational age and days on ventilation) and current medical severity variables (Health Status Classification System-Preschool Version (HSCS-PS)) were examined in fifty one preschoolers born VLBW.
Results: No EF measures correlated with the perinatal medical variables (birth weight, gestational age or days on ventilation). There were significant correlations between current medical severity and all four of the EF measures. When predicting EF, models including current medical variables were significantly stronger than models employing solely perinatal medical variables.
Conclusions: In these children born VLBW, current medical severity was a strong predictor of EF, whereas perinatal or historical medical severity variables were poor and inconsistent predictors of EF. This implies greater importance of current functional health over perinatal medical health in EF performance during preschool ages, at least given the measures we employed. These results speak to the need for continuing early intervention services for VLBW children in order to promote EF and related real world functioning at preschool and beyond.
Correspondence: *Susanne W. Duvall, MS, University of New Mexico, Psychology Department, University of New Mexico, Albuquerque, NM 87131. E-mail: swduvall@unm.edu*

N.M. EPSTEIN, J. MAHONEY, H. BUSCHKE & R. HOLTZER. Simple Reaction Time to Appearing and Disappearing Visual Stimuli.
Objective: Typically reaction time (RT) tests require participants to respond to the appearance of stimuli. We determined whether differences in RT and intra-individual variability would be found when young and old participants were required to respond to the appearance and disappearance of the same stimulus. We hypothesized that RTs would be longer and more variable for disappearing compared to appearing stimuli irrespective of age group.
Participants and Methods: Participants were 19 old (Mean age=76.5 years) and 18 young (Mean age=19.0 years) adults matched on key demographic characteristics. Based on a comprehensive neuropsychological tests battery and structured interviews participants were determined to be non-demented and without any medical or psychiatric conditions that may affect their performance. E-prime software was used to design two separate RT tasks for appearing and disappearing stimuli. Task order was counterbalanced. Participants were required to respond by pressing the spacebar to the appearance or disappearance of the same stimulus.
Results: ANOVA repeated measures analyses revealed that RT was significantly slower for disappearing (mean=342 ± 81 milliseconds) compared to appearing (mean=313 ±47 milliseconds) stimuli (p=0.001) for both age groups. Similarly, intra-individual variability, assessed using the Coefficient of Variation (CV), was significantly increased for disappearing (mean=18.5 ±7) compared to appearing (14.0 ±5) stimuli (p<0.001) irrespective of group status.
Conclusions: Responding to the disappearance, as compared to the appearance, of stimuli causes slower reaction time and increased intra-individual variability possibly due to increased executive control demands.
Correspondence: *Noah M. Epstein, BA, Ferkauf Graduate School of Psychology, 315 Central Park West, Apt 6 South, New York, NY 10025. E-mail: noahmaxepstein@gmail.com*

D. DECIO, A. FALCHOOK, J. WILLIAMSON & K. HEILMAN. Alternate Hand Postures, but Do Not Swim: A Test for Executive Motor Dysfunction in Parkinson Disease.
Objective: The purpose of this study was to learn if participants with PD, when compared to normals, are impaired in making simultaneous right and left hand independent movements as tested with a Luria Alternating Hand Postures (LAHP) test and if the type or form of these movements influences performance.
Participants and Methods: 12 participants with PD with normal MoCA scores and 12 matched controls were assessed for their abilities to perform a LAHP test and with modifications of this test into swimming and reverse swimming movements, as well as other tests including: open and closed hand taps, 3 step Luria sequence (fist-edge-palm) test, Luria's test for echopraxia, the Controlled Oral Word Association (COWA) test and a modified forward and backward digit span test.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Compared with normals, the participants with PD demonstrated significantly impaired performance on the LAHP test and reverse swimming movements test, but they did not perform significantly different than controls on the swimming movements test, or any other motor or executive function tests.
Conclusions: Testing bilateral independent hand movements with the LAHP may reveal impairments in PD before frontal-executive cognitive deficits are apparent. When testing patients' ability to perform alternating hand movements, care should be taken to avoid having patients perform them as swimming movements, since these movement may be phylogenetically and ontogenetically more primitive, not as heavily dependent on frontal-basal ganglia networks and thus less sensitive.
Correspondence: *Adam Falchook, University of Florida, UF HSC, Dept of Neurology, Box 100236, Gainesville, FL 32610-0236. E-mail: Adam.Falchook@neurology.ufl.edu*

I. FOURNIER, A. DUROCHER, A. DROUIN-GERMAIN, M. HENRY & P. NOLIN. What virtual reality learns us about cognitive development among adolescent.
Objective: The purpose of this study was to explore the contribution of Virtual Reality (VR) in understanding adolescent's cognitive development, in comparison with an equivalent traditional assessment task.
Participants and Methods: Sample was made of 67 teenagers, between 12 and 16 years of age, regrouped in four age-groups (12 years old: 9 boys and 3 girls; 13 years old: 11 boys and 9 girls; 14 years old: 11 boys and 13 girls; 15 and 16 years old: 5 boys and 7 girls). Each participant was administered the traditional Continuous Performance Task-VIGIL and the same test in a Virtual Classroom. In both tasks, reaction time, number of omission and number of commission are used for analysis purposes.
Results: Results of ANOVA indicate a significant difference between age for number of commission errors in the VR task ($F(3,61) = 3.46$, $p < .05$). No significant differences were found for age and reaction time or number of omission errors ($p > .05$). Further results analysis show a gradual diminution of commission errors with age, but only the performance of 13 years old and the performance of 15-16 years old are statistically different ($p < .05$).
Conclusions: The VR task seems more sensitive to fine cognitive differences that occur during adolescence in comparison with the traditional task. Results also suggest that inhibition is an ability that continues to develop throughout teenage years. Other functions also measured by this task, sustained attention and processing speed for example, do not seem to improve in adolescence.
Correspondence: *Isabelle Fournier, Doctorat, Psychology, Université du Québec à Trois-Rivières (UQTR), 3328 Monnerie #4, Québec, QC G1X 1Y8, Canada. E-mail: Isabelle.Fournier.Ps@hotmail.com*

B. TREVISAN, R. HIPÓLITO, S. GODOY, G. PICCHI, B. PAULA, N. DIAS, A. MENEZES & A. SEABRA. Cognitive flexibility and attention in preschoolers: a validity study of instruments and developmental considerations in Brazilian sample.
Objective: Attentional mechanisms are responsible for selecting relevant information within cognitive processes, enabling one to effectively apply his/her cognitive strategies. The cognitive flexibility, as an ability related to executive functions, refers to the capacity of an individual engages and disengages alternative cognitive processes according to environmental demands. Considering that low academic performance in children may be related to cognitive impairments seen among children with attention disorders and executive functions deficits, the effort to assess such skills may be relevant to the establishment of schooling interventions and prevention programs that target the mitigation and prevention of future problems. However, the availability of valid instruments of executive functions and attention in Brazilian preschool context is poor. The present study aimed to assess cognitive flexibility and attention in preschoolers.
Participants and Methods: Participants were 134, 3-7 years old. The instruments used were: Cancellation Test (TC), which assesses selective and alternating attention; Trail Making Test for Preschoolers (TMT-P), which assesses divided attention and cognitive flexibility; and Columbia Mental Maturity Scale (CMMS) for intelligence control.
Results: Multivariate analysis of variance, with the CMMS as covariant, revealed that both instruments, TC and TMT, discriminated performance of children regarding age and performance at school level, except between 6 and 7 years old, that presented similar performance on TMT. Pearson correlation analysis showed significant and positive correlation between both instruments.
Conclusions: These consists validity evidences based on developmental changes and relationship to other variables for both instruments, what might contribute to the availability of valid neuropsychological instruments in Brazilian context.
Sponsor: FAPESP, CNPq, MackPesquisa
Correspondence: *Silvia Godoy, Post Graduate, Developmental Disorders Program, Mackenzie Presbyterian University, Rua Amador Bueno 143 - apt0 23, Campinas 13035-030, Brazil. E-mail: silviagodoy04@yahoo.com.br*

H. KAFADAR. Cognitive Model of Problem Solving.
Objective: In this study problem solving tackled in cognitive psychological literature and the relationship of its cognitive stages with various cognitive processes are analyzed within the framework of a theoretical model. In the study the relationship pattern of problem solving with reasoning, attention, working storage, planning, and establishing a strategy was tried to be mentioned with a model.
Participants and Methods: Eightyfive healthy university students participated as research subjects. The study is made up of two stages. In the first stage Raven Standard Progressive Matrices Test (RSPM) was exerted to subjects. While doing the test, the subjects were asked to write which mental stages they went through. In the second stage the university student subjects took Raven Standard Progressive Matrices Test, Wisconsin Card Sorting Test, Tower of London, Stroop TBAG Form, Cancellation Test, Complex Span Task, Visual Memory Span.
Results: The findings obtained from the study were analyzed with Structural Equation Model. A two dimensional model was tried to be formed to explain the relationship pattern between neuropsychological tests implemented. The first dimension in this model shows the mental stages a healthy person going through for problem solving when s/he is encountered with a problem; the second dimension shows the relationship pattern among problem solving, reasoning, abstract thinking, selective attention, constant attention, working storage, planning and establishing a strategy.
Conclusions: According to the findings of a cognitive model of problem solving is proposed.
Correspondence: *Hatice Kafadar, Ph. D, Psychology, Abant Izzet Baysal University, Abant Izzet Baysal University Faculty of Science and Art, Department of Psychology, Gölköy Campus, Bolu 14280, Turkey. E-mail: haticekafadar@yahoo.com*

M. LØVSTAD, I. FUNDERUD, T. ENDESTAD, P. DUE-TØNNESSEN, T. MELING, M. LINDGREN, R.T. KNIGHT & A. SOLBAKK. Focal lesions to the lateral and orbital prefrontal cortex: Neuropsychological profiles and self reported executive functions in everyday living.
Objective: While dorsolateral prefrontal cortex is associated with cognitive aspects of executive functioning, orbitofrontal cortex mediates emotional and behavioral control, functions not easily captured by neuropsychological tests. We examined whether focal lesions to lateral (LPFC) and orbital (OFC) prefrontal cortex had differential effects on cognitive test results and self-reported measures of executive control.
Participants and Methods: Fourteen patients with OFC and 10 with LPFC lesions were compared to 21 healthy controls using: WASI, Digit-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Span and Letter-Number Sequencing (WAIS-III), California Verbal Learning Test (CVLT-II), Brief Visual Memory test (BVMT-R), and Trail-Making Test, Design Fluency, Verbal Fluency and Color-Word Interference (D-KEFS). The Behavioral Rating Inventory of Executive Functions (BRIEF-A) measured self-reported executive problems.
Results: LPFC patients differed from controls on Total and Verbal IQ, Letter-Number Sequencing, several BVMT-measures, Verbal Fluency and the Inhibition and Switching conditions of the Color-Word Interference test. The OFC patients differed from controls on the third learning trial of BVMT, and reported more executive problems on all 3 main indexes of the BRIEF-A and 4/9 subscales. The LPFC group differed from controls on 2 BRIEF-subscales only. LPFC patients had lower scores than OFC patients on the naming and inhibition conditions of the Color-Word test.
Conclusions: Patients with lateral and orbitofrontal lesions differed from controls on different aspects of executive functioning. LPFC patients predominantly displayed cognitive executive symptoms on neuropsychological tests, while OFC patients reported more executive problems in everyday living. Few differences were seen between patient groups, indicating that measures of executive functioning lack specificity in differential diagnosis.
Correspondence: *Marianne Løvstad, Can.psychol, Reserach dept, Sunnaas Rehabilitation Hospital, Bjørnemyrvn, Nesoddtangen 1450, Norway. E-mail: mar.lovstad@gmail.com*

A. LUKOSE, K. KUMAR, J. KOVOOR & D. BHAT. Neuropsychological correlates of decision making in frontal lobe lesion patients.
Objective: The aim of the study was to examine the neuropsychological correlates of decision making in individuals with frontal lobe lesions as compared to normal controls.
Participants and Methods: The sample consisted of 22 frontal lobe lesion patients from inpatient/outpatient services of neurosurgery unit NIMHANS, Bangalore. 22 normal controls, matched with respect to age and education were selected from the community in Bangalore. The study had used computerized version of Iowa Gambling task, Object Alteration test, and Corsi Block Tapping test. The other tests used in the study were: Stroop Color-Word Test, N-Back Verbal Test of Working Memory, Tower of Hanoi task, Matrix reasoning, Pass along test and Block design test.
Results: The findings of the study showed there were significant difference between the two clinical group and the healthy normal controls on executive functions. However, the groups did not differ on decision making on IGT and OAT. Decision making processes and executive function were independent in normal controls. While there was a significant correlation between planning test and object alternation tests in the frontal group.
Conclusions: The correlation between executive function and object alternation test in the frontal group, and its absence in the normal control group is attributed to compensation of the functioning of disrupted DLPFC by unaffected orbitofrontal cortex in the frontal lobe group.
Correspondence: *Ammu Lukose, MPhil, Department of Psychology, Christ University, Assistant Professor, Christ University, Bangalore 560029, India. E-mail: ammu18lukose@gmail.com*

A. MENEZES, N.M. DIAS, B.T. TREVISAN, S. GODOY & A.G. SEABRA. Cognitive Flexibility in Brazilian Children and Adolescents Measured by the Trail Making Test.
Objective: Cognitive flexibility is considered one of the executive abilities and it is concepted as the ability to alternate responses, with the purpose to adapt choices to the contingencies, ensuring a flexible and adapted behavior to the new circumstances. A commonly used test to evaluate the flexibility is the Trail Making Test B (TMT-B). So, the aim of this study was to evaluate cognitive flexibility performance on the TMT-B in Brazilian students from 5th to 8th grade of an elementary school in State of São Paulo. Moreover, this research aimed to investigate validity evidences for the instrument based on the development through school grades.
Participants and Methods: The sample consisted of 251 participants, aged from 11 to 17 years, being 73 from 5th grade, 51 from 6th, 68 from 7th and 59 students from 8th grade. Inferential and post hoc analyses were conducted.
Results: In agreement with several previous studies, the results showed a significant effect of the scholar grade on the performance in the TMT-B, that is, there was an improvement in the students' cognitive flexibility performance with the school progression, from 5th to 8th grade. Furthermore, it was found validity evidences for the TMT-B in the Brazilian sample.
Conclusions: To obtain more knowlegde about executive functioning, abilities development, and the instruments, it is suggested that new studies are carried out, with larger samples and covering a larger diversity of ages and school grades.
Sponsor:
Menezes, A.; Dias, N. M.; Trevisan, B. T. : FAPESP Scholarship.
Godoy, S. : Mérito Mack Pesquisa Scholarship.
Seabra, A. G. : CNPq Productivity Scholarship.
Correspondence: *Amanda Menezes, Master of Science, Mackenzie Presbyterian University, Martinico Prado Street, 159, apartment 42, São Paulo 01.224-010, Brazil. E-mail: amandinhame@uol.com.br*

C.K. NZEREM, M.S. KIM, F.W. MARTINEZ, E. WOO, J. FOLEY, M.L. ETTENHOFER, S.A. CASTELLON, C.H. HINKIN & M.J. WRIGHT. Comparison of Verbal Fluency Switching Measures in HIV.
Objective: We compare spontaneous switching to directed switching in HIV+ participant verbal fluency performances. Our goal was to determine which of these was better associated with other measures of executive ability and was less language driven.
Participants and Methods: Our sample was comprised of 31 HIV+ participants. All the participants completed measures of phonetic fluency (FAS, F & S switching) and semantic fluency [Animals, Human Actions (HA), Animals & HA switching) in addition to the Paced Auditory Serial Addition Test (PASAT), Stroop Color-Word Test (Stroop), Trailmaking Test (TMT), Letter-Number Sequencing (LNS), Wisconsin Card Sorting Test, and the Boston Naming Task (BNT).
Results: Spontaneous switching on FAS correlated with PASAT (r=.37) and Stroop (r=.39). The spontaneous switching on Animals and HA correlated with Stroop (Animals: r= .36; HA: r= .44). Directed switching between the F and S as well as Animals and HA was associated with TMT B (F & S: r= -.43; Animals & HA: r= -.50), PASAT (F & S: r=.36; Animals & HA: r=.38), Stroop (F & S: r=.37; Animals & HA: r=.59), and LNS (F & S: r=.52; Animals & HA: r=.53). Spontaneous switching on FAS correlated with the BNT (r= .39), although directed switching did not.
Conclusions: While both measures indicated merit for assessing executive ability, directed switching appeared to be superior to spontaneous switching.
Correspondence: *Chinonyere K. Nzerem, Masters, Psychiatry, Harbor UCLA Medical Center, 1124 W. Carson St. B-4 South, Torrance, CA 90502. E-mail: cnzerem@llu.edu*

A. OCAMPO-FLORES & B. TELLEZ-ALANIS. The role of working memory in planning during performance in the tower of London task.
Objective: The aim of this study was to evaluate the influence of working memory (WM) on planning using the Tower of London task (TOL).
Participants and Methods: We evaluated 80 participants randomly distributed in four groups. Two manipulations of the TOL were realized to increase or decrease the WM load. The first was the form of application, originating four groups: immediate start, classic condition, pre-plan and plan plus help. The second one was to vary the trials according to the minimum number of moves required for solution (3, 4, 5, 6, 7, and 8 moves, four trials for each one).
Results: The results evidence significant differences in the number of perfect solutions between immediate start condition (Median, Med=9) and pre-plan (Med=11) and plan plus help conditions (Med=13). Likewise, the number of perfect solutions was higher in trials of three (Med=3) and four (Med=3) minimum moves compared with trials of five (Med=1) to eight (Med=1) minimum moves.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The results indicate that the application form has an effect on planning, pre-plan and plan plus help conditions, and that these last two conditions were more beneficial than the immediate start condition. Although the pre-plan and plan plus help conditions demand a greater WM load, this increment allows the development of the plan as well. On the other hand, the increase of WM load by augmenting the number of moves required for the solution did not lead to a gradual decrease in performance, since there were no differences among trials requiring five to eight moves.

Correspondence: *Amador Ocampo-Flores, MD undergraduate, Psicologia, Universidad Autonóma del Estado de Morelos, Calle Pico de Orizaba No.1, Cuernavaca 62360, Mexico. E-mail: atzayacahtl@hotmail.com*

R. GARRETT & C.A. PIERCE. A Comparative Analysis of the Category Test and the Wisconsin Card Sorting Test.

Objective: The current study is designed to replicate and extend the paper by Golden, Kushner, Lee, and McMorrow (1998), which sought to determine the skills underlying performance on the Wisconsin Card Sorting Test (WCST) and Category Test (CT) and how those tests differed. Unlike the previous paper, this study used demographically adjusted scores to address the influence of demographic factors on these two tests.

Participants and Methods: The sample comprised 82 females and 69 males referred for neuropsychological testing. Subjects were administered the CT, WCST, and the Wechsler Adult Intelligence Scale-III (WAIS-III). Mean age was 43.3. Mean education was 14.8. The racial breakdown was Caucasian (n = 128), African American (n = 9), Latino/a (n = 9), and Other (n = 5). Subjects with questionable effort were eliminated from the sample.

Results: Both of the current factor analyses produced a 5-factor model. Similar to the previous study, we found that the CT variables were included in a factor with performance variables from the WAIS-III, and the WCST variables loaded on their own factor. The three remaining factors included WAIS-III verbal, working memory, and processing speed subtests, respectively.

Conclusions: The current factor analyses were consistent with the findings of Golden et al., which used non-demographically corrected scores. These results continue to support the independence of the two tests. Consistent with the previous findings, the CT appears to require spatial reasoning, while the WCST does not. Neither test appears to be particularly influence by verbal ability or attentional factors (e.g., working memory or processing speed).

Correspondence: *Christopher A. Pierce, Ph.D., OBHS, Denver Health Medical Center, 667 Bannock St., Mail Code 3450, Denver, CO 80204. E-mail: christopher.pierce@dhha.org*

E. RHODES, M. LAMAR, V. ELDERKIN-THOMPSON, M. CASERTA, O. AJILORE, J. MEDINA & A. KUMAR. The Role of Executive Dysfunction on Visuoconstructional Processing in Late Life Depression.

Objective: Research into visuoconstructional processing and aging suggests that executive functioning (EF) is key to successful performance. Given EF deficits are observed in late life depression (LLD), we hypothesized that they would negatively impact visuoconstructional processing in LLD.

Participants and Methods: Eighty-seven healthy controls (HC;mean age=70.3±7.4) and 57 individuals with LLD (mean age=69.0±8.1) completed three visuoconstructional tasks (Visual Reproduction-Copy; Block Design; Rey-Osterrieth Complex Figure-Copy) as part of a larger neuropsychological protocol. Hierarchical linear regression analyses were computed for each task by diagnostic group. After age and MMSE were entered, composite z-scores from individual cognitive domains of EF, attention/information processing, learning and memory were entered as predictor variables of performance variance for each visuoconstructional task.

Results: Groups did not differ on demographic or visuoconstructional abilities. Across all three tasks, age and EF significantly contributed to performance variance in HCs while only age had a significant impact on performance variance in LLD. Given significant correlations between age and EF, especially for LLD (r=-.62, p<.001; HC:r=-.39, p<.001), we re-ran regressions exchanging the entry positions of age and EF. No change in results was observed for HC. In LLD, EF significantly contributed to visuoconstructional performance variance in lieu of age and with similar R^2-change values as those previously seen with age in this population.

Conclusions: Age and EF appear to be parallel mechanisms contributing to visuoconstructional abilities in HCs while the presence of LLD may consolidate their contribution to visuoconstructional processing. This may be due, in part, to increased white matter damage associated with LLD compared to HCs.

Correspondence: *Emma Rhodes, MA, Psychiatry, University of Illinois Chicago, 1601 W Taylor St., MC 912 - Psychiatric Institute, Chicago, IL 60612. E-mail: erhodes@psych.uic.edu*

C. SATLER & C. TOMAZ. Visuo-spatial Working Memory in Alzheimer's Disease: Role of Emotion.

Objective: The aim of the present study was to evaluate whether Alzheimer's disease patients (AD) and healthy older adults (OA) have the same performance pattern in a computerized spatial-delayed recognition span task (SRST) with emotional (positive/negative) and neutral (neutral/geometric) stimuli and short delay intervals.

Participants and Methods: The study included 40 healthy older adults (twenty-four women) and 22 AD patients (fifteen women). These patients met diagnostic criteria for probable AD according to NINCDS-ADRDA and ranged from mild to moderate by CDR Scale. All the subjects were assessed with a wide neuropsychological battery; behavioral disorders with Neuropsychiatric Inventory and Cornell Scale for Depression in Dementia (CSDD).

First, to determine the onset of the visuo-spatial working memory (VWM) impairment, we compared the performance of AD patients to that of OA. Second, to explore the influence of emotion on VWM we assessed whether AD patients and OA can remember a larger number of pictures when they have emotional valence.

Results: Results showed that groups differed significantly in VWM performance (P = .001), but did show a similar pattern of performance. As a key result, we observed that both groups remembered a higher number of negative than positive pictures (P = .001).

Conclusions: The present findings suggest that independently of the performance impairment of AD patients, they can store a larger number of emotional than neutral pictures as healthy OA, and emotional information have beneficial effects in their VWM function.

Correspondence: *Corina Satler, Master, Department of Physiological Sciences, University of Brasília, Laboratory of Neurosciences and Behavior, IB,, Brasilia 70910-900, Brazil. E-mail: corina.satler@gmail.com*

G.N. SAVLA, E.W. TWAMLEY, D.C. DELIS, S.C. ROESCH, W.K. THOMPSON, D.V. JESTE & B.W. PALMER. A Comprehensive Study of Executive Functions in Schizophrenia Using the Delis-Kaplan Executive Function System (D-KEFS).

Objective: Executive dysfunctions have long been associated with schizophrenia, but the precise nature of these deficits and their clinical and functional correlates has been elusive. Our goal was to determine (1) whether specific executive functions are differentially impaired in schizophrenia, (2) whether they represent unitary versus diverse constructs, and (3) how they relate to severity of psychopathology and functional capacity.

Participants and Methods: Participants were 145 individually-matched pairs of outpatients with schizophrenia (SCs) and normal comparison subjects (NCs). Group differences on ten "higher-order" executive tasks from the D-KEFS were analyzed with a MANOVA. In SCs only, a principal components analysis (PCA) was conducted on the ten D-KEFS tasks. A second PCA was conducted on weighted residuals of the D-KEFS tasks after accounting for processing speed. Relationships among executive functions and demographics, psychopathology, and functional capacity were examined via bivariate correlations.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Diagnostic group had a large main effect on D-KEFS tasks [(SCs < NCs), $F(10, 279)=16.38$, $p<.001$, partial $\mu^2=.370$], with Trails Switching being most impaired among SCs. The initial PCA suggested a two-component solution (switching/timed and abstraction tests). PCA of D-KEFS residual scores yielded two components (cognitive flexibility and abstraction, variance explained=52.6%), with little overlap ($r^2=9.6\%$). Better cognitive flexibility was associated with lower age and less severe psychopathology. Better abstraction was related to higher education and functional capacity, and shorter illness duration.
Conclusions: Executive functions are not a unitary construct, rather, comprise at least two distinct constructs. These findings may have implications for treatment planning and cognitive rehabilitation efforts, as well as for elucidating the underlying neural circuitry in schizophrenia.
Correspondence: *Gauri N. Savla, Ph.D., Psychiatry, University of California, San Diego, 3350 La Jolla Village Drive, 0603-V, San Diego, CA 92161. E-mail: gnayak@ucsd.edu*

S.R. THORGUSEN, Y. SUCHY, H.K. RAU & P.G. WILLIAMS. Emotional Distracters Affect Task Performance under High Executive Demands.
Objective: Emotional distracters can alter performances on various cognitive measures, including task switching (Wang & Guo, 2008). This study investigated the effects of emotional distracters on performance on low versus high executive demand conditions in spatial and verbal versions of a switching task.
Participants and Methods: Three hundred college-age students were recruited from undergraduate psychology classes. Participants completed two switching tasks, one requiring that they switch between classifying stimuli as vowels/consonants versus capital/lower case letters, and one requiring that they switch between classifying locations of stimuli on the screen along a diagonal versus vertical axis. Stimuli were alphabet characters superimposed over grayscale images with smiling (positive) or crying (negative) facial expressions.
Results: We ran a repeated measures analysis of variance (ANOVA) using response latencies as dependent variables, and distracter type (positive versus negative), trial type (high versus low executive demand), and task type (verbal versus spatial) as within-subjects factors. The ANOVA yielded a significant three-way interaction between task type, distracter type, and trial type ($F[1,299]=5.905$, $p<.05$), demonstrating longer response latencies for positive distracter trials on the verbal task and for negative distracter trials on the spatial task, but only under high executive demand. Distracter type had no differential effects on either switching task under low executive demand.
Conclusions: Emotional distracters may have the greatest impact on task performance under higher executive demand. Future work should include a neutral comparison group to clarify whether effects of distracters result from facilitation and/or interference effects.
Correspondence: *Sommer R. Thorgusen, M.S., Psychology, University of Utah, 380 S 1530 E, Room 502, Salt Lake City, UT 84112. E-mail: sommer.thorgusen@hsc.utah.edu*

D. WALKER & M. DESROCHER. Executive Function and Social Cognition in Typically Developing Adolescents.
Objective: Appropriate development of social skills is important for academic and career success. Adolescence may be a sensitive period of reorganization in brain areas such as the frontal lobe, which may have significant effects on social development. The purpose of this study was to investigate the relationship of social cognition and executive function in adolescence.
Participants and Methods: Ninety-one males participated in this research (mean age = 14.23, SD = 2.44). Participants completed measures of executive function (concept formation, verbal fluency, cognitive flexibility, inhibition, visual-spatial processing, planning and organization) and social cognition (perspective taking, social problem-solving, and social norm violations). Analysis of variance and regression methods were used to analyze the data.
Results: Performance on visual executive function tasks was found to plateau in mid-adolescence, while verbal executive function tasks continue to develop at a linear rate throughout adolescence. Performances on working memory and complex attention tasks plateau in early to mid-adolescence, with an increase in performance in late adolescence. With respect to the relationship of social cognition and executive function, scores on tasks that involve encoding and interpretation of another's behaviour were predicted by concept formation/reasoning and visual processing skills. The ability to generate alternative social responses was predicted by word generation and attention/planning abilities.
Conclusions: Concept formation, planning, attention and word generation were found to be related to an adolescent's ability to engage in appropriate social cognition. Attention and working memory may develop in a non-linear fashion during adolescence, which may have an impact on social development. Strategies targeting specific executive skills related to social cognition may enhance social development in adolescence.
Correspondence: *Darlene Walker, Ph.D., Psychology, Sick Kids, 555 University Avenue, Toronto, ON M5G 1X8, Canada. E-mail: darlene.walker@sickkids.ca*

J.A. WELLER, J.J. VENTER, C. ADLER & D. DRACHMAN. Differences in Executive Functioning in Children with an Autism Spectrum Disorder versus Children with ADHD.
Objective: The study compared executive functioning (EF) test data in children with either ADHD or an autism spectrum disorder (ASD) to identify similarities and differences.
Participants and Methods: Neuropsychological data from the Wechsler Intelligence Scale for Children – Fourth Edition, Wisconsin Card Sorting Test (WCST), Conners Continuous Performance Test – Second Edition (CPT-II), and Trail-Making Tests (TMT) were acquired. Two groups (ASD and ADHD) were created using DSM-IV-TR diagnoses. Demographic and clinical variables from the two groups were compared using T-tests and Chi-square analyses. Data from 46 children were analyzed (19 ADHD, 27 ASD; mean age 11.6 years both groups).
Results: Full Scale IQ scores were not statistically significantly different between groups. Of the four composite IQ indexes, only Processing Speed was significantly different ($p = .024$), with ADHD participants scoring higher. Scores on the CPT-II and TMT were not statistically significantly different. On the WCST, statistically significant differences were found on number of trials required to complete the test ($p = .006$) and number of categories completed ($p = .034$) with ADHD participants performing more poorly. Trends toward statistical significance were noted for number of trials required to complete the first category and number of failures to maintain set, with ASD performing better.
Conclusions: ADHD participants showed faster processing speed, supporting findings in the literature. In contrast to expectation, the ADHD group performed less well on the WCST, with better cognitive flexibility in the ASD group. These findings may reflect selection bias (the ASD group had comparable IQ scores, reflecting higher functioning) and/or symptom overlap.
Correspondence: *Jennifer A. Weller, Ph.D., Psychiatry, District Medical Group of Arizona (DMG), Desert Vista Behavioral Health Center, 570 W. Brown Road, Mesa, AZ 85201. E-mail: drjweller@gmail.com*

J.P. WILSON & L.J. ALTMANN. Too Many Stroops Spoil the broth? Effects of Congruent Stimuli and Cue-Switching on Stroop Performance.
Objective: While computerized versions of Stroop tasks are widely reported in the literature, to our knowledge, no study compares performance on traditional versions of Stroop to cue-switching versions. In this study we contrast performance on Stroop tasks with and without congruent stimuli or cue-switching. Our purpose is to determine whether times and interference are congruent across different versions of the task and whether performance reflects task-related differences in prepotent response inhibition or cue costs.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: As part of a larger cognitive battery, 30 college students completed 4 Stroop tasks: traditional offline, traditional online versions (both 100% incongruent), an online version with 25% incongruent stimuli, and an online cued version with 25% incongruent stimuli in which participants were cued to produce either the WORD or the COLOR of the following stimulus.
Results: Response times (RTs) but not interference for traditional offline Stroop correlated weakly with traditional online, 25% incongruent and cued-color Stroop. However, participants were faster in the traditional online (i.e. all incongruent) version than in the 25% incongruent and cued-color versions, which did not differ. Cued color performance aligned with the 25% incongruent version in RTs, interference and correlations with other tasks. Cued-color and cued-word conditions dissociated in RTs, interference, and patterns of correlations with other tasks.
Conclusions: We find no evidence for common cuing costs underlying the cued Stroop versions. However, we find strong evidence that including both congruent and incongruent stimuli in a Stroop task fundamentally changes task demands, perhaps by increasing the difficulty of inhibiting prepotent responses.
Correspondence: *Jonathan P. Wilson, MA, Speech Language & Hearing, University of Florida, 336 Dauer Hall, Box 117420, Gainesville, FL 32611-7420. E-mail: wilsonjp@ufl.edu*

N.T. YEHYAWI, B.C. BAUGHMAN, J.C. YOUNG & E.M. CROUSE. Disconnect between BRIEF-A and performance-based measures of executive functioning: Where's the clinical relevance?
Objective: The Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A) is a psychometrically sound measure of executive behavior that was developed to supplement data gathered from face-to-face testing. Previous research with children (BRIEF) has found inconsistent relationships with performance-based measures (McCauley et al., 2010). In an adult sample, Rabin and colleagues (2006) found that the BRIEF-A Working Memory subscale was most frequently elevated in subjects with diagnoses of cognitive impairment, but they found only a modest relationship with performance on one visual memory task. The present study examines the relationship between the BRIEF-A and scores on performance-based executive tasks in a fairly heterogenous sample of veterans.
Participants and Methods: Participants included 89 male veterans (age: M = 66.2, SD =15.8, Range = 24-85; education, M = 12.6, SD =3.4) who completed neuropsychological evaluation for a variety of clinical complaints.
Results: Analyses revealed non-significant correlations between BRIEF-A subscales and virtually all executive functioning tests. For the self-report BRIEF-A, ratings on the Inhibition and Task Monitoring subscales were related to performance on an action/verb fluency task and Task Monitoring was related to letter fluency performance. For the informant version, Working Memory ratings were related to action/verb fluency.
Conclusions: Our results broadly support Rabin et al.'s (2006) findings regarding the relationship between the BRIEF-A and performance-based executive tasks. While the BRIEF-A is a useful source of data regarding patients' and families' perceptions of executive dysfunction in daily life, clinicians should be aware that such a measure cannot serve as a replacement for traditional neuropsychological testing. Clinical implications and future directions are discussed.
Correspondence: *John C. Young, Ph.D., Memphis VA Medical Center, 399 Reksten Cove, Cordova, TN 38018. E-mail: john.young5@va.gov*

THURSDAY AFTERNOON, FEBRUARY 3, 2011

Invited Symposium: The Impact of Amyloid-β on Cognitive Aging: PET Amyloid Imaging and Neuropsychological Performance

Chair: Reisa Sperling

1:30–3:00 p.m.

R. SPERLING. The impact of amyloid-β on cognitive aging: PET amyloid imaging and neuropsychological performance.
Symposium Description: Converging evidence from autopsy, cerebrospinal fluid and PET amyloid imaging studies suggests that approximately one-third of clinically normal older individuals harbor substantial amyloid-β burden. The long-term consequences of amyloid deposition in these individuals remain unknown, but recent studies suggest that the presence of high amyloid burden may be associated with early alterations in brain structure and function. The limited literature on amyloid-associated neuropsychological alterations thus far has been somewhat inconsistent, but several studies have reported subtle changes in cognitive performance in clinically normal older individuals with high amyloid burden. Furthermore, recent reports suggest that cognitive and brain reserve may modulate the clinical expression of amyloid burden. This symposium will bring together investigators from several groups using PET amyloid imaging to investigate the impact of amyloid deposition on neuropsychological performance in healthy older individuals.
Correspondence: *Reisa Sperling, MD, Center for Alzheimer Research and Treatment, Brigham and Women's Hospital, 221 Longwood Avenue, Boston, MA 02115. E-mail: reisa@rics.bwh.harvard.edu*

R. SPERLING. Introduction - Amyloid-β deposition and large-scale neural networks.
Objective: The striking anatomic overlap between the pattern of amyloid deposition on PET amyloid imaging and a set of cortical regions, collectively known as the "default network", has been previously noted. Several multi-modality neuroimaging studies in healthy older individuals have demonstrated amyloid-associated functional abnormalities within the default network, detectable during both memory tasks and the resting state. Recent studies have also reported subtle cortical thinning in regions known to harbor high amyloid burden, even in cognitively normal older individuals. Interestingly, the hippocampus, sometimes considered a node in the default network, has not shown consistent abnormalities in amyloid-positive clinically normal older individuals, suggesting that medial temporal involvement may be concurrent with memory failure. The findings from neuroimaging studies may provide important clues to the pattern of very early cognitive alterations associated with amyloid deposition in clinically normal older individuals.
Correspondence: *Reisa Sperling, Brigham and Women's Hospital, 221 Longwood Avenue, Boston, MA 02115. E-mail: reisa@rics.bwh.harvard.edu*

D. PARK. The Cognitive Consequences of Amyloid Deposition in a Lifespan Sample of Healthy Adults.
Objective: We conducted amyloid imaging using AV-45 on a sample of 140 very healthy adults from aged 30 to 90 who were participants in the Dallas Lifespan Brain Study. We also collected extensive cognitive and functional imaging data. Amyloid deposition did not become prevalent in the sample until the sixth decade. Despite a MMSE mean score of 29, amyloid depositers showed lower speed of processing, working memory and reasoning scores, and also showed lower prefrontal activations on an encoding task. Increased default activity was also observed in depositers. Long-term follow-up is planned.
Correspondence: *Denise Park, Center for Vital Longevity, University of Texas at Dallas, Dallas, TX 75235. E-mail: denise@utdallas.edu*

S.M. RESNICK. Amyloid Imaging and Memory Change as Predictors of Cognitive Decline and Resilience.
Objective: Through serial neuroimaging and neuropsychological evaluations of participants in the Baltimore Longitudinal Study of Aging

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

(BLSA), we are examining changes in brain structure and function as predictors of cognitive decline and resilience. Since 1994, magnetic resonance imaging (MRI), positron emission tomography (PET) blood flow scans, and neuropsychological testing have been performed for participants, aged 55 and older. PET imaging of ≥-amyloid deposition using 11-C-Pittsburgh Compound B was added in 2005. Consistent with autopsy data from BLSA and other studies, more than 30% of cognitively normal individuals have detectable amyloid deposition in the brain on in vivo imaging. Individuals with higher levels of ≥-amyloid are older, have greater longitudinal decline in memory and other cognitive functions, and show greater longitudinal increase in amyloid deposition. We are continuing to follow these individuals and are examining modifiers of both structural and functional brain changes and their associations with cognitive function. Early prediction of cognitive impairment and factors that promote cognitive resilience in the face of pathology will be essential as new therapies are developed.

Correspondence: *Susan M. Resnick, Biomedical Research Center, room 04B317, National Institute on Aging, Bethesda, MD 21224. E-mail: resnicks@grc.nia.nih.gov*

D.M. RENTZ. Detecting Amyloid-related Neuropsychological Alterations in Cognitively Normal Adults.

Objective: Cerebral amyloid beta (A≥) deposition occurs in a substantial fraction of cognitively normal older individuals. However, it has been difficult to reliably detect evidence of A≥-related cognitive alterations in normal aged adults using standard neuropsychological measures. In a sample of normal older individuals who underwent amyloid imaging using Positron Emission Tomography with Pittsburgh Compound B (PIB), we found that standard neuropsychological tests were not as useful for detecting A≥-related cognitive alterations in cognitively normal older subjects because of the modifying effects of cognitive reserve. However, more challenging tests of associative memory, in particular, a face name associative memory test (FNAME) was able to reliably detect A≥-related memory impairment in cognitively normal adults. As the field moves toward detecting and treating asymptomatic individuals during the very earliest stages of A≥ deposition, neuropsychologists will need to develop cognitive measures that are sensitive to early pathological change, such as amyloid deposition.

Correspondence: *Dorene M. Rentz, Department of Neurology, 221 Longwood Avenue, Boston, MA 02115. E-mail: DRENTZ@PARTNERS.ORG*

Symposium 4: Endophenotypes for Schizophrenia Spectrum Disorders: Evidence from Neurological, Cognitive, and Emotional Findings

Chair: Raymond C. Chan

Discussant: Matcheri Keshavan

1:30–3:00 p.m.

R.C. CHAN, R. CHAN, W.S. STONE, R.`. GUR, L. SEIDMAN & M. KESHAVAN. Endophenotypes for Schizophrenia Spectrum Disorders: Evidence from Neurological, Cognitive, and Emotional Findings.

Symposium Description: The Endophenotype concept has been an enduring feature in psychiatry for nearly 4 decades, since its introduction in the classic monograph by Gottesman and Shields (1972). However, there is a tremendous reviving interest in endophenotype recent years due to their potential associations with genomic data to provide a promising step forward for parsing complex, heterogeneous disease phenotypes such as schizophrenia spectrum disorders. These endophenotypes of disorders may be more specific and amenable to objective measurement than clinical symptoms, which presumably reflect variation among smaller numbers of genes than more distal clinical symptoms. These features support the current usefulness of endophenotypes in genetic studies, and their potential usefulness in the development of strategies for early intervention. In this symposium we focus on potential endophenotypes, including the neurological, cognitive, and emotional domains, for schizophrenia spectrum disorders.

Correspondence: *Raymond C. Chan, Ph.D., Institute of Psychology, Chinese Academy of Sciences, 4A Datun Road, Beijing 100101, China. E-mail: rckchan@psych.ac.cn*

R. CHAN. Functional Connectivity of Neurological Soft Signs in First-episode Schizophrenia and Their Non-psychotic First-Degree Relatives.

Objective: Neurological soft signs have been considered to be one of the promising neurological endophenotypes for schizophrenia. However, most of the previous studies have been limited to clinical rating data. The current study aimed to provide a neural basis for one of the typical motor coordination signs, the Fist-Edge-Palm (FEP) in first-episode schizophrenia and their non-psychotic probands.

Participants and Methods: Nine patients with first-episode schizophrenia and 10 non-psychotic first-degree relatives were recruited for the current study. All of them were instructed to perform the FEP task in a 1.5 T GE Machine. Psychophysiological interaction (PPI) analysis was adopted for data analysis

Results: The PPI analysis indicated that significantly greater functional connectivity between the left and right sensorimotor cortex and the right inferior and middle frontal cortex during the performance of the FEP task compared with the simple motor task in both patients and non-psychotic probands. However, regional signal changes showed no significant activation differences in the prefrontal regions. Similar patterns were demonstrated in both schizophrenia patients and their non-psychotic probands, with patients showing a weaker connection than their non-psychotic probands

Conclusions: These findings suggest a role of functional connectivity of neurological soft signs to be the potential endophenotype for schizophrenia. In particular, the role of motor regulation, rather than direct participation, of the prefrontal cortex in the execution of neurological soft signs is specific to schizophrenia spectrum disorders.

Correspondence: *Raymond Chan, 4A Datun Road, Beijing 100101, China. E-mail: rckchan@psych.ac.cn*

W. STONE. Recent developments in neuropsychological endophenotypes for schizophrenia: Relationships to other dimensions of function and to liability syndromes.

Objective: The main objective of this presentation is to maximize the utility of neuropsychological endophenotypes in schizophrenia as both diagnostic indicators and potential treatment targets, by exploring their roles and interrelationships with other dimensions of schizophrenia illness. This topic reflects the increasing attention directed to the search for alternate phenotypes, or 'endophenotypes' (e.g., heritable social, psychophysiological or neurocognitive abnormalities) in schizophrenia, and the growing awareness that multidimensional expressions of psychiatric disorders can advance the search for underlying etiological factors and early intervention strategies. Measures of neuropsychological functioning have been particularly informative in this endeavor, as neuropsychological dysfunction is now widely recognized as a core component of schizophrenia that contributes to functional outcomes of the illness. Neuropsychological deficits occur in subjects with schizophrenia and related 'spectrum' conditions, and in clinical (e.g., prodromal) and genetic (e.g., the children of parents with schizophrenia) high risk subjects

Participants and Methods: After an overview of proposed neuropsychological endophenotypes in schizophrenia, data from recent studies will be presented to assess: 1) how neuropsychological function relates to other dimensions of function, including performance-based measures of functional capacity and clinical symptoms; and 2) the current status of attempts to include neuropsychological measures in liability syndromes for schizophrenia in non-psychotic adult relatives of schizophrenia patients

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Neuropsychological measures are significantly associated with other dimensions of function in schizophrenia, and in the development of liability syndromes.
Conclusions: Neuropsychological measures show promise as diagnostic indicators of liability to develop schizophrenia, and as treatment targets to improve clinical outcomes
Correspondence: *William Stone, 401 Park Drive, Boston, MA 02215. E-mail: wstone@bidmc.harvard.edu*

R. GUR. Findings from a computerized neurocognitive battery applied to phenotype large-scale genomic studies of schizophrenia: Lessons and a glimpse into future applications of item response theory.
Objective: Cognitive domains are increasingly being used as potential endophenotypic markers of brain disorders. Such domains are measured with neuropsychological tests, but incorporation of this testing into large scale genomic studies requires a computerized format and rapid yet reliable collection of neurobehavioral data. We present our experience with using a neuroscience-based computerized battery in genomic studies with thousands of participants.
Participants and Methods: We developed a battery that adapts tasks that have been validated in functional neuroimaging studies for use as neuropsychological tests. The initial hour-long battery has been administered in 3 collaborative studies involving about 6000 participants that included patients with schizophrenia, their family members and healthy controls. It was trimmed into a 40-minute session using both classical psychometric approaches and item response theory (IRT), and this abbreviated battery is being administered to 10,000 children age 8-21.
Results: The battery showed robust differences between patients and controls, with family members showing intermediate performance. Response time was slowed in relative on those domains where accuracy of response was maintained. The measures showed moderate to high heritabilities and large genetic correlations. The abbreviated battery showed strong age effects of increased accuracy and speed, indicating developmental maturation, as well as sex differences.
Conclusions: Brief computerized neuropsychological batteries are feasible in large-scale genomic studies. They produce reasonably reliable effects and high heritability, and thus can serve as tools for generating biomarkers in genomic studies. Such behavioral endophenotypes can help uncover vulnerability genes that may underlie neurodevelopmental disorders such as schizophrenia.
Correspondence: *Ruben Gur, 3400 Spruce Street, Philadephia, PA 19104. E-mail: gur@upenn.edu*

L. SEIDMAN. Comparison of genetic and clinical high risk studies for early detection of schizophrenia in adolescence.
Objective: The focus on early detection and developing novel interventions to prevent or delay the onset of schizophrenia, and to attenuate the severity of the disorder, has captured the imagination of many investigators around the world. Recent approaches have focused primarily on the symptom based clinical high-risk (HR) approach comprising the period roughly within the year prior to onset of psychosis ("prodrome"), as well as the "basic symptom" approach that potentially addresses an earlier prodromal period. Yet one of the strongest predictors of conversion to psychosis is having a family history of schizophrenia. Indeed, an earlier generation of studies focused on the role of family history of psychosis ("genetic HR" approach) by studying biological and social markers for future predictive use in offspring of people with schizophrenia. Thus genetic HR cohorts have the potential to enhance the prediction of schizophrenia. A key question is how to integrate the genetic HR findings, particularly for earlier detection, in the era of clinical HR studies.
Participants and Methods: The presentation will include: 1) an overview of the various strategies. 2) a review of the neural substrates of risk for schizophrenia, summarizing research from structural and functional MRI studies; and 3) evaluating the relationship of brain and neuropsychological measures.
Results: Structural and functional measures are significantly associated with clinical and neuropsychological function in schizophrenia especially the "default mode" of functioning
Conclusions: The various HR approaches offer strategies for earlier intervention at different stages of the pre-illness period that may alter the disabilities associated with schizophrenia.
Correspondence: *Larry Seidman, 401 Park Drive, Landmark Building, 2 East Boston, Boston, MA 02114. E-mail: lsquire@ucsd.edu*

Poster Session 4: Aging, Epilepsy, Functional and Structural Imaging, Memory

1:30–3:00 p.m.

Aging

M. ANDERS, A.M. CHRISTNER, S.A. ROGERS & D.A. LOWE. Can Anxiety Hinder Frontal-Executive Performance Among Older Adults?
Objective: Previous studies have looked at the relationship between negative affect and executive functioning in participants with neurological disorders. Little research has been conducted, however, to consider anxiety's particular effect on frontal-executive functioning. This study investigates the relationship between anxiety and frontal-executive performance, specifically in older adults.
Participants and Methods: Fifty-two older adults, with a mean age of 80.19 years (*SD* = 8.72) and average education of 15.88 years (*SD* = 2.93), completed a comprehensive battery of neuropsychological tests, including the Beck Anxiety Inventory (BAI) to assess state anxiety. Frontal-executive measures included the WAIS-III Similarities, Digit Span, Digit Symbol, and Letter-Number Sequencing subtests; Trailmaking A and B; DKEFS Color Naming, Word Reading, and Color-Word Interference; and COWAT FAS.
Results: Significant negative correlations were found between BAI scores and several frontal- executive tests, including WAIS-III Digit Symbol, $r(48) = -.35$; Trailmaking A, $r(49) = -.31$; WAIS-III Similarities, $r(52) = -.30$; and DKEFS Color-Word Interference, $r(49) = -.30$, $ps < .05$. Multiple regression analyses revealed that the relationship between BAI and WAIS-III Similarities was no longer significant after controlling for the effects of age and education, $p > .05$.
Conclusions: Anxiety seems to impact a variety of frontal-executive functions in older adults, including response inhibition and verbal abstraction, although the latter may be mediated by level of education. Visual processing speed also appears to be slowed by anxiety, although verbal processing speed does not appear to be related to anxiety. These results suggest that clinicians and researchers may find it helpful to account for older adults' current level of anxiety when assessing frontal-executive skills.
Correspondence: *Megan Anders, Westmont College, MS# 1030, 955 La Paz Rd, Santa Barbara, CA 93108. E-mail: manders@westmont.edu*

M. ANDERS, S.A. ROGERS & D.A. LOWE. Is There An Interaction Between Personality and Memory Among Older Adults?
Objective: Little research has examined the relationship between personality differences and the process of encoding, retention, and recall. This study aims to elucidate the effects of personality on learning and memory among older adults.
Participants and Methods: Seventy-seven older adults (*M* age = 79.52, *SD* = 9.15) completed the NEO-FFI, which measures five factors of personality: neuroticism, extroversion, openness, agreeableness, and conscientiousness. To assess learning and memory performance, WMS-III Logical Memory (LM I & II), WMS-III Visual Reproduction (VR I & II), CVLT-II, and ROCF (3' & 30') were administered.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Neuroticism was negatively correlated with LM I and VR I, *p*s < .05. Extroversion was positively correlated with LM I, CVLT-II Trial 5, and CVLT-II Trials 1-5 performance, *p*s < .05. Openness was positively correlated with CVLT-II Trial 5, $p < .04$.
Conclusions: These results suggest that the learning and memory of older adults is related to distinct personality features. Those with greater emotional instability seem to struggle more with both verbal and visual learning, but not retention and recall. Those who are more extroverted appear to perform better at verbal learning than those who are less extroverted, and those with higher levels of openness may be better at learning unstructured verbal information than those with lower levels of openness. With this in mind, clinicians should consider patients' personality features when reviewing test results and when making interpretations about learning and memory. Future research should also further investigate the intersection of personality and cognitive functioning.
Correspondence: *Megan Anders, Westmont College, MS# 1030, 955 La Paz Rd, Santa Barbara, CA 93108. E-mail: manders@westmont.edu*

A. BENITEZ, M.D. HORNER & D. BACHMAN. Intact Cognition in Depressed Elderly Veterans Providing Adequate Effort.
Objective: Geriatric depression has been associated with cognitive impairments, but whether suboptimal effort contributes to these deficits is unknown. This study investigated differences in cognitive functioning between depressed and non-depressed elderly veteran patients, before and after excluding patients who provided suboptimal effort on testing.
Participants and Methods: Elderly, predominantly male veteran patients at a Southeastern VA Medical Center completed a neuropsychological and neurological evaluation at a multidisciplinary Memory Disorders Clinic. Each patient completed the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), Geriatric Depression Scale (GDS), and Test of Memory Malingering (TOMM). Suboptimal effort was identified using a multi-method approach including TOMM performance and behavioral observations, and rendered by team consensus based on the entire encounter at the time clinical care was delivered.
Results: Patients diagnosed with a depressive disorder (n=40) performed more poorly than non-depressed patients (n=58) on almost all RBANS indices [$F(6, 90)=5.58$, $p<.001$], but these differences became non-significant after excluding patients who provided suboptimal effort. However, when patients were classified as normal (n=168), mildly (n=95), or severely (n=45) depressed based on GDS scores, these groups were not significantly different on RBANS indices, regardless of whether patients who provided suboptimal effort were included or excluded from analyses. Furthermore, the GDS was only minimally correlated with the Attention index ($r=.12$, $p<.05$) and no other indices.
Conclusions: The findings suggest that cognitive deficits in depression reported in previous research may be largely attributable to suboptimal effort, and that identifying depression via clinical diagnosis or psychometric data may affect this trend.
Correspondence: *Andreana Benitez, Kent State University, 11969 Kiowa Ave., Apt 16, Los Angeles, CA 90049. E-mail: anyabenitez@gmail.com*

C. CHUNG & Z. LIN. A cross-cultural examination of the positivity effect in memory: China vs. United States.
Objective: We aimed to examine the cross-cultural generalizability of the age-related positivity effect in memory. We hypothesized differences in emotional memory among cultures based on cultural age stereotypes (more negative in Western vs. Eastern cultures).
Participants and Methods: We tested 46 young (ages 18-30) and 48 older adults (ages 60-87) in the United States (US); 15 young (ages 18-30) and 40 older adults in Canton, China (ages 60-85); as well as 28 first generation Chinese older adults (ages 60-79) who reside in the US on an emotional picture memory task. Participants were shown 30 pictures (10 positive, 10 negative, 10 neutral) on a computer screen during an incidental memory task and were asked to recall these pictures using brief verbal descriptions after a filled delay of 5 minutes.
Results: Chinese older adults remembered significantly fewer negative pictures than their Chinese young adults, $t(53) = 3.42$, $p < .01$; while US older adults remembered significantly more positive pictures than US young adults, $t(93) = 2.24$, $p < .03$. Chinese older adults who live in the US recalled marginally fewer negative pictures than the Caucasian older adults, $t(75) = 1.68$, $p < .10$; but did not perform significantly differently from China older adults.
Conclusions: Older adults in both countries exhibited an age-related positivity effect in memory. However, the different emotional memory patterns suggest that Chinese older adults achieved positivity through a decrease in negative memory, while US adults did so through an increase in positive memories.
Correspondence: *Christie Chung, Mills College, 5000 MacArthur Blvd., Oakland, CA 94613. E-mail: cchung@mills.edu*

E.M. HOLCOMB, J.L. WOODARD, J.E. CALAMARI, M. DUX, M. MESSINA, N. PONTARELLI, J. SOCHA, B. DEJONG & K.M. ARMSTRONG. Serial Position Effects as Predictors for Change in Global Cognition as Measured by the Dementia Rating Scale-2.
Objective: Serial position recall performance in dementia is characterized by large deficits in recalling words presented earliest on the list (primacy portion of the list) with few deficits recalling information presented most recently (recency portion of the list). The purpose of this study was to investigate the value of these baseline serial position effects for predicting future cognitive change.
Participants and Methods: Participants were 204 older adults (M age = 76.7) drawn from a longitudinal study of risk factors for late-life anxiety. Participants completed the Rey Auditory-Verbal Learning Task (AVLT) and Dementia Rating Scale-2 (DRS-2) at baseline and one-year follow up. Standardized residual change scores were calculated for the DRS-2 raw score and each subscale. Linear regression examined whether baseline AVLT primacy and recency recall performance could predict one-year change in DRS-2 total and subscale scores.
Results: Baseline AVLT primacy recall score was a significant predictor of one-year change in DRS-2 total score (p=006). Baseline primacy performance also predicted change specifically on the DRS-2 Attention (p=.007) and Memory (p=.005) subscales. AVLT recency recall performance did not predict change on DRS-2 total or subscale scores.
Conclusions: Recall from the primacy portion of the AVLT serial position curve predicted one-year cognitive change, specifically related to attention and memory, in healthy older adults. Mild reductions in primacy recall may be linked to early cognitive changes that may be present prior to the onset of observable clinical symptoms.
Correspondence: *Erin M. Holcomb, MA, Wayne State University, 316 S Maple Ave, Royal Oak, MI 48067. E-mail: du0878@wayne.edu*

M. BADARACCO, K. GIFFORD, A. GENTILE, G. CHAPMAN, U. NAHAR, Y. TRIPODIS & A.L. JEFFERSON. The Relation of Hypertension to Cognition in Observational Studies: A Meta-Analysis.
Objective: Observational studies suggest hypertension has adverse effects on cognition; however, results are inconsistent. Using meta-analysis, we sought to determine whether hypertension is associated with cognition among older adults in the absence of clinical dementia or stroke and determine which cognitive domains are preferentially affected among observational studies.
Participants and Methods: Using PubMed and PsycINFO, 8861 articles were initially identified. Exclusion criteria included randomized controlled trials, reviews, mean age of entry of <55 years, clinical diagnoses of dementia or stroke, non-English language publications and studies lacking cognitive data. After screening for these criteria, 18 articles were identified. Study parameters, regression covariates, and cognitive test results were extracted and examined using meta-analysis.
Results: Preliminary analyses were restricted to 3 studies which contained regression coefficients. Effect sizes of systolic (S) and dias-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

tolic (D) hypertension on the various cognitive domains are as follows: Global Cognition: d(S)=-0.029 (p<0.05), d(D)=-0.051 (p<0.05), Memory: d(S)=-0.030 (p<0.05), d(D)=-0.064 (p<0.05), Executive Functioning: d(S)=-0.019 (p>0.05), d(D)=0.007 (p>0.05), Information Processing Speed: d(S)=-0.009 (p>0.05), d(D)=-0.023.
Conclusions: Our meta-analysis suggests that hypertension has a significant and medium size effect on global cognition and memory. These results underscore the need for continual efforts to prevent and treat hypertension, as hypertension negatively affects cognition prior to the onset of clinical disease, such as dementia or stroke.
Correspondence: *Angela L. Jefferson, PhD, Boston University School of Medicine, 72 East Concord Street, B-7800, Boston, MA 02118. E-mail: angelaj@bu.edu*

J.C. LEA, M. KAREN, J. KIM, S. PAZIENZA, J. WONG & G. SMALL. The Montreal Cognitive Assessment (MOCA)'s Subtests and Mild Cognitive Impairment in Oldest Old Adults.
Objective: Age-consistent Memory Impairment (ACMI) is cognitive decline associated with normal, non-pathological aging. Some older adults experience Mild Cognitive Impairment (MCI), or memory decline beyond what is expected for age and educational level, and is often the predecessor to dementia. The Montreal Cognitive Assessment (MoCA) is a 30-point screener to detect MCI. The goal of this study is to determine the effectiveness of the MoCA and its subtests in differentiating ACMI and MCI.
Participants and Methods: The following domains from the MoCA were examined: attention, orientation, visuospatial/executive functioning, language/naming, abstraction, and memory.
Results: There was a significant difference between ACMI (N=63) and MCI (N=35) on MoCA scores (F=39.96, p < .01; MCI: M=21.77, SD=2.50; ACMI: M=25.19, SD=2.60), with no significant differences in age (M=81.30, SD=6.34), education level (M=16.13, SD=2.18) or intelligence (WTAR: M=41.86, SD=10.64). Individuals with MCI scored significantly lower on visuospatial/executive (F=8.60, p < .01), attention (F=19.71, p < .01), language/naming (F=9.49, p < .01), and memory (F=20.22, p < .01) subtests; no differences found for abstraction and orientation. Means and standard deviations of subtests will be available in a table.
Conclusions: Individuals with MCI score lower than those with ACMI on the MoCA, suggesting that it is a good tool to detect early cognitive decline. It is also notable that the average score on the MoCA for the ACMI group was 25, which is less than the suggested cut-off of 26, warranting a closer evaluation of the cut-off, particularly in older adults over 80 years.
Correspondence: *Julia C. Lea, MA, Fuller School of Psychology, 185 N. Oakland Ave, Pasadena, CA 91101. E-mail: julia_lea@fuller.edu*

S. LEON, L.J. ALTMANN, L. ABRAMS, L.J. GONZALEZ ROTHI & K.M. HEILMAN. Divergent Thinking as a Measure of Creative Processing in Aging.
Objective: Divergent thinking is a critical element of creativity. It taps the ability to produce a range of responses or solutions to given stimuli and requires disengagement, the ability to switch to a new set or interpretation, as well as fluent production of responses. Lesion and imaging studies have shown frontal lobe involvement for these activities. Normal aging often results in some deficit in functions controlled by the frontal lobes such as disengagement and fluency. The objective of this study was to compare two tasks of divergent processing in young and older adults.
Participants and Methods: Participants were 30 healthy younger adults and 30 healthy older adults. Tasks included the Unusual Uses Test (Guilford, 1978) and an associative fluency task. Neither task was time constrained. Participants listed as many possible uses for specified objects and associates for stimulus words as they could. Dependent variables were total number and uniqueness of occurrence of responses.
Results: Older adults produced significantly more unique responses on both tasks than the younger adults. Total number of responses was not significantly different.
Conclusions: The finding that older adults produced more unique responses was unexpected. Our post-hoc hypothesis was that older adults may have been using their greater store of life experiences to produce more unique responses. This method of responding relies more on recall of stored memories and may have ameliorated any decline in divergent thinking. Further research is needed to test these and other hypotheses as well as to develop tests of divergent thinking that might rely less on past experiences.
Correspondence: *Susan Leon, Ph.D, University of Florida, 4135 NW 18th Place, Gainesville, FL 32605`. E-mail: sleon@ufl.edu*

S. LEON, L.J. ALTMANN, L. ABRAMS, L.J. GONZALEZ ROTHI & K.M. HEILMAN. Story Production Using Novel Associates as a Measure of Creative Processing in Aging.
Objective: Divergent processing tasks, which require disengagement from typical thought patterns, can be a measure of creative processing. Neuroimaging studies find divergent processing taps frontal lobe functioning. Older adults have subtle deficits in frontal lobe function so may be impaired at divergent processing. This study compares divergent processing in young and older adults' by asking them to create stories using semantically unrelated words, thus inspiring novel associations.
Participants and Methods: Participants were 30 healthy younger adults and 30 healthy older adults. Participants were required to incorporate semantically unrelated words into a short story. Participants created four stories using separate sets of words. There were no time constraints. Stories were transcribed and rated by independent judges on five categories: uniqueness, cohesion, organization, appropriateness and overall.
Results: Older adults' stories were rated as significantly less unique, less appropriate and received lower overall scores than those of younger adults.
Conclusions: The finding that older adults' stories were judged less unique contrasted with our finding that the same participants produced significantly more unique responses than younger adults in another divergent processing task. We postulate that this difference in performance was due to the story production task requiring the generation of novel semantic associations. Apparently, when the task allowed participants to utilize life experiences to generate a broad array of responses, older adults could outperform younger adults. However, older adults could not rely on life experience to produce these stories. Thus, story production may be a more accurate measure of creative processing in aging than other divergent tasks.
Correspondence: *Susan Leon, Ph.D, University of Florida, 4135 NW 18th Place, Gainesville, FL 32605`. E-mail: sleon@ufl.edu*

E.C. LERITZ, V.J. WILLIAMS, D.H. SALAT, J.L. RUDOLPH, G. DOROS, W.P. MILBERG & R.E. MCGLINCHEY. Elevated Cholesterol is Differentially Associated with Brain Structure and Cognition in Older Adults.
Objective: We examined how serum cholesterol, a systemic metric of vascular integrity and a known risk factor for cerebrovascular disease (CVD) and dementia, relates to brain structure and cognition in healthy older individuals with no neurologic or CVD history.
Participants and Methods: One-hundred-fifteen older individuals with varying levels of serum cholesterol, ranging from normal to moderately and severely elevated, underwent a comprehensive neuropsychological evaluation and MRI protocol (3D MPRAGE for cortical thickness estimation and diffusion tensor imaging (DTI) for analysis of white matter microstructure), as well as a complete lipid panel.
Results: Higher cholesterol levels were associated with globally increased cortical thickness, with strongest significance in frontal, prefrontal, middle temporal, and parietal regions. In contrast, higher cholesterol was associated with decreased fractional anisotropy (FA), an indicator of white matter integrity, primarily in temporal lobe

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

white matter and the internal capsule. Cholesterol was most strongly associated with episodic memory such that higher levels were related to better performance. All significant relationships were present across all ranges of cholesterol levels, including subclinical or mild elevations. A path analysis, conducted using neuropsychological composite scores and regions of interest (ROIs) from cortical thickness and DTI analyses, revealed that cholesterol had direct effects on memory function, as well as indirect effects, via frontal and temporal ROIs.

Conclusions: These results provide evidence that cholesterol levels, even in normal or mildly elevated ranges, have differential relationships with cognition and with indices of gray matter and white matter integrity, in older adults. As such, they demonstrate the importance of the consideration of vascular risk factors in studies of cognitive aging, as even subclinical levels may have an impact on neural tissue and cognition.

Correspondence: *Elizabeth C. Leritz, PhD, GRECC, Boston VA Healthcare System, 150 South Huntington Avenue, GRECC 182 JP, Jamaica Plain, MA 02130. E-mail: bleritz@nmr.mgh.harvard.edu*

L. LIU, D. YEH, J.B. BARSUGLIA, K.J. MILLER, J. KIM, M.L. CLEMENTS, P. SIDDARTH, L.E. ERCOLI & G.W. SMALL. Longitudinal memory decline and apolipoprotein X4 status in healthy older adults.

Objective: Apolipoprotein APOE X4 allele is an identified risk factor for Alzheimer's disease; however, the impact of this allele on healthy older adults remains in question. The objective of our current study was to determine if APOE X3/X4 genotype (carriers) demonstrate more cognitive decline specific to memory than APOE X3/X3 genotype (non-carriers) in a sample of healthy older adults. We proposed that APOE X3/X4 carriers will be associated with worse memory functioning compared to non-carriers over time.

Participants and Methods: Our study consisted of 34 participants (23 APOE X4 non-carriers with X3/X3 genotype, 11 APOE X4 carriers with X3/X4 genotype; APOE X2 carriers were excluded). Mean age of participants was 65.07 (SD =12.46). Immediate and delayed tasks of verbal and nonverbal memory were administered.

Results: 1) There is a significant correlation between APOE X4 status and whether a person exhibited cognitive decline (normal to mild cognitive impairment), r = .38, p = .03.

2) APOE X4 carriers declined on more memory tasks (M = 2.82, SD = 1.89) as compared to non-carriers (M = 1.43, SD = 1.20), $\mu 2 = .18$, $F(1, 32) = 14.24$, p = .01.

3) Using a repeated measures MANOVA analysis, there was a statistically significant interaction effect of time and APOE status on z-scores of immediate and delayed Logical Memory, Pillai's Trace = .13, $F(1, 32) = 4.66$, p = .04.

Conclusions: Results from the study were consistent with our hypothesis that possession of an APOE X4 allele is associated with longitudinal decline on more measures of immediate and delayed tasks of memory.

Correspondence: *Lisa Liu, MA, Aging and Memory Research Center, UCLA, 5625 Crescent Park West #330, Playa Vista, CA 90094. E-mail: lisaliu84@gmail.com*

J.R. MAHONEY, P. LI, M. OH-PARK, J. VERGHESE & R. HOLTZER. Multisensory Integration in Young and Old Adults: A Simple Reaction Time Study.

Objective: Daily, individuals are bombarded by stimulation across multiple sensory systems. However, the differential effect of sensory integration across various sensory combinations on reaction time (RT) has not been investigated in older adults. The current study investigated multisensory processing across three cross-modal pairings (auditory-visual (AV); auditory-somatosensory (AS); and visual-somatosensory (VS)) in young and old individuals. We also determined which multisensory pairing yielded the greatest facilitatory RT effect.

Participants and Methods: 18 old (M=76.44 yrs) and 18 young (M=19.17 yrs) individuals participated in the study. Participants were determined to be non-demented and without any medical or psychiatric conditions that may affect their performance. Participants received randomly presented unisensory (auditory, visual, or somatosensory) and multisensory (AS, AV, VS) stimulation using E-prime software and were instructed to make speeded foot-pedal responses as soon as they detected any sensory stimulation.

Results: Results revealed that RTs to all multisensory pairings were significantly faster than those elicited by the constituent unisensory conditions ($p<0.005$). Older adults benefited more from this RT facilitation than younger adults ($p<0.01$). Multisensory combinations containing somatosensory stimulation (AS & VS) were significantly faster than the AV condition ($p<0.005$), regardless of age group. Race models showed that RT facilitation across all multisensory conditions could not be accounted for by simple probability summation.

Conclusions: Multisensory integration enhanced RT performance in both age groups. However, this effect was greater in the older participants. Also, the addition of somatosensory stimulation to either auditory or visual stimulation seemed to have the most pronounced effect on RT.

Correspondence: *Jeannette R. Mahoney, Ph.D., Neurology, Albert Einstein College of Medicine, Rousso Building - Room 304, 1165 Morris Park Avenue, Bronx, NY 10461. E-mail: Jeannette.Mahoney@einstein.yu.edu*

M.J. MARQUINE, D.K. ATTIX, L.B. GOLDSTEIN, G.P. SAMSA, M.E. PAYNE, G.J. CHELUNE & D.C. STEFFENS. Cognitive Decline in Normal Aging: The Impact of Anterior and Posterior WMH Progression.

Objective: Declines in specific cognitive domains are well established in normal aging, and white matter hyperintensities (WMHs) have been purported to be one of the neural mechanisms underlying such decline. The purpose of the present study was to determine whether anterior or posterior WMH progression would have a greater impact on cognition.

Participants and Methods: Participants included 110 normal controls from the Duke Neurocognitive Outcomes of Depression in the Elderly study. Participants underwent comprehensive neuropsychological evaluations and MRI scans at baseline and 2-year follow-up. We measured eight cognitive domains, including: simple and complex processing speed, working memory, general memory, immediate and delayed verbal memory, visual-construction, and language. Cognitive change was calculated utilizing standard regression-based models. WMH load in anterior and posterior brain regions was assessed through a semi-automated segmentation method.

Results: Hierarchical multiple regression analyses showed that anterior WMH progression was an independent predictor of decline in complex processing speed and visual-construction, while total WMH best predicted decline in immediate verbal memory. In contrast, posterior WMH progression was not an independent predictor of cognition.

Conclusions: These findings suggest that anterior WMH progression has a greater impact on cognitive decline than posterior WMHs, which might have important implications for evaluating their clinical significance.

Correspondence: *Maria J. Marquine, PhD, Behavioral Sciences, Rush University Medical Center, 1645 W. Jackson Blvd. Suite 400, Chicago, IL 60612. E-mail: marquine@u.arizona.edu*

L.A. MORROW, J. SAXTON, A. ESCHMAN, G. ARCHER, B. SNITZ, K. HUBER, L. CIMINO, C. STERLING & K. METHENY. Comparing Cognitive Impairment by Clinical Adjudication, Computerized Assessment and Diagnostic Algorithm in Older Adults.

Objective: This study compared cognitive diagnostic criteria based on: 1) clinical adjudication, 2) computerized screening and 3) data-algorithmic approach.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants were 533 non-demented patients (age 65+) recruited from 24 primary care physicians (PCP). All subjects completed a comprehensive paper and pencil battery as well as the Computer-Based Assessment of Mild Cognitive Impairment (CAMCI), a brief self-administered testing with audio instructions and touch-screen responding. Consensus diagnosis of "normal" or "MCI" was determined from the paper and pencil battery with a panel of expert neuropsychologists and included scores as well as medical chart review, memory questionnaire and IADLs. The CAMCI provided a classification of "normal" or "risk for MCI." A data-algorithm approach (based on test scores) was also used to classify participants as "normal" or "MCI."
Results: Moderate to substantial agreement was found between the traditional consensus diagnosis and the algorithm (Kappa = .64) and between the consensus diagnosis and the CAMCI (Kappa = .52). Fair to good agreement was seen between the diagnostic algorithm and the CAMCI (Kappa = .4).
Conclusions: There was substantial agreement between diagnosis based on clinical adjudication and a simple algorithm computed from paper and pencil test scores. Moderately high agreement was found between the clinical adjudication and the computer testing. Diagnosis based on paper and pencil tests – whether adjudicated or with a standard algorithm – is time consuming and labor intensive compared to a brief computerized screening. The quick, portable, self-administered computer screen may be a reliable alternative for PCPs to screen for cognitive status in older adults.
Correspondence: *Lisa A. Morrow, Ph.D., Department of Psychiatry, University of Pittsburgh, WPIC, 3811 O'Hara St., Pittsburgh, PA 15213. E-mail: morrowla@upmc.edu*

J. POWELL, M.S. DANIEL, M. ETCHELLS & K. WYMAN-CHICK. Brief Visuospatial Memory Test – Revised: Form Equivalency for Ages 80-89.
Objective: Normative data has established that normal age-related declines are more pronounced on visual-graphic than verbal memory tests. The BVMT-R is a visual-graphic memory test clinically useful for the elderly because the relatively simple content minimizes low ceiling effects and it has six alternate forms that can be used in serial evaluations. However, subjectively, not all forms appear to be equal in complexity. The purpose of this study was to assess the equivalence of Forms 1 and 4 of the BVMT-R for individuals aged 80-89.
Participants and Methods: Volunteer participants were 26 men and 64 women without significant history of, or current, medical / psychological problems or substance use. Subjects were divided into two age groups: 80-84 (n = 42) and 85-89 (n = 48). Subjects were administered Forms 1 and 4 one week apart in counterbalanced order.
Results: There were no significant differences between Forms 1 and 4 for BVMT-R Total and Delayed raw scores for the 80-84 age group Wilks's = .952, $F(2,40) = 1.01$, $p = .374$. There were significant differences between Form 1 and 4 raw scores for ages 85-89 Wilks's = .842, $F(2,46) = 4.32$, $p = .019$. BVMT-R Total raw scores were higher for Form 1 $F, (1, 47) = 8.83$, $p = 0.005$, and nearly significantly higher for Delayed raw scores $F, (1, 47) = 3.94$, $p = 0.053$.
Conclusions: Individuals in their early 80's obtain comparable scores on Forms 1 and 4 of the BVMT-R. For patients in their late 80's, learning, and likely delayed recall, is easier for Form 1 than Form 4.
Correspondence: *Jessica Powell, M.S., Pacific University, 15465 SW Tephra Terrace, Beaverton, OR 97007. E-mail: gurc5188@pacificu.edu*

L.L. RICHMOND, A. MORRISON, J. CHEIN & I.R. OLSON. Older Adults Show Improved Everyday Memory and Attention via a Working Memory Training Regime.
Objective: There has been a great deal of interest, both privately and commercially, in training working memory (WM). However, laboratory findings for older adults, a group in which WM training is of utmost importance, are discouraging as there appears to be little generalization to other tasks. Importantly, improvements in everyday functioning remain unexamined in relation to WM training. Ecologically valid tasks may be a more appropriate measure of transfer for older adults.
Participants and Methods: We trained WM in older adults (60-80 years, n=21) using a task that encouraged transfer in young adults (Chein & Morrison, 2010). We include an active control group for comparison (n=19). Participants completed pre- and post-testing to assess transfer to measures of everyday functioning (the Test of Everyday Attention [TEA] and the California Verbal Learning Test [CVLT]) as well as other tasks of interest, including Reading Span.
Results: Training participants show improvement on both verbal ($t(20) = 3.79$, $p = .001$) and spatial ($t(20) = 3.10$, $p = .006$) portions of the training task. Of greater interest, training participants show post-test improvement in the number of repetitions made in the CVLT ($t(20) = 3.48$, $p = .002$), Reading Span ($t(20) = 3.95$, $p = .001$), and an attention switching subtest of the TEA ($t(19) = 2.207$, $p = .040$). Similar improvements did not occur in the control group (all ps > .05). Comparing groups, a greater number of training participants self-report improvements in attention (one-tailed $\alpha 2(1, n = 9) = 2.78$, $p = .05$).
Conclusions: These findings show that WM training is beneficial to older adults and encourages transfer to some ecological measures of cognition.
Correspondence: *Lauren L. Richmond, MA, Psychology, Temple University, 1701 N 13th Street, 6th Floor, Weiss Hall, Philadelphia, PA 19122. E-mail: tuc09480@temple.edu*

L.L. RICHMOND & T. GIOVANETTI. Errors in Hierarchical Ordering of Scripts: A Performance-based Analysis.
Objective: The steps of an overlearned script may be organized in a linear fashion, with strong links between adjacent steps. Others propose that steps are organized as nested hierarchies, with strong associations among steps within the same hierarchy and weaker associations among steps between hierarchies. Recently, Farag, et al (2010) showed that script judgment errors were significantly more frequent at junctions separating within hierarchy events than between hierarchy events, regardless of the step sequence. We examined the junctions at which errors occurred in healthy people while making coffee.
Participants and Methods: Thirteen healthy participants were videotaped while making coffee with a coffee maker and a cone filter over 22 trials according to a previously specified sequence. Errors were analyzed in the following test phases: early learning (trials 5-10); late learning (trials 11-16); dual task (trials 16-22). Errors were coded as overt or microslip (e.g., misreaches) and classified as occurring at a within hierarchy junction or between hierarchy junction according to classification data obtained from a separate sample of 20 healthy participants.
Results: In early learning, participants made more overt errors when completing steps within hierarchy versus between ($t(12) = 2.96$, $p = .01$). In late learning, no differences were observed by junction type (ps >.4). However, under dual task conditions, participants made more microslips within hierarchy than between ($t(12) = 2.22$, $p = .05$).
Conclusions: Our results contrast with those of Farag et al. (2010), possibly due to the fact that there is greater flexibility in the order of steps during actual task execution versus more abstract script judgment tasks. We noted greater sequence flexibility among within hierarchy steps than between hierarchy steps; this increased flexibility may have generated greater competition for action/object selection, leading to more errors. Our findings have implications for the neuropsychological rehabilitation of everyday tasks.
Correspondence: *Lauren L. Richmond, MA, Psychology, Temple University, 1701 N 13th Street, 6th Floor, Weiss Hall, Philadelphia, PA 19122. E-mail: tuc09480@temple.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. SARTORI, V.G. WADLEY, O.J. CLAY, J.M. PARISI, M. MARSISKE, G.W. REBOK & M. CROWE. The Relationship Between Cognitive Function and Life Space: The Potential Role of Personal Control Beliefs.

Objective: Mobility declines have important implications for elderly individuals and their families, as well as for health care institutions. Baseline data from the ACTIVE study were utilized to examine the relationship of cognitive function with life space (a measure of spatial mobility), and to investigate the potential moderating role of intellectual control beliefs.

Participants and Methods: Participants were 2,737 adults with a mean age of 74 years. Cognitive function was measured by composite scores for memory, reasoning, and processing speed. Control beliefs were evaluated using items adapted for ACTIVE from the Personality in Intellectual Aging Contexts (PIC) Locus of Control scales. Life space was measured by the Life Space Questionnaire (LSQ).

Results: In multiple regression models controlling for demographic factors, each cognitive domain was significantly associated with life space (p's <.001), though reasoning ability appeared most predictive (≥=.117). Interactions between cognitive function and control beliefs were tested, and external control beliefs moderated the relationship between memory and life space, with the combination of high objective memory and low external control beliefs yielding the highest life space (p=.039).

Conclusions: In conclusion, older adults with better cognitive function (particularly reasoning ability) have a larger overall life space. Additionally, control beliefs may moderate the relationship between objective cognitive function and life space, with low external control beliefs buffering the effect of lower cognitive function. These findings suggest that future studies examining the relationships between these factors longitudinally may be worthwhile to further elucidate the important interrelationship of cognitive function, control beliefs, and life space.

Correspondence: *Andrea Sartori, M.A., Psychology, University of Alabama at Birmingham, 140 Singapore Circle, Birmingham, AL 35211. E-mail: asartori@uab.edu*

B. SCHNEIDER, L. ERCOLI, P. SIDDARTH, M. RIPARETTI-BROWN & H. LAVRETSKY. Vascular Burden and Cognitive Impairment in Older Adults with Depression.

Objective: Many elderly patients treated for depression suffer from medical comorbidities and cognitive impairment. Apathy is a symptom of depression and may contribute to cognitive declines. However, co-occurring depression and cognitive impairment may also be caused by vascular disease due to shared underlying mechanisms. The objective of our study was to identify how medical comorbidity, vascular burden and apathy may contribute to cognitive impairment in older adults with depression.

Participants and Methods: One hundred nine community-dwelling older adults (mean age = 71.2 years) diagnosed with major depression were recruited to participate in the Tai Chi Complementary Use study aimed to improve antidepressant response to an antidepressant medication. All participants received comprehensive evaluations of depression and provided data on vascular risk factors (CVRFs) and medical illness burden at baseline. Participants also completed measures of apathy and cognition, including memory (California Verbal Learning Test-2), executive functioning (Trail Making Test Part B, Stroop) and attention (Symbol Digit Modalities Test, Trail Making Test Part A).

Results: CVRFs and medical illness burden, but not apathy, were significantly related to depression while only CVRFs were correlated with performances on cognitive measures. Among cognitive domains, measures of executive functioning and attention were related to CVRFs. These relationships remained after controlling for level of depression.

Conclusions: While both CVRFs and medical illness burden are related to depression in older adults, only CVRFs correlate with cognitive impairment. Findings suggest that vascular involvement contributes to impaired attention and executive functioning in depressed older adults. Aggressive treatment of vascular risk factors may prevent declines in these domains.

Correspondence: *Brooke Schneider, PhD, West Los Angeles VA Healthcare Center, 11301 Wilshire Blvd, Los Angeles, CA 90073. E-mail: Brooke.Schneider@va.gov*

C.R. WENDELL, L.I. KATZEL, W.F. ROSENBERGER, V. PLAMADEALA, M.M. HOSEY & S.R. WALDSTEIN. Plasma Lipid Levels and Neuropsychological Function: Nonlinear Relations and Effect Modification by Age.

Objective: Prior literature has revealed conflicting findings regarding lipid levels as risk factors for poor neuropsychological function. A paucity of research has examined nonlinear effects of lipids, an approach that may further clarify the existing literature. We examined quadratic relations of total, low-, and high-density lipoprotein cholesterol (TC, LDL-C HDL-C) to performance on an extensive neuropsychological battery.

Participants and Methods: Participants were 190 older adults (53% men, mean age=66 yrs) free of major medical, neurologic, and psychiatric disease. Measures of fasting plasma TC and HDL-C were assayed, and LDL-C was calculated. Participants completed a neuropsychological battery assessing attention, verbal/visual memory, psychomotor speed, visuo-perception/construction, and executive function. Multiple regression analyses examined lipids as quadratic predictors of each measure of cognitive performance, with age (dichotomized as <70 vs. 70+) as an effect modifier. Analyses were adjusted for sex, education, alcohol, smoking, depression, antihypertensives, statins, glucose, and systolic blood pressure.

Results: Significant quadratic effects of TC*TC*age were identified for Logical Memory II (b=-.001, p=.02) and Digits Backward (b=-.001, p=.02), such that the 70+ group performed better at high and low levels of TC than at mid-range TC (U-shaped), whereas the <70 group performed worse at high and low levels of TC than at mid-range TC (inverted U-shape). Similarly, significant U- and J-shaped effects of LDL-C*LDL-C*age were identified for Visual Reproductions II (b=-.002, p=.02), Digits Backward (b=-.0004, p=.019), log of Trails B (b=.0001, p=.02), and Block Design (b=-.002, p=.02). Quadratic effects of HDL on cognitive performance were nonsignificant.

Conclusions: Results indicate differential associations between lipids and neuropsychological function across different ages and domains of function. High and low TC and LDL may confer both risk and benefit for suboptimal cognitive function at different ages.

Correspondence: *Carrington R. Wendell, MA, Psychology, University of Maryland, Baltimore County, 101 Basset Hall Drive, Durham, NC 27713. E-mail: carringtonwendell@gmail.com*

G. MCFALL, B.P. WHITEHEAD, A.N. DEMSKY & R.A. DIXON. Effects of Obesity on Cognition: Differential Roles of Age and Gender.

Objective: Overweight and obesity have been associated with increased risk of cognitive deficits, dementia, and Alzheimer's disease. Body Mass Index (BMI; kg/m2) may be used to classify adults into normal weight (NW), overweight (OW), and obese (OB) groups. Comparisons of selected indicators of neuropsychological functioning and cognitive outcomes have produced mixed results (with both protective and detrimental effects of elevated BMI). The goal of this research was to elucidate the relationships among BMI, age, and gender.

Participants and Methods: Using a recent cross-sectional sample of the Victoria Longitudinal Study, we examined 571 adults on a comprehensive (19-test) battery of cognitive neuropsychological measures organized in six theoretical clusters (e.g., episodic memory, executive functioning, neurocognitive speed). Participants were classified by BMI (NW = 18.50-24.99; OW = 25.0-29.99; OB □ 30.00), age in years (young old = 53-64.9; middle-old = 65.0-74.9; old-old □75.0), and gender.

Results: We focus on three selected sets of BMI-related results. First, for episodic memory (RAVLT), both NW and OB participants performed better than OW participants on both RAVLT A6 (interference) and B1 (short-delay recall) trials. Second, for both Simple Reaction Time and

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Brixton Spatial Anticipation Test, OB men were differentially disadvantaged. Third, we observed BMI x Age x Gender interactions for a cluster of semantic processing measures (Verbal Fluency, Hayling Sentence Completion, Verbal Speed). A general theme across these interactions was that OB old-old men performed worse than targeted comparison groups.
Conclusions: Understanding the impact of obesity on cognition has theoretical and clinical implications that will involve key, differential roles of gender and age.
Correspondence: *Bonnie P. Whitehead, Psychology, Psychology, University of Alberta, Victoria Longitudinal Study, Department of Psychology, P217 Biological Sciences Building, Edmonton, AB T6G 2E9, Canada. E-mail: geall@ualberta.ca*

C.L. WILLS, G.J. CAPILOUTO & H.H. WRIGHT. Attention and Off-topic Speech in the Recounts of Middle-Aged and Elderly Adults: A Pilot Investigation.
Objective: The discourse of older healthy adults is commonly described as lengthy and off-topic and thought to be associated with the general cognitive decline that accompanies healthy aging. Changes in attention, specifically shifting and selective attention are thought to be contributing factors. The purposes of the present study were to: (1) investigate the relative influence of shifting and selective attention on the incidence of off-topic speech (OTS) in healthy adults beginning in middle age, and (2) determine where in the lifespan these specific linguistic changes become apparent.
Participants and Methods: Language samples were elicited from 29 healthy, community-dwelling adults, and analyzed for OTS. Incidence of OTS was measured in the context of three autobiographical, recount discourse tasks. Participants also completed standardized measures of attention.
Results: Results indicated that shifting and selective attention became vulnerable to the effects of aging as early as middle-age (40s), and older adults began to produce significantly more OTS beginning around age 60. Poorer scores on measures of attention were associated with higher instances of OTS.
Conclusions: The results of this study provide support for the Inhibitory-Deficit hypothesis, which posits that older adults produce more OTS due to a reduced ability to inhibit irrelevant stimuli.
Correspondence: *Courtney L. Wills, B.H.S., University of Kentucky, 2001 Ballardsville Rd., Eminence, KY 40019. E-mail: wills.courtney@gmail.com*

K.Z. YAMOUT, D.M. MUNGAS & B.R. REED. Alzheimer's Disease Pathology, Vascular Neuropathology, and Cognition.
Objective: Postmortem studies have demonstrated that vascular neuropathology (e.g., ischemic lesions) and Alzheimer's disease pathology independently increase the risk for dementia. In our study, we used latent variable modeling to replicate these studies and extend their findings to domain-specific neuropsychological scores.
Participants and Methods: Secondary data analysis of an autopsy database provided by the National Alzheimer's Coordinating Center. We included 602 cases with neuropathology-informed diagnoses of Normal Brain (10%), Vascular Dementia (9%), or Alzheimer's Disease (81%). A two factor model with a single latent variable for AD pathology (ADpath) and a second latent variable for vascular neuropathology (Vpath) fit the data well. We then tested the effects of ADpath and Vpath on dementia diagnosis and on neuropsychological test scores obtained at the last visit prior to death.
Results: In a model that controlled for age and education, both ADpath and Vpath were independently and positively associated with increased risk of dementia. Both also had independent negative effects on neuropsychological tests of attention span, processing speed, episodic memory, semantic memory, and picture naming. Executive function was related to ADpath, but the effect of Vpath was marginal ($p = 0.095$).
Conclusions: Pathology-defined Alzheimer's and cerebrovascular disease exhibited an additive effect on dementia diagnosis and cognition. The effects of Vpath were generalized to cognitive domains and, perhaps contrary to expectations, were weakest for executive function. This may reflect the relatively low levels of Vpath in this predominantly AD sample.
Supported by National Institute on Aging (NIA) Grant (U01 AG016976) to the National Alzheimer's Coordinating Center.
Correspondence: *Karim Z. Yamout, PsyD, UC Davis ADC, 150 Muir Rd, #127A, Martinez, CA 94553. E-mail: kzyamout@gmail.com*

D. YEH, J.B. BARSUGLIA, L.M. LIU, K.J. MILLER, J. KIM, M.L. CLEMENTS, P. SIDDARTH, L.E. ERCOLI & G.W. SMALL. APOE Χ4 status and executive functioning decline in cognitively intact older adults.
Objective: Possession of an APOE Χ4 allele is an identified risk factor for memory decline in individuals with Alzheimer's disease. However, the impact of APOE Χ4 on additional cognitive domains during the earliest stages of the disease is less clear. Specifically, the impact of an APOE Χ4 allele on executive functioning in cognitively intact older adults remains uncertain. Thus, the current study hypothesized that older adults with APOE Χ4 allele would exhibit greater longitudinal decline on measures of executive functioning compared to APOE Χ4 non-carriers in a sample of cognitively intact older adults.
Participants and Methods: Our study consisted of 34 participants (23 APOE Χ4 non-carriers with Χ3/Χ3 genotype, 11 APOE Χ4 carriers with Χ3/Χ4 genotype). Mean age of the participants was 65.07 (SD =12.46). There were no significant differences between groups on age, education, or gross cognitive functioning. Executive functioning was measured utilizing response inhibition (Stroop Interference) and set-shifting (Trails B).
Results: Using a repeated measures MANOVA analysis, there was a statistically significant main effect of time, Pillai's Trace = .14, $F(1, 32) = 5.35$, $p = .03$, and an interaction effect of time and APOE status, Pillai's Trace = .15, $F(1, 32) = 5.56$, $p = .03$.
Conclusions: Results from the study reveal that possession of an APOE Χ4 allele is associated with a greater decline in executive functioning in cognitively intact older adults.
Correspondence: *Dow-ann Yeh, MA, Aging and Memory Research Center, UCLA Semel Institute for Neuroscience and Human Behavior, 760 Westwood Blvd., Los Angeles, CA 90024. E-mail: yeh.d.ann@gmail.com*

B. YOCHIM, L.C. KING, A.E. MUELLER & K.D. KANE. Anxiety, Depression, Memory, and Executive Function in Older Adults: Processing Speed as a Mediator.
Objective: Research has suggested that deficits in memory and executive dysfunction in older adults are associated with depressive and anxiety symptoms and that processing speed mediates relationships between depression and many cognitive functions.
Participants and Methods: The present study examined a community-based sample of 107 older adults, age 60 and above, with a range of self-reported depressive and anxiety symptoms on measures of memory (California Verbal Learning Test, Second Edition [CVLT-II] and Brief Visuospatial Memory Test, Revised [BVMT-R]), processing speed (WAIS-III Digit Symbol – Coding Test), and executive functioning (D-KEFS Trail Making, Verbal Fluency, and 20 Questions Tests) to determine if processing speed also mediates the relationship between anxiety and memory, and anxiety and executive functioning.
Results: No significant correlation was found between anxiety scores and Digit Symbol – Coding, suggesting that processing speed does not mediate the relationships between anxiety and memory, or anxiety and executive function. Anxiety did not predict CVLT-II or BVMT-R scores, but was found to predict Trail Making performance. Digit Symbol – Coding was found to mediate the relationship between depression and BVMT-R, Trail Making, and Verbal Fluency scores. Neither anxiety nor depression was related to 20 Questions performance.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results suggest depression, more than anxiety, is related to memory and specific components of executive functioning, but that these relationships are mediated by processing speed. Results suggest that older adults with depressive symptoms may have certain cognitive difficulties that should be considered in treatment, and that these depressive symptoms may increase the risk of cognitive decline.
Correspondence: *Brian Yochim, Ph.D., ABPP, Psychology; University of Colorado at Colorado Springs, 1420 Austin Bluffs Parkway; Colorado Springs, CO 80918. E-mail: amuelle2@uccs.edu*

J. YOON, M. GORAL, L. CAMPANELLI, K. MARTON & L.K. OBLER. Aging and Comprehension: Roles of Inhibition and Attention-switching.
Objective: We examined which specific aspects of executive function (EF; e.g., inhibition, working memory, attention-switching) predict processing of plausible and implausible sentences among older adults.
Participants and Methods: Participants were 40 healthy older adults and 40 younger adults aged 18 to 35 and 55 to 75. Three Marton (2007) tasks measured different EFs: one measured inhibitory control; another additionally taxed working memory; and the third assessed attention-switching. The sentence-comprehension task (Goral et al., in press) required a plausibility judgment for sentences including 0 to 2 negatives.
Results: A mixed design ANOVA results for the sentence processing task showed a main effect of plausibility ($p<.005$), a main effect of the number of negatives ($p<.005$), and a negatives X plausibility interaction ($p<.005$), indicating that implausible sentences with two negatives were most difficult. There was no main effect of group.
Group differences were significant for the RT data from our EF tasks, with older adults responding more slowly than young adults in all EF conditions.
Our multiple regression data further showed attention-switching (RT in 3A condition) and inhibition (RT in 3E condition) both were strong predictors of comprehension performance accuracy for the two-negative and implausible conditions among older adults. However, no significant predictors were found among younger adults.
Conclusions: We conclude that inhibition and attention-switching predicted performance of comprehension differently for younger and older adults, suggesting changing strategies involved in this crucial task with advancing age.
Correspondence: *Jungmee Yoon, Speech-Language-Hearing Sciences, City University of New York, Graduate Center, 95 Wall St. Unit #602, New York, NY 10005. E-mail: 2jungmee@gmail.com*

Epilepsy/Seizures

J.C. ALVAREZ-CARRILES, A. GARCÍA-MARTÍNEZ, A. MORAL & X. SALAS-PUIG. Wisconsin Card Sorting Test performance in cryptogenic and symptomatic frontal and temporal lobe epilepsy.
Objective: Although traditionally associated to executive functioning, Wisconsin Card Sorting Test (WCST) performance requires the coordination of several neuropsychological functions, aside from executive ones. Furthermore, these functions might be differentially involved during the completion of the different stages of the task.
Our objective is to compare the performance of temporal lobe (TLE) and frontal lobe epilepsy (FLE) patients on the different stages of WCST (128 items).
Participants and Methods: For this purpose, we administered WCST (128 items) to 62 focal epilepsy patients: 39 TLE and 23 FLE. General task performance measures, as well as the differences between the former part of the task (Run 1: until the subject gets the first three categories) and the latter part of the task (Run 2: after the subject completes the first three categories) were recorder and analyzed.
Results: Considering the whole test performance, FLE and TLE groups show a similar pattern of execution with a slightly (non-significant) increase in the percentage of perseverative responses in the FLE group. However, when we consider different stages of the WCST completion, results changed significantly. Thus, symptomatic FLE group displayed, during Run 1, a significant increase in the number and percentages of errors, perseverative responses and perseverative errors. These differences between FLE and TLE groups completely disappeared for cryptogenic epilepsy groups and for all groups of patients during Run 2.
Conclusions: WCST, as a multicomponent task, may be impaired by different brain damage locations. However, the former part of the task seems to be more exigent from an executive-frontal point of view.
Correspondence: *Juan C. Alvarez-Carriles, PhD, Clinical Neuropsychology Unit, Hospital Universitario Central de Asturias (HUCA), Julian Claveria, s/n, Oviedo 33006, Spain. E-mail: juancarriles73@gmail.com*

C. BECK, G.Z. RECKESS, R. BAUER, C. LEONARD, J. JONES, K. DABBS, B. HERMANN & M. SEIDENBERG. Relationship between Age of Onset of Temporal Lobe Epilepsy and Gross Sulcal Morphology.
Objective: The anterior temporobasal surface of the brain prominently features the collateral (CS) and rhinal (RS) sulci. The increased prevalence of CS-RS connections in individuals with temporal lobe epilepsy (TLE) is thought to reflect abnormal brain development (Kim et al, 2008). Since sulcal morphology is maximally influenced by factors present early in development, we hypothesized that this CS-RS connection would be associated with a younger age of onset of epilepsy.
Participants and Methods: Participants were 72 (21 male) individuals diagnosed with complex partial seizures with definite or probable origin in the temporal lobe. Mean age was 36.0±10.9 years.
Results: Due to a positively skewed and leptokurtic distribution of age of onset, rank sum analysis was used. Results indicate a significantly younger age of onset for individuals with a CS-RS connection in the left hemisphere compared to those without ($Z = -2.443$, $p = .008$, $\mu 2 = .084$). The median age of onset in individuals with a CS-RS connection in the left hemisphere was 135 months; for those without a connection, the median was 168 months. This relationship was not significant in the right hemisphere ($p = .179$).
Conclusions: A CS-RS connection in the left hemisphere of temporal lobe epilepsy patients is related to a younger age of disease onset. This supports the theory that presence of a CS-RS connection is a neurodevelopmental risk factor for TLE, though further research is needed to fully establish a causal relationship between sulcal morphology and epilepsy.
Correspondence: *Callie Beck, B.S., Clinical and Health Psychology; University of Florida, PO Box 100165 HSC, Gainesville, FL 32610-1065. E-mail: cbeck@phhp.ufl.edu*

H.A. BENDER, L.A. WHITMAN, C. CARLSON, C. MORRISON, W.S. MACALLISTER, J. WEINFELD, M. RODRIGUEZ-RIVERA, B. VAZQUEZ & W.B. BARR. The convergent validity of the intracarotid amobarbital procedure in Spanish-speaking surgical candidates.
Objective: The validity and diagnostic efficiency of the intracarotid amobarbital procedure (IAP) has been widely studied in English-speakers (ES) with epilepsy. However, findings cannot be automatically extended to patients tested in other languages due to methodological confounds and performance moderators, such as differences in administration practices (e.g., translated materials or an interpreter), item salience and 'word frequency', and atypical language representation of bilinguals.
Participants and Methods: Our study evaluated the relative effectiveness of the Spanish-language IAP in lateralizing language and/or memory functioning using a form composed of test stimuli developed for use with both ES and Spanish-speakers (SS). Forty-eight Spanish and English-speaking surgical candidates were matched by age, education, and gender; no statistically-significant between-group differences emerged for age, education, gender or handedness. Word repetition, verbal comprehension, object/picture naming and delayed recall were evaluated following an internal carotid artery injection of amobarbital.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The frequency of patients with typical (left hemisphere) language laterality was identical in each group. IAP memory scores did not did not significantly differ among language groups in those with left vs. right hemisphere lateralization (p=.16) or lateralizing vs. non-lateralizing studies (p=.25).
Conclusions: Interestingly, while an identical proportion of participants exhibited left hemispheric language dominance in each group, all atypical dominance was bilateral language in SS and right hemispheric in ES. Findings also suggest that the Spanish-language IAP has adequate convergent validity to standard English-language administration in establishing memory dominance. Future studies are warranted to establish the predictive validity of the IAP in SS with epilepsy.
Correspondence: *Heidi A. Bender, Ph.D., Neurology, NYU Comprehensive Epilepsy Center, 223 East 34th Street, New York, NY 10016. E-mail: HeidiBender@aol.com*

J. BENGE, R.L. COLLINS, A. LEMAIRE, D.K. CHEN, R. FRANKS & S. IZADYAR. Performance on the Structured Inventory of Malingered Symptoms in Known Epilepsy and Psychogenic Non-Epileptic Event Groups.
Objective: The SIMS is a popular self-report screening instrument for malingered symptoms. In the initial validation of the instrument, proposed cut points were created based on the results of simulation studies. However, few studies have validated these cut points in other known patient samples, and in particular the base rates of symptom endorsement in various neurological populations have not been established.
Participants and Methods: In the current study, 14 individuals with epilepsy confirmed by epileptic seizures documented during video EEG (VEEG) monitoring and 45 individuals with psychogenic non epileptic events (PNEE) also confirmed by VEEG and placebo induction completed the SIMS.
Results: Sixty-eight percent of the PNES group and 50.0% of the epilepsy group exceeded recommended cut points for the SIMS total score, with even higher rates of endorsement for the individual subscales. Receiver operating characteristic curves showed that while extremely elevated SIMS total and subscale scores can have good specificity (>.9), at these scores sensitivity is extremely low (<.2).
Conclusions: Results suggests that self-reported atypical symptoms are commonly endorsed in epileptic and PNES group, and do not consistently differentiate the groups. While extremely elevated scores on the SIMS may raise a clinician's suspicion of PNES, commonly used cut points are of limited utility at distinguishing between epileptic and PNEE.
Correspondence: *Jared Benge, Ph.D., Jack C. Montgomery VA Medical Center, 1011 Honor Heights Dr., Muskogee, OK 74401. E-mail: jared.benge@gmail.com*

R. BERMAN, E. LUTHER & D. TUCKER. Development of an Assessment of Emotional Processes during the Wada Test.
Objective: Although language and memory lateralization has been extensively studied in the context of the Wada exam, emotional processes remain virtually untouched. Limited anecdotal evidence exists supporting hemisphere of injection-specific affective change, but no published studies have used a systematic method to examine emotional processes during this procedure. This study examines the utility of a newly-developed assessment of emotional change for patients undergoing the Wada test.
Participants and Methods: For 6 adults (mean age= 43.1, SD=13.3; 2 female, 4 male) with medically intractable epilepsy undergoing the Wada test, verbal and facial responses were recorded and coded with respect to frequency, magnitude, and emotional valence before, during, and following sodium amobarbital injection in left and right internal carotid arteries. A mood self-rating scale was administered before, during, and following each injection for 4 of the 6 participants.
Results: Evidence for clinically-significant emotional change dependent on hemispheric side of injection was observed both in the behavioral observations and self-rating scales for all participants. However, neither the magnitude nor direction of change was consistent with respect to injection side.
Conclusions: These preliminary findings suggest that emotional processes during the Wada may be studied using a systematic approach. Given the intermittency of change for each patient, a shift in focus to examining the moderators of such effects is warranted. Applications and future directions of study based on focus lateralization, epigenesis of pathology, and personality factors with respect to Wada-induced emotional changes are discussed.
Correspondence: *Rachel Berman, B.A., University of Texas at Austin, 7744 Northcross Dr., Apt. #N263, Austin, TX 78757. E-mail: rachel.berman@mail.utexas.edu*

J.G. BRAND, M. RIVERA-MINDT, S.G. SCHAFFER, K.R. ALPER, O. DEVINSKY & W.B. BARR. Emotion Processing Bias in Depressed Epilepsy Patients.
Objective: The current study examined whether mood-congruent biases in emotion processing extend to individuals with epilepsy and depression. We also investigated the potentially moderating effects of age of seizure onset on these biases, in addition to associations between emotion processing bias, depression, and quality of life. Mood-congruent emotion processing bias was expected to be associated with depression, particularly in those participants with early age of seizure onset. Depression was expected to be associated with poorer quality of life.
Participants and Methods: Data from 101 epilepsy patients were analyzed, including 61 females and 40 males. Measures included the Comprehensive Affect Testing System – Abbreviated, from which indices of mood-congruent bias were derived. Mood and quality of life were assessed with the Beck Depression Inventory – 2nd Edition (BDI-II) and the Quality of Life in Epilepsy – 10-item (QOLIE-10) questionnaire.
Results: Consistent with hypotheses, a significant interaction between BDI-II raw scores and age of onset was found in the facial affect modality ($\geq = -0.24$, $p < .03$). As expected, the QOLIE-10 was significantly and positively correlated with BDI-II ($r = .69$) raw scores.
Conclusions: Results of the current study add partial support to prior research showing mood-congruent biases in individuals reporting elevated levels of depression, and demonstrate the presence of these biases in an epilepsy population. Additionally, the current findings lend support to previous work demonstrating impaired emotion processing in epilepsy patients with early age of onset.
Correspondence: *Jesse G. Brand, M.A., Department of Psychology, Fordham University, 441 East Fordham Road, Bronx, NY 10458. E-mail: jebrand@fordham.edu*

T. BRADSHAW, K. EVANKOVICH, A. WILFONG & L. CHAPIESKI. Intellectual and Academic Decline in Children with Intractable Seizures.
Objective: Patients are assumed to be at risk for a decline in their cognitive abilities but there have been few studies in the pediatric epilepsy population. Clear interpretation of some studies is compromised because the second assessment is often necessitated by a decline in functional status or continued school problems. Furthermore, most have relied on IQ scores and measures of academic skills may be more sensitive to changes in cognitive ability.
Participants and Methods: This study included 32 pediatric patients who received a neuropsychological assessment as part of their evaluation for epilepsy surgery. Each of the patients had been previously tested. The time between the two assessments ranged from 1 to 9 years. The average age at the time of the first assessment was 9.5 years. 50% of the patients had temporal lobe foci, 28% had frontal lobe foci and 22% had foci outside those areas. 62% had seizures with secondary generalization. IQ scores and scores on measures of reading, math and spelling were compared with paired t-tests. Pearson correlations and t-tests were used to evaluate the effects of seizure related factors that might place patients at risk for decline.
Results: Analyses revealed significant declines in IQ and reading comprehension scores ($p<.001$)and a trend for math reasoning ($p<.08$)but not reading decoding, math computation, and spelling scores. Decline in these scores had no significant association with location of seizure focus, duration of seizure disorder, seizure frequency, secondary generalization or age at first assessment.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The findings from this study suggest that some children with intractable seizures are at risk for a decline in overall intellectual functioning and more conceptual academic skills. No factors were identified that placed specific children at risk for decline.
Correspondence: *Lynn Chapieski, Ph.D., Baylor College of Medicine, 6621 Fannin St.-CC-1250, houston, TX 77008. E-mail: mlchapie@texaschildrenshospital.org*

M.L. COHEN, R. ROZENSKY, Z.Z. ZLATAR, R. AVERBUCH & J. CIBULA. Presentation of Post-Traumatic Stress Disorder Due to the Misattribution of Seizure-Related Experiential Responses: A Case Report.
Objective: Patients with seizures that originate in the temporal lobes sometimes experience what John Hughlings Jackson described as "dreamy states" at the onset of these seizures. These phenomena may be characterized by a re-experiencing of past events, feelings of familiarity (déjà vu), and hallucinations. In previous reports of these phenomena, patients have been aware of the illusory and incongruous nature of their experiences. Here, a patient is presented who is not aware of the nature of his experiences.
Participants and Methods: Recently, we evaluated a patient with a documented 37-year seizure history (bitemporal, greater in the right hemisphere) who first experienced one of these phenomena fifteen years ago. At that time, the patient saw visions of traumatic autobiographical events that he had never recalled previously. He believed them to be veridical memories from his childhood, although evidence from his family suggests that they were not.
Results: The patient's psychological reaction to what he described as the "recovery" of these traumatic "memories" was severe enough to qualify as posttraumatic stress disorder (PTSD).
Conclusions: To our knowledge, this is the first report of PTSD caused by the misattribution of mental states that accompany a seizure.
Correspondence: *Matthew L. Cohen, M.S., Clinical & Health Psychology, University of Florida, PO BOX 100165, Gainesville, FL 32610. E-mail: mlcohen@PHHP.UFL.EDU*

C. CONN, J. WALKOWIAK & M. BERL. ADHD Inattentive Symptoms in Pediatric Epilepsy.
Objective: The rate of ADHD, Inattentive type, is elevated among children with epilepsy (CWE); however, this phenomenon has not been examined at the symptom level. In ADHD populations, inattentive symptoms have been shown to predict neuropsychological impairment. We aimed to specify the ADHD Inattentive symptom profile of children with epilepsy, and examine the relationship between inattention and neuropsychological performance.
Participants and Methods: 103 controls (49M; ages: 5-18, mean: 9.5; FSIQ mean: 111); were compared to 63 CWE (34 M; mean: 9.5; FSIQ mean: 99). Patients had left-hemisphere localization-related epilepsy (age of onset mean: 5.1; antiepileptic drugs (AED) mean: 1.37, range: 0-4). Groups were compared on a parent-rating measure of ADHD in children (DuPaul) and on IQ, memory, and attention measures.
Results: Inattentive symptoms were higher ($p<.01$) in CWE than controls across all 9 symptoms. All 9 items correlated highly ($r = .79 - .85$) with the inattention total score, and each item contributed strongly to the reliability of the measure. Symptoms were not correlated with age, age of onset, or total number of medications. Clinically significant inattentive symptoms did not significantly predict performance on memory or attention measures among CWE, but did among controls ($p<.05$).
Conclusions: CWE demonstrated elevated inattentive symptoms as compared to controls and all symptoms contributed comparably to elevated scores. Like previous findings, inattentive symptoms among the controls predicted neuropsychological performance. In contrast, inattentive symptoms did not predict performance on attention or memory measures among CWE, suggesting that the role of inattention in neuropsychological performance is different for CWE than for other populations.
Correspondence: *Courtney Conn, M.A., Children's National Medical Center, 1600 N. Oak St., Apt 1201, Arlington, VA 22209. E-mail: courtney.e.conn@gmail.com*

J.B. DAVE, M.J. HAMBERGER & A. BORDERS. Verbal Fluency Localizes Seizure Onset Among Left Hemisphere Epilepsy Patients.
Objective: It is well established that verbal fluency is mediated primarily by the left (dominant) hemisphere. We sought to determine whether phonemic and semantic fluency performance would differentiate patients with left frontal versus left temporal lobe seizure onset. We hypothesized that frontal lobe epilepsy (FLE) patients would perform worse on phonemic fluency, whereas temporal lobe epilepsy (TLE) patients would perform worse on semantic fluency. As hippocampal sclerosis (HS) is associated with poorer semantic fluency, we also hypothesized that HS patients would have the lowest semantic fluency scores.
Participants and Methods: Subjects were 208 epilepsy patients: 21 FLE and 187 TLE (95 with HS). All participants were administered phonemic (FAS) and semantic fluency (Animal Naming) measures in the context of a comprehensive neuropsychological evaluation. T-scores were calculated using Heaton et al. (2004) demographic-corrected norms. Two one-way ANOVAs assessed the effect of group (FLE, TLE-HS, and TLE-non-HS) on fluency scores.
Results: For phonemic fluency, FLE patients (mean=31.95, SD=10.71) performed significantly worse than TLE-non-HS patients (mean=40.86, SD=12.38), $p<.01$. TLE-HS patients were not significantly different from other groups (mean =37.34, SD=9.68). For semantic fluency, there were no significant differences (FLE mean=32.20, SD=13.41, TLE-HS mean=34.54, SD=10.97, TLE-non-HS mean=37.69, SD=12.47), $p > .05$.
Conclusions: These results suggest that phonemic fluency might be helpful in distinguishing between FLE and TLE-non-HS patients. On the other hand, semantic fluency might not localize dysfunction within the language dominant hemisphere.
Correspondence: *Jennifer B. Dave, Ph.D., Neurology - Comprehensive Epilepsy Center, Columbia University, 710 W. 168th St., 7th Floor, New York, NY 10032. E-mail: jennifer.dave@gmail.com*

S.W. HILL & S.D. GALE. A Case of Upside-down Reading and Writing: A Real Condition?
Objective: This case study discussed a patient with epilepsy who reported a life-long history of perceiving verbal stimuli upside-down in comparison to her peers. She indicated she must read and have stimuli presented upside-down. In addition, she must write upside-down and backwards. Evaluation results and challenges in examining such a patient were reviewed. Questions of a possible functional etiology were discussed.
Participants and Methods: This 40-year-old right-handed female has had a life-long history of seizures and learning disability. She was tested in the context of a presurgical epilepsy evaluation and consequently received a neuropsychological evaluation, Wada procedure, epilepsy monitoring unit (EMU) stay, and brain MRI.
Results: Performance on the Stroop task, copy of simple figures, and handwriting sample were consistent with the patient's reported better performance when stimuli were presented upside-down. However, her reproduction of visual stimuli and aspects of language functioning brought into question the accuracy of her self-reported visual disturbance. Consistent with her history of learning disability, this patient showed impairment across WRAT-3 subtests that were disproportionate to her obtained intelligence. Neurocognitive functions were generally normal except for processing speed. Wada testing showed evidence of atypical speech dominance and sufficient memory capacity of the right temporal lobe.
Conclusions: This case was unusual given the patient's self-reported perception of written words being upside-down and having normal fluency and appearance of handwriting when done upside-down and backwards. Objective and informal measures produced conflicting evidence regarding the accuracy of this patient's self-reported condition which was further discussed.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Stacy W. Hill, Ph.D., Clinical Neuropsychology, Barrow Neurological Institute, 222 W. Thomas Rd., Suite 315, Phoenix, AZ 85013. E-mail: hillstw@hotmail.com*

S.W. HILL & S.D. GALE. The Relationship Between Mood and Neurocognitive Functions in Nonepileptic and Epileptic Seizure Patients.

Objective: This study investigated the relationship between mood and neurocognitive functioning (processing speed and memory) in patients with nonepileptic seizures (NES) and those with temporal lobe epilepsy (TLE). Research has found comparable rates of mood disturbance in patients with NES and TLE. Neurocognitive impairment has been observed in both seizure groups; however, impairments in NES patients have been presumed to be psychogenic as opposed to neurologic in origin.

Participants and Methods: A total of 272 consecutive seizure patients with NES (120), left TLE (78), or right TLE (74) were evaluated on an epilepsy monitoring unit and given a neuropsychological battery. Mood measures included BDI-II and PAI. Neuropsychological measures included WAIS-III Coding, Trails A, BVMT-R, and RAVLT.

Results: Patients with NES scored significantly higher on measures of mood and neurocognition in comparison to TLE patients. Statistically significant modest correlations were seen between mood and processing speed (e.g., r = -.329, p<.01) as well as processing speed and memory (e.g., r =.499, p<.01) in NES patients. In patients with TLE, the relationship between mood and cognitive functions as well as between processing speed and memory was generally smaller and less consistent.

Conclusions: Evidence from this study suggested a small but higher degree of mood disturbance in NES compared to TLE patients. The fairly consistent relationship between mood and processing speed and between processing speed and memory in NES (compared to TLE patients) indicated mood may be an important factor in neurocognitive functioning in NES versus TLE patients.

Correspondence: *Stacy W. Hill, Ph.D., Clinical Neuropsychology, Barrow Neurological Institute, 222 W. Thomas Rd., Suite 315, Phoenix, AZ 85013. E-mail: hillstw@hotmail.com*

A. STEVENS, D. RITCHIE, G. REY, M. DUCHOWNY, T. RESNICK & W. MITTENBERG. Estimation of Premorbid Intelligence in Children with Intractable Epilepsy.

Objective: The Children's Premorbid Intelligence Estimation (CPIE) consists of regression equations that use demographic variables alone or combined with current WISC-4 subtest scores to estimate premorbid IQ. This study examined the accuracy of CPIE estimates in children with intractable epilepsy by evaluating differences between obtained and premorbid IQ as estimated by demographic variables alone or combined with the Vocabulary and/or Matrix Reasoning subtests.

Participants and Methods: Participants were 20 candidates (mean age=11.7, SD=2.4) for neurosurgical treatment of seizures that were poorly controlled by medications. 65% were Caucasian, 25% Hispanic, and 10% African American. Average parent education was 13.6 years (SD=2.19).

Results: Mean estimated premorbid IQ was 101 (SD=4.9) using demographics (parent education, ethnicity), 90 (SD=13.3) using demographics/Vocabulary, 88 (SD=13.5) using demographics/Matrix Reasoning, and 86 (SD=16.4) using demographics and both subtests. All premorbid estimates were significantly higher (p<.001) than obtained WISC-4 IQ (M=68, SD=18.6). Classification accuracy was determined by comparing the percentages of the sample with IQs 1 SD or more below premorbid estimates to the corresponding percentages of intellectually intact children in the WISC-4 standardization sample. 88% overall classification accuracy was obtained with the demographics/Vocabulary method, 84% with demographics/Matrix Reasoning, and 81% using either demographics alone or demographics combined with both subtests.

Conclusions: Premorbid estimates using current abilities may be reduced by the effect of seizures on ability acquisition or by current cognitive impairment. Although the extent of estimated intellectual decline varied, both demographic variables and current abilities appear to provide potentially useful estimates of premorbid IQ in children with intellectual impairment caused by intractable epilepsy.

Correspondence: *Wiley Mittenberg, Ph.D., Center for Psychological Studies, Nova Southeastern University, 3301 College Ave, Ft Lauderdale, FL 33314. E-mail: wiley@nova.edu*

L.M. MORAN, L.D. HAMIWKA, L.D. BAIR, K.A. VANNATTA & K.O. YEATES. Social Information Processing in Pediatric Epilepsy.

Objective: Previous research suggests children with epilepsy are less socially competent than healthy peers, although the specific reasons for this deficit are undetermined. This study seeks to evaluate social information processing (i.e., attributional styles, coping strategies, and emotional responses) in children with epilepsy in response to hypothetical stressful social scenarios.

Participants and Methods: At present, the sample includes 17 of 28 recruited children with epilepsy and 6 matched healthy controls. For each of five scenarios, children selected the reason the situation occurred, how they would handle the situation, and how they would feel. The five scenarios were completed twice, with the antagonist being an unknown peer in one instance and the child's reported best-friend in the other.

Results: Preliminary findings from a series of repeated-measures ANOVA revealed few differences between children with epilepsy and healthy controls. All children reported more externalizing attributions (e.g., "He did it on purpose") toward unknown peers than friends. No differences were found in coping strategies at the group level or for antagonist type. Overall, children reported feeling less anger, embarrassment, and sadness in situations involving friends versus unknown peers. However, group differences were nearly significant (p = 0.07) for sadness, such that healthy controls experienced more sadness in response to stressful social situations than children with epilepsy.

Conclusions: The results are preliminary, and may change as we continue to recruit participants, but suggest that the social difficulties experienced by children with epilepsy are not necessarily linked to deficits in social information processing on hypothetical social scenarios.

Correspondence: *Lisa M. Moran, M.A., Psychology, The Ohio State University, 1835 Neil Ave, Room 108, Psychology Bldg., Columbus, OH 43210. E-mail: moran.170@osu.edu*

A. PAPAZOGLOU, T.Z. KING & T.G. BURNS. The Relationship Between Adaptive and Executive Functioning in Children with Epilepsy.

Objective: Research suggests that children with epilepsy are at risk of suboptimal adaptive functioning. Having epilepsy may significantly interfere with daily functioning by limiting school attendance and participation in activities, as well as by creating new adaptive demands (e.g., medication management) in children who also may be facing cognitive or physical limitations. Executive functioning has been proposed as a key factor in the development of adaptive functioning, yet the extent to which deficits in executive functioning adversely affect adaptive functioning in this population, or how this relationship might differ from that in typically developing children, is unclear.

Participants and Methods: This study examined if the relationship between adaptive and executive functioning was moderated by whether or not a child had epilepsy. Sixty-two children (ages 7-19 years; 46 diagnosed with epilepsy and 16 typically developing) and their parents participated.

Results: Adaptive deficits were prevalent on the ABAS-II (57% of children with epilepsy scored below average compared to 13% of typically developing children). The relationship between adaptive and executive functioning was moderated by whether a child had epilepsy (B= -.57, SE= .28, p(one-tailed)= .02; R2Δ= .04), with poorer adaptive functioning associated with greater executive difficulties for children with epilepsy, but not for typically developing children. This relationship persisted when controlling for Wechsler IQ scores.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The results suggest a strong association between adaptive and executive functioning in children with epilepsy that may not be solely due to the lower level of functioning in children with epilepsy. Clinical implications will be discussed.
Correspondence: *Aimilia Papazoglou, Ph.D., Kennedy Krieger Institute, 1750 E. Fairmount Ave, Baltimore, MD 21231. E-mail: apapazoglou1@gmail.com*

C.P. PECK, R.W. SCHROEDER, B.A. BOATWRIGHT, R.J. HEINRICHS & L.E. BAADE. MCMI-III Profile Differences in Epileptic and Non-Epileptic Seizure Disorder.
Objective: Ten to 56‰ of patients seen for videotelemetry monitoring present with non–epileptic seizures (NES). NES are behavioral events that resemble epileptic seizures (ES) but lack paroxysmal neuronal discharges. Aspects of personality are consistently cited in association with NES. Few studies have investigated MCMI-III profile differences between ES and NES groups. This study examined differences in MCMI-III profiles between ES and NES groups identified by video EEG.
Participants and Methods: Archival data from 70 individuals was examined: ES = 27 and NES = 43. Participants completed the MCMI-III as a part of an objective personality test battery. Base rate scores from MCMI-III validity and clinical scales were analyzed.
Results: At the 0.05 level, the ES group scored significantly higher on the Compulsive scale [F (75, 57) .093, p .028, d = 0.54]. Conversely, the NES group scored significantly higher on the Somatoform [F (74, 49) 2.304, p .024, d = 0.55], Thought Disorder [F (74, 63) 2.26, p .04, d = 0.52] and Major Depression [F (74, 55) .005, p .053, d = 0.47] scales. At the 0.10 level, the NES group scored significantly higher on the Masochistic [F (75, 63) .3.978, p .080, d = 0.44], Posttraumatic Stress [F (74, 57) .708, p .084, d = 0.43] and Depressive [F (75, 56) .769, p .098, d = 0.40] scales.
Conclusions: Findings suggest the ES group was more likely to elevate the Compulsive scale, while the NES group was more likely elevate the Somatoform, Thought Disorder, Major Depression, Masochistic, Posttraumatic Stress, and Depressive scales.
Correspondence: *Caleb P. Peck, Psychiatry and Behavioral Sciences, University of Kansas School of Medicine, 143 N. Sedgwick Street, Wichita, KS 67203. E-mail: calebppeck@yahoo.com*

C. SETER, M. IAMPIETRO, G. WICAS, J. EPPIG, C. NIEVES, D.M. WAMBACH, J. KITAIN, J. PILLAI & D.J. LIBON. Visual Serial List Learning in Patients with Epilepsy: The 15-item Biber-Glosser Figure Learning Test.
Objective: The Biber-Glosser Figure Learning Test (BGFLT) was devised to be a visual serial list learning test analogous to the California Verbal Learning Test (CVLT). The original, standard scoring criteria for the BGFLT in epilepsy patients can be problematic due to floor effects. The present study assessed the psychometric properties of new scoring criteria designed to be more sensitive to memory disorders seen in epilepsy.
Participants and Methods: A group of 21 patients with epilepsy presenting with diverse seizure type and seizure foci (M_{age}= 44.43±12.23; M_{edu}= 13.38±2.73; 52.4% women) completed the 15-item BGFLT and the CVLT-II as part of a comprehensive neuropsychological evaluation. Three independent raters scored all free recall test items using a 3-point scale measurable in 0.5 increments allowing partial credit. Patient drawings were scored for figure component accuracy and spatial relationship.
Results: Inter-rater reliability ranged between .986 and .996. BGFLT list A 1-5, list B, short delay free recall, long delay free recall, and delayed recognition discriminability were normally distributed without floor or ceiling effects. Significant correlations were obtained between most BGFLT free recall/recognition discriminability test conditions and their analogous CVLT-II test conditions, providing evidence for concurrent validity ($r_{BGFLT1\text{-}5/CVLT1\text{-}5}(20)$= .61, p< .01; $r_{BGFLTListB/CVLTListB}(20)$= .40, p< .07; $r_{BGFLT\text{-}SD/CVLT\text{-}SD}(20)$= .64, p <.01; $r_{BGFLT\text{-}LD/CVLT\text{-}LD}$ (20)= .34, *n.s.*; $r_{BGFLTrecog/CVLTrecog}(20)$= .65, p< .01).
Conclusions: The generally strong correlations between the BGFLT and the CVLT-II provide evidence for the criterion and construct validity of the BGFLT to assess visual serial list learning in epilepsy.
Correspondence: *Colette Seter, M.A., Psychology, Temple University, 1701 North 13th Street, 851 Weiss Hall, Philadelphia, PA 19122. E-mail: tua93506@temple.edu*

A. SOPER & M.T. WAGNER. Emotional State Changes and Their Awareness During the Pre-Surgical Wada Intracarotid Sodium Amobarbital Procedure.
Objective: Objectives of the current research are: 1) to characterize asymmetry of emotional experience, including emotional state changes, during the Wada intracarotid sodium amobarbital procedure for epileptic pre-surgical candidates; 2) to test pre-Wada emotional functioning as a predictor of emotional state changes during the procedure; and 3) to investigate whether anosognosia for emotion during the procedure is related to limb anosognosia.
Participants and Methods: Using a sample of 12 epileptic surgical candidates, the Wada procedure was used to reversibly simulate post-surgical cognitive functioning by unilaterally inactivating each cerebral hemisphere. Patients pointed to a visual analogue scale to rate their mood prior to the injection and then at the height of the injection. Concurrently, the examiner rated the patient's mood on this scale. The discrepancy between the patient's rating of his/her mood and the examiner's rating served as the measure of emotional anosognosia. The Personality Assessment Inventory was administered prior to the Wada.
Results: Emotion state changes during the Wada were more than twice as likely to occur following left sided inactivation than right sided inactivation. The most frequent emotion state changes following left injection were agitation/aggression and lethargy, followed by crying/dysphoric mood and hypomanic-like tendencies. There was greater lack of awareness for mood change during right hemisphere inactivation than left. High levels of paranoia, suicidal ideation, and non-support on the PAI significantly predicted hypomanic-like tendencies during the Wada. Limb anosognosia and mood anosognosia were significantly, positively correlated for left-sided injections.
Conclusions: Ways in which this study furthers understanding of emotional state changes and anosognosia for these changes that can occur during the Wada are discussed, which may have importance for post-surgical psychiatric outcomes since the Wada test reversibly simulates functioning after brain surgery.
Correspondence: *Ana Soper, PhD, VA Northern California Healthcare System, VA Northern California Healthcare System, 150 Muir Rd., Martinez, CA 94553. E-mail: ana.soper@va.gov*

E. VERCHE, M. CAIRÓS & S. HERNÁNDEZ. Learning and Visual Memory in Children and Adolescents with Frontal Lobe Epilepsy.
Objective: Children with frontal lobe epilepsy (FLE) have fewer memory problems, but more attention and response inhibition problems. Strategic learning difficulties have found in verbal memory tasks in FLE children. However, few studies have focused on visual memory in children with FLE. Our objective is to study visual memory and learning in children and adolescents with FLE.
Participants and Methods: 7 FLE and 7 healthy control subjects aged 10 to 18 years old participated in the study. A computer version of the DCS from Lamberti & Weidlich (1999) was used to assess visual learning and memory. Measures included number of drawings recalled in each trail, total number of drawings recalled on trials 1-6, total errors in the learning process, number of drawings recalled after 20 minutes, total errors in delayed recall and score in recognition. Data were analyzed using Student t statistics.
Results: FLE group performed significantly lower in trails 2, 3, 4, 5 and 6, in total number of drawings recalled on trials 1-6, in total errors in the learning process and in total errors in delayed recall. FLE subjects had more false positives than control subjects in recognition task.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results suggest problems in FLE group due to a failure using appropriate strategies for organizing the visual material than due to encoding problems.
Correspondence: *Emilio Verche, Psychology, Psychobiology and Methodology, University of La Laguna, School of Psychology, University of La Laguna, Campus de Guajara s/n, La Laguna 38071, Spain. E-mail: evercheb@ull.es*

Imaging (Functional)

N. ABE, T. FUJII, M. SUZUKI, A. UENO, Y. SHIGEMUNE, S. MUGIKURA, S. TAKAHASHI & E. MORI. False Recollection and Recognition: An Event-Related fMRI Study.
Objective: Recent neuroimaging evidence suggests that brain activities associated with true recognition are different from those associated with false recognition. However, it is not explored whether the difference in neural activity is also observed between veridical and illusory "recollection". We used functional magnetic resonance imaging to detect the difference in neural activity between true and false memories characterized by "Remember" and "Know" responses, respectively.
Participants and Methods: Thirty-three healthy volunteers participated in this study. The subjects studied a series of photographs and were later asked to make a recognition judgment (Remember, Know, or New) in response to the following three categories of items: (1) Same items (items identical to those presented at encoding), (2) Similar items (items similar to but not identical to those presented at encoding), and (3) New items (items not presented at encoding) during fMRI scanning. We analyzed activities associated with true recollection (i.e., Remember responses to the Same items), false recollection (i.e., Remember responses to the Similar items), true recognition (i.e., Know responses to the Same items), and false recognition (i.e., Know responses to the Similar items).
Results: Compared with false recollection, true recollection was associated with increased activity in the posterior part of the medial temporal lobe. Brain activity in this region showed no significant difference between true recognition and false recognition.
Conclusions: These preliminary findings suggest that the posterior part of the medial temporal lobe is sensitive to objective memory accuracy, especially in the context of recollection.
Correspondence: *Nobuhito Abe, Harvard University, 33 kirkland Street, Cambridge, MA 02138. E-mail: abe@wjh.harvard.edu*

A. ARENIVAS, C. CULVER, K. KRISHNAN, J. LIAGHAT, S. BETTE, N. NAJAFIAN, C. MOORE, C. HARPER, R. DIAZ-ARRASTIA & C. MARQUEZ DE LA PLATA. Compromise to the Default Mode Network after Traumatic Axonal Injury: A Longitudinal Study.
Objective: Little is known about the functional integrity of the default mode network (DMN) following traumatic axonal injury (TAI). This study examined whether functional integrity between the nodes of the DMN of patients with TAI showed compromise as compared to controls.
Participants and Methods: Twenty-five patients with an injury mechanism consistent with TAI and 15 controls were studied. Resting state fMRI was obtained 2 to 9 days post-injury for acute scans, and 6 to 11 months post-injury for chronic scans. Functional and cognitive outcomes were assessed the day the chronic scan was obtained
Results: Acutely, patients revealed significantly weaker functional connectivity (FC) than controls for four of six DMN between-node pairs [i.e., medial frontal cortex (MFC) and posterior cingulate cortex (PCC), MFC and left lateral parietal lobe (LPL), MFC and right LPL, and PCC and right LPL]. At the chronic stage, patients continued to show weaker FC than controls between the MFC and RLPL, and PCC and MFC ($p<.05$). Paired samples t-tests among patients revealed a significant increase in FC from the acute to the chronic scan between the MFC and LLPL ($p<.05$). Injury severity was significantly correlated with acute FC between the PCC and RLPL. Functional outcome and tasks of information processing speed and cognitive flexibility were significantly correlated with the integrity of several chronic DMN connections ($p<.05$).
Conclusions: Results revealed compromise to the integrity of the DMN after TAI. The degree of compromise to this resting state network has clinical implications, as functional connectivity measures were associated with acute injury severity and long-term outcome.
Correspondence: *Ana Arenivas, MS, MPH, UT Southwestern Medical Center, 5323 Harry Hines Blvd, Dallas, TX 75235. E-mail: ana.arenivas@utsouthwestern.edu*

A. BEA, S. PRIMAK, S. DURGERIAN, J. ZIMBELMAN, C. REECE, E. NEWMAN, A. JUHL, K. KOENIG, M. LOWE, V. MAGNOTTA, J. PAULSEN & S. RAO. Inter-Scanner Comparability of fMRI Task Activation in Healthy Participants.
Objective: For fMRI to serve as a valid imaging outcome measure in large-scale clinical investigations, it is critical to demonstrate comparability across multiple scanning sites. For this study, healthy participants were administered two activation tasks at each of two scanner sites(Cleveland Clinic and University of Iowa) using identical 3T scanners.
Participants and Methods: 12 healthy participants(mean age = 27.2, 6 males) were administered time reproduction (Paced Finger Tapping; PFT) and response inhibition (Stop Signal; SS) tasks on two occasions using a counterbalanced order: 6 participants scanned at the Cleveland Clinic followed by University of Iowa; remaining 6 scanned in opposite order. The two scanning sessions were separated by <30 days. Imaging maps were compared using voxel-wise paired t-tests between sites to examine across-site comparability and session order (session 1 vs. 2) to examine learning effects.
Results: No significant site or session effects were observed for the PFT (synchronization and continuation) and SS (stop signal reaction time) tasks. On the brain maps generated from the PFT, no significant site or session effects were observed for the synchronization and continuation conditions. Likewise, on the SS task, no significant sites or session effects were observed in the brain maps generated for the correct and incorrect inhibition conditions.
Conclusions: These data suggest that comparable fMRI brain maps can be generated across scanner sites, especially when the sites have identical scanners. In addition,we demonstrated an absence of learning effects suggesting that these tasks could be used to measure changes in the course of a longitudinal study or clinical trial.
Correspondence: *Alexandra Bea, Psychology, Neurological Institute, Cleveland Clinic, 17456 Clifton Blvd., Lakewood, OH 44107. E-mail: alex.w.bea@gmail.com*

C. BROWN, C. FARACO, M.H. KAO & L.S. MILLER. Functional Activation During Language Processing: Syntax Versus Semantics.
Objective: The purpose of this study was to investigate language activation during an explicit verbal memory task, involving memorizing target nouns within phrases processed for syntactic or semantic comprehension. We hypothesized that language areas would yield differential activation based on condition: BA 44 and 46 would yield more syntactic activation, BA 21, 37, and 47 would yield more semantic activation, and BA 45 would yield an equivalent amount of activation.
Participants and Methods: 24 young adults (mean age = 20.33, s.d. = 1.9) from a university community were recruited. Participants were shown a series of phrases within the fMRI scanner, asked to make semantic (man-made versus nature) or syntactic (present versus past tense) judgments about each, and asked to memorize target words for later recall. Activation in temporal and frontal language areas during presentation of response prompts were analyzed using SPM5.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Semantic processing yielded larger activated cluster sizes (uncorrected; $p < .001$) within most regions of apriori interest: BA37 (semantic largest cluster size (LCS) = 61 voxels; syntax LCS = 54 voxels), BA 44 (semantic LCS = 70 voxels; syntax LCS = 14 voxels), BA 45 (semantic LCS = 124 voxels; syntax LCS = 29 voxels), BA 46 (semantic LCS = 276 voxels; syntax LCS = 210 voxels).
Conclusions: Results provide preliminary support that the language processing network may be more integrative than previously thought and that semantic processing may require additional resources over syntactic processing. This favors a levels of processing memory model, which states that higher level encoding requires additional cortical resources.
Correspondence: *Courtney Brown, B.A., Psychology, University of Georgia, University of Georgia, Department of Psychology, Athens, GA 30602. E-mail: cbrown07@uga.edu*

D.M. COTE, U.S. CLARK, B.A. JERSKEY, E.G. WALSH & L.H. SWEET. Altered Blood Oxygen Level Dependent Response Independent of Cognitive Function in Older Adults.
Objective: Interpretation of the blood-oxygen-level-dependent (BOLD) response presents unique challenges in fMRI studies of older adults. Although linear coupling of neural function and cerebrovascular response is critical to the study of cognitive processes using fMRI, studies have reported age-related changes in BOLD response that may be independent of cognitive function. We quantified BOLD response during hypercapnia to explore potential age-related effects on fMRI independent of cognitive processing.
Participants and Methods: Twenty-one healthy adults, aged 54-85, completed a six block breath-holding hypercapnia challenge during BOLD fMRI. Each block contained 3s of instructions, 15s breath-holding, and 30s rest. Preprocessing included motion correction and removal of physiological artifact. Voxelwise time delay of the full model fit of the BOLD hypercapnic time series was estimated and aligned to an anatomically based parcellation, yielding average BOLD delay in 35 anatomically defined bilateral gray matter regions. Correlations between regional hypercapnic delay and age were computed.
Results: While hypercapnia-associated BOLD delay was not significantly correlated with age in the whole cortical ribbon, 10 of 35 regions exhibited significantly ($p<0.05$) faster BOLD response with increasing age. These effects were most prominent in occipital and temporal regions associated with visual and emotional processing.
Conclusions: The spatial distribution of age effects was unexpected and suggests that future BOLD fMRI studies of cognitive processes including elderly may improve results by accounting for such age effects on the BOLD response independent of neural processing. We speculate that this spatial pattern may be related to differential age-related changes in regional vascular systems.
Correspondence: *Denise M. Cote, MS, Transdisciplinary Research Group, Butler Hospital, Weld Bldg., Room 201, 345 Blackstone Blvd, Providence, RI 02906. E-mail: DMCote@butler.org*

K. DONNELLY, J.B. ALLENDORFER & J.P. SZAFLARSKI. Right Hemispheric Participation in Semantic Decision Improves Performance.
Objective: FMRI studies of semantic processing consistently show left frontal, temporal, and parietal involvement. While these areas have proven to be important for language functioning, it is unclear which cortical regions are involved in improved performance on semantically related tasks. The purpose of this study was to determine the relationship between BOLD signal response and (1) intra-scanner task performance on a semantic decision task, and (2) extra-scanner neuropsychological test performance.
Participants and Methods: 52 healthy, right-handed individuals performed a blocked semantic decision (SD) fMRI task at 3T. Subjects made a two-choice decision after hearing the names of animals (30 sec active blocks) or a series of tones (30 sec control blocks). Group activation for active>control blocks was computed. To assess the relationship between the pattern of activation and intra-scanner performance, accuracy on the SD task was used as a regressor during multiple regression analysis. Boston Naming Test (BNT) and Semantic Fluency Test (SFT) scores were then entered in the regression equation to determine if performance is associated with recruitment of specific cortical regions during the SD task.
Results: Performance on the SD task positively correlated with activation in the right inferior parietal lobule (IPL; 44, -58, 40) and negatively with activation in bilateral temporal and occipital regions. A similar increase in activation in the right IPL (44, -42, 30) during the SD task was seen with improved performance on the BNT. Conversely, increased performance on the SFT was associated with activation in right frontal regions (RF; 54, 16, 24).
Conclusions: Improved accuracy on a SD task was associated with increased activation in the right IPL. Increased performance on the BNT and SFT resulted in greater recruitment of right hemispheric regions (IPL and RF) during the SD task. Our study suggests a greater role of the right hemisphere in semantic processing than previously believed.
Supported by NIH R01 NS048281.
Correspondence: *Kiely Donnelly, M.A., University of Cincinnati, 3664 C Stonebridge Dr., Cincinnati, OH 45209. E-mail: kielydonnelly@gmail.com*

C.R. EDWARDS, B.C. MCDONALD, L.K. STICKANS, J.D. WEST & A.J. SAYKIN. Episodic Memory Processing in Children: Relationship of Medial Temporal Lobe Activation to Cognitive Functioning.
Objective: Recent investigations of the neural substrate of episodic memory processes have shown that functional differentiation may occur within medial temporal lobe (MTL) structures, specifically the adult hippocampus. However, relatively little is known about how activity in MTL structures is associated with episodic memory encoding and retrieval in children.
Participants and Methods: Fifty-one medically and psychiatrically healthy children (ages 8-16; 23 males, 28 females) were administered an fMRI episodic memory task previously employed in adults and shown to activate MTL regions. The task included blocked visual scene encoding and recognition trials. Participants identified, via button press, if each picture was previously displayed. Within group analyses utilized six atlas-defined MTL regions of interest (ROIs), including the bilateral hippocampus, parahippocampus gyrus, and amygdala. Activation in each ROI was extracted from the encoding contrast map (encoding novel scenes > viewing the scene control image), and correlated with recognition task performance and scores on out of scanner neuropsychological testing. All correlations were Bonferroni corrected.
Results: Greater left hippocampal and bilateral parahippocampal gyrus activation during encoding was associated with recognition accuracy. In addition, higher estimated IQ (WASI) was significantly associated with greater bilateral parahippocampal activation during encoding.
Conclusions: Consistent with prior studies of adults, these data from a pediatric sample provide evidence that greater ability to activate bilateral MTL regions is correlated with better performance on memory tasks, and maybe related to baseline intellectual ability.
Correspondence: *Chad Edwards, Ph.D., Department of Radiology and Imaging Sciences, Indiana University School of Medicine, 950 W. Walnut St., R2 E124, Indianapolis, IN 46202. E-mail: chadredwards@gmail.com*

A. HAYASHI, N. ABE, T. FUJII, A. ITO, A. UENO, Y. KOSEKI, S. MUGIKURA, S. TAKAHASHI & E. MORI. Neural correlates of moral judgment about anti- and pro-social lying.
Objective: Lying is usually thought to be one of the human immoral, anti-social acts. It can, however, be sometimes viewed as pro-social behavior, depending on protagonists' purposes and surrounding situations. We used functional magnetic resonance imaging (fMRI) to determine whether the neural mechanisms underlying moral judgment about anti-social lying differ from those about pro-social lying.
Participants and Methods: Twenty-two healthy volunteers were paid for their participation in this study (19 males and 3 females, mean age

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

20.9 years). During scanning, the subjects read 96 short stories under a 2 (lie or truth) ×2 (anti- or pro-social) factorial design. In each story, protagonists told either a lie or the truth, for the purpose of benefiting their partner (pro-social purpose) or oneself (anti-social purpose). After reading a story, the subjects were asked to judge whether the protagonist's act was morally appropriate or not. The imaging data were analyzed using SPM8 (Wellcome Department of Imaging Neuroscience, London, UK).

Results: Behavioral data revealed that, compared with pro-social lying, anti-social lying was judged to be morally inappropriate with significantly higher probability. Neuroimaging data showed that moral judgment about anti-social lying, relative to moral judgment about pro-social lying, was associated with increased activity in several brain regions, including prefrontal cortex and temporo-parietal junction.

Conclusions: These preliminary findings suggest that distinct brain regions are engaged in moral judgment about anti- and pro-social lying.

Correspondence: *Akiko Hayashi, Tokoku University Graduate School of Medicine, 2-1, Seiryo-machi, Aoba-ku, Sendai 980-8575, Japan. E-mail: akikohayashi@med.tohoku.ac.jp*

K.F. HOTH, M.M. GONZALES, T. TARUMI, S.C. MILES, H. TANAKA & A.P. HALEY. Altered fMRI Activation in Metabolic Syndrome.

Objective: Metabolic syndrome (MetS) refers to a cluster of cardiovascular risk factors (i.e., hypertension, hyperglycemia, hypertriglyceridemia, low high-density lipoprotein (HDL), and obesity) that are associated with cardiovascular morbidity and mortality, and diminished cognitive function. Little is known about the early signs of brain vulnerability related to persistent metabolic dysfunction. Thus, our aim was to determine whether cognitively normal middle-aged individuals with metabolic syndrome (MetS) exhibit altered cerebrovascular response to a cognitive challenge relative to those without MetS.

Participants and Methods: Forty neurologically healthy adults aged 40 to 60 years (19 with MetS and 21 healthy controls) performed a 2-back verbal working memory task during functional magnetic resonance imaging (fMRI). We compared blood oxygen level-dependent (BOLD) responses between the two groups in eight a priori regions of interest previously shown to be associated with the 2-back task in patients with cardiovascular disease.

Results: The two groups did not differ on age, education, gender distribution, cognitive and emotional functioning or task performance (accuracy and reaction time). Compared with healthy controls, individuals with MetS demonstrated lower 2-back related BOLD response in the right superior frontal gyrus, right superior parietal lobule, and left inferior parietal lobule.

Conclusions: This fMRI study provides preliminary evidence that cognitively intact middle-aged individuals with MetS exhibit alterations in cerebrovascular response to a cognitive challenge prior to development of overt cardiovascular disease. Our results also demonstrate that fMRI may be able to identify early brain changes associated with MetS.

Correspondence: *Karin F. Hoth, Ph.D., Psychosocial Medicine, National Jewish Health, 1400 Jackson St., Denver, CO 80206. E-mail: hothk@njhealth.org*

W.D. KILLGORE, Z.J. SCHWAB, M.R. WEINER & S.L. RAUCH. Smart People Go with Their Gut: Emotional Intelligence Correlates with Non-Conscious Insular Responses to Facial Trustworthiness.

Objective: Emotional intelligence (EI) is the ability to accurately perceive, understand, and use emotional information to guide decision-making. The neural basis of EI is not well delineated but it has been proposed to involve the Damasio somatic marker circuitry (medial prefrontal cortex [MPFC], insula, and amygdala). We hypothesized that activation within this circuitry during subliminal presentations of facial cues of trustworthiness would be correlated with EI.

Participants and Methods: Twelve healthy adults (6 male; 6 female) ranging from 19 to 45 years of age completed the Bar-On Emotional Quotient Inventory (EQi) and Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT). During fMRI, participants viewed masked presentations of faces rated high (H) or low (L) in trustworthiness in a blocked paradigm. Conscious awareness of the trustworthiness of each face was effectively prevented via rapid presentation of the target (H or L) face (20 msec) followed by a neutral expression mask (80 msec). Contrast images comparing H vs L conditions were constructed in SPM5 and entered into second level regression analyses with EQi and MSCEIT. Three bilateral search territories comprising the somatic marker circuitry were interrogated ($p<.005$, $k\geq5$), including MPFC, insula, and amygdala.

Results: Higher EQi scores were associated with reduced MPFC and increased anterior insula responses to lower trustworthiness in faces. EQi was unrelated to amygdala responses. Higher MSCEIT was similarly associated with greater left middle insula and dorsal anterior cingulate gyrus responses to low facial trustworthiness. Amygdala responses were unrelated to MSCEIT.

Conclusions: During subliminal perception of low facial trustworthiness, EI was associated with increased responsiveness of insular cortex, a region of the somatic marker circuitry posited to be critical for social emotions and interoceptive processing (i.e., "gut feelings"). Individuals with higher EI may be more interoceptively responsive to socially relevant stimuli.

Correspondence: *William D. Killgore, Ph.D., Psychiatry, Harvard Medical School, Brain Imaging Center, McLean Hospital, 115 Mill Street, Belmont, MA 02478. E-mail: killgore@mclean.harvard.edu*

W.D. KILLGORE, M.R. WEINER, Z.J. SCHWAB & S.L. RAUCH. Whom Can You Trust? Neural Correlates of Subliminal Perception of Facial Trustworthiness.

Objective: Judging the trustworthiness of others is critical to survival. Prior research suggests that overt perception of untrustworthiness activates the amygdala, but no study has yet examined how perceptual brain responses relate to behavioral discrimination of facial trustworthiness. We hypothesized that greater accuracy in discriminating trustworthiness would be related to activation of the amygdala and medial prefrontal cortex during subliminal presentation of trustworthiness cues.

Participants and Methods: Eleven healthy adults (6 male) ranging from 19 to 45 years of age underwent fMRI while viewing masked presentations of faces classified as either high (H) or low (L) in facial trustworthiness. Conscious awareness of trustworthiness information was prevented via rapid presentation of the target face (20 msec) followed by a neutral expression (N) mask (80 msec). Participants then made overt trustworthiness judgments (OTJ) for 100 pairs of similar faces previously rated on trustworthiness. Contrast images comparing H and L fMRI conditions with N were entered into a regression analyses with OTJ accuracy as the independent variable. Whole brain analyses were evaluated at $p<.001$, $k\geq20$ voxels. An amygdala search territory was interrogated at $p<.05$, $k\geq5$ voxels.

Results: OTJ accuracy ranged from 57% to 87%. During H>N, greater accuracy on the OTJ task correlated with increased activation within the right superior medial frontal gyrus. During L>N, OTJ accuracy correlated with increased activation within right superior frontal, middle frontal, medial orbitofrontal gyri, and left middle frontal gyrus. Greater accuracy was correlated with increased amygdala responses to facial untrustworthiness.

Conclusions: Accuracy in discriminating overt facial trustworthiness is related to the responsiveness of the medial prefrontal cortex and bilateral amygdala during subliminal presentations of facial features communicating trustworthiness information. Results support the hypothesized role of these regions in social evaluation.

Correspondence: *William D. Killgore, Ph.D., Psychiatry, Harvard Medical School, Brain Imaging Center, McLean Hospital, 115 Mill Street, Belmont, MA 02478. E-mail: killgore@mclean.harvard.edu*

M.R. MADORE, J.B. ALLENDORFER, M. LAMY, D. FLECK, M. CERULLO, J. ELIASSEN, P.K. SHEAR, C. ADLER, M.P. DELBELLO, M. SMITH & S.M. STRAKOWSKI. Functional Role of the Cerebellar Vermis in Emotional Processing.

Objective: The cerebellar vermis is associated with verbal working memory, explicit memory retrieval, and modulation of emotion. The aim of

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

the current study was to examine the role that the vermis plays in the attentional and emotional processing abilities of patients with bipolar disorder (BPD) experiencing affective instability. We hypothesized that the vermis modulates emotional (ventral) networks, similar to the modulatory role of the cerebellum in motor control.
Participants and Methods: Fifty-seven participants with BPD in a manic mood state, ages 18 to 45 years, and 33 demographically matched healthy participants were recruited from similar communities and scanned using fMRI. Participants were excluded for Axis I diagnoses (healthy participants only), first-degree relatives with affective/psychotic disorder (healthy participants only), medical/neurological disorder that could influence fMRI results, or history of mental retardation or estimated IQ score of <85. During the scan, they completed a continuous performance task (CPT-END). The CPT-END is an oddball task requiring differential response to an attentional target (circle) than to the frequently presented standard (square). Negative/neutral affective images from the International Affective Pictures were included and required the same response as the standard.
Results: Functional connectivity analysis revealed that vermal activation was significantly correlated with areas listed below; greater correlation was present in right inferior frontal gyrus and right precuneus for healthy individuals and right anterior cingulate, left caudate, right medial frontal gyrus and right superior frontal gyrus for bipolar manic individuals.
Conclusions: The connectivity pattern suggests that vermal activation is differentially associated with activity in emotion regulating regions in the two groups.
Correspondence: *Michelle R. Madore, M.A., Psychology, University of Cincinnati, Mail Location 0376, Cincinnati, OH 45221-0376. E-mail: madoremr@gmail.com*

P. MATTIS, C.C. TANG, Y. MA, V. DHAWAN & D. EIDELBERG. Metabolic Network Activity as a Predictive of Cognitive Response to Levodopa Treatment in Parkinson's Disease (PD).
Objective: To determine whether changes in cognitive functioning in PD patients undergoing levodopa treatment are associated with modulation of metabolic network activity.
Participants and Methods: We studied 17 non-demented PD patients (14 men; 3 women, age: 58.4 ± 8.2 years; UPDRS motor scale: 23.5 ± 8.7), with FDG PET and a measure of verbal learning while on- and off- levodopa treatment. Reliable change index was used to classify each patient's response (i.e., improvement) with dopaminergic treatment. There were eight responders (R) and nine non-responders (NR). For each subject, we computed expression of the PD cognition-related metabolic pattern (PDCP), as well as that of our corresponding motor-related pattern (PDRP). Changes in PDCP and PDRP expression with treatment were compared for the R and NR subgroups and correlated with behavioral outcome.
Results: Comparison of levodopa-mediated changes in network expression revealed differences between the two subgroups. For PDCP, there was a significant interaction effect ($p < 0.05$) in which pattern expression declined in the R ($p < 0.05$) but not the NR. By contrast, both subgroups exhibited significant reductions in PDRP expression ($p < 0.05$). Verbal learning and PDCP expression were significantly correlated at baseline ($R = -0.70$; $p<0.01$); the changes in these measures with levodopa were also inter-correlated. ($r = 0.70$, $p<0.01$). Baseline PDCP expression was predictive of the change in verbal learning with treatment ($R = 0.54$, $p< 0.05$), whereas the behavioral change was not predicted by baseline UPDRS or PDRP scores.
Conclusions: This study indicates that cognitive changes in PD patients undergoing levodopa treatment are associated with changes in PDCP expression. Moreover, the behavioral change with cognitive treatment can be predicted by baseline network activity. Thus, this metabolic measure may have use as a potential treatment biomarker for the objective assessment of new interventions for cognitive dysfunction in PD.
Correspondence: *Paul Mattis, Ph.D., Neurology, North Shore University Hospital, 865 Northern Blvd., suite 201, Great Neck, NY 11021. E-mail: pmattis@nshs.edu*

J.D. MEDAGLIA, K. CHIOU, J. SLOCOMB & F.G. HILLARY. Functional Connectivity Between the Cerebellum and Neocortex During Working Memory.
Objective: Previous imaging studies have shown the cerebellum to be responsive to task load in working memory (WM) tasks, and resting connectivity studies have demonstrated cortico-cerebellar loops between lobules of the cerebellum and a number of cortical association regions. However, the cerebellum's functional connectivity with the neocortical motor and association regions during WM has not been thoroughly explored. The aim of the current study is to examine the relationships of blood-oxygen-level dependent functional MRI (BOLD fMRI) brain activity between specific lobules of the cerebellum, neocortical association regions, and motor regions during a WM task.
Participants and Methods: Participants were twelve healthy adults with no history of psychiatric or neurological disease.Participants performed the n-back task during fMRI acquisition. fMRI timeseries for the bilateral cerebellar Crus I, Lobule VI, and VIIA, bilateral BA 40, bilateral BA 46, bilateral BA 4, and bilateral BA 6 were extracted using ROIs from Wake Forest University pickatlas and the MarsBar toolbox in SPM5. Timeseries were regressed with one another and submitted to second-level analyses using paired t-tests.
Results: Cerebellar relationships with contralateral parietal regions were nearly equivalent to relationships with motor regions, while cerebellar relationships with the PFC were significantly lower. The cerebellum demonstrated large and significant correlations with neocortical regions in general.
Conclusions: Cerebellar regions shown to be active during WM tasks do not differentially connect to the parietal cortex and PFC compared to motor regions. The corticocerebellar networks identified in resting connectivity studies are highly interactive during WM performance in the healthy brain.
Correspondence: *John D. Medaglia, B.S., Psychology, Pennsylvania State University, 610 Moore Building, University Park, State College, PA 16802. E-mail: jdm454@psu.edu*

I.M. ROSSO, W.D. KILLGORE, J.C. BRITTON, M.R. WEINER, Z.J. SCHWAB & S.L. RAUCH. Hyperarousal and Reexperiencing Symptoms of Post-Traumatic Stress Disorder Are Differentially Associated with Limbic-Prefrontal Brain Responses to Threatening Stimuli.
Objective: Post-traumatic stress disorder (PTSD) involves three types of symptoms: re-experiencing, avoidance, and hyperarousal. Functional neuroimaging research suggests that both the categorical diagnosis of PTSD and its total symptom severity predict heightened limbic activation and diminished medial prefrontal activation in response to threatening stimuli. It is unclear, however, whether the different symptom dimensions of PTSD map onto similar versus distinct neural correlates.
Participants and Methods: Subjects were 14 unmedicated adults who met criteria for PTSD based on the Structured Clinical Interview for DSM-IV. The Clinician-Administered PTSD Scale (CAPS) assessed symptom severity. Functional magnetic resonance imaging (fMRI) was conducted on a 3 Tesla Siemens whole-body scanner during a backward-masked emotional face perception paradigm. Multiple regressions examined relationships of CAPS scores, total and subscale, with activation maps for the masked fear versus masked neutral contrast using SPM5.
Results: Total CAPS scores were significantly positively correlated with activation for fearful versus neutral faces in the right amygdala and left insula, and significantly negatively correlated with activation in bilateral ventromedial prefrontal cortex (VMPC). Hyperarousal symptoms also correlated positively with right amygdala activation and negatively with right VMPFC activation. In contrast, re-experiencing symptoms showed a negative relationship with right amygdala and left insula activation, and a positive correlation with right VMPFC activation.
Conclusions: We found that hyper-arousal and re-experiencing symptoms of PTSD were associated with differential, and somewhat opposite, patterns of limbic-prefrontal neural activation during the processing of masked fearful faces. This suggests the importance of considering dimensional measures of PTSD psychopathology to parse its corresponding neurobiology.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Isabelle M. Rosso, PhD, McLean Hospital & Harvard Medical School, 115 Mill Street, Neuroimaging Center, Belmont, MA 02478. E-mail: irosso@hms.harvard.edu*

Z.J. SCHWAB, M.R. WEINER, S.L. RAUCH & W.D. KILLGORE. Neural Correlates of Cognitive and Emotional Intelligence in Adults.
Objective: The ability to accurately perceive, understand, and manage emotional information is known as Emotional Intelligence (EI), a construct that is claimed to be distinct from traditional cognitive intelligence (IQ). Construct validity would be bolstered by evidence of neural processing of EI that is distinct from that of IQ during emotion processing tasks. We hypothesized that EI, but not IQ, would correlate negatively with neural responses in emotion processing regions of the amygdala, insula, and ventromedial prefrontal cortex (VMPFC), consistent with greater neural efficiency in higher ability individuals.
Participants and Methods: Twelve healthy adults ranging in age from 19 to 45 (6 male) underwent functional magnetic resonance imaging (fMRI) while viewing a masked angry-face perception paradigm that minimizes conscious perception of the affective stimulus. Two assessments of EI, the BarOn Emotional Quotient Inventory (EQ-i) and Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), as well as the Wechsler Abbreviated Scale of Intelligence (WASI), a measure of Full Scale intelligence (FSIQ), were administered. EQ-i, MSCEIT and FSIQ scores were correlated voxel-wise with emotion circuitry activation during the masked anger > neutral contrast using SPM5 ($p<.005$, $k\geq5$).
Results: Higher EQ-i was associated with reduced left insula and MPFC activation. Similarly, higher MSCEIT was associated with reduced bilateral insula and MPFC activation. Interestingly, higher WASI scores were similarly correlated with reduced bilateral insula and MPFC regions. Amygdala activation was not correlated with EI or IQ.
Conclusions: Findings support the neural efficiency hypothesis (i.e., higher EI individuals recruit less neural resources to deal with emotional information), but also suggest that the neural activation patterns were highly similar to that seen for IQ. Findings suggest that the constructs of EI and IQ may share considerable variance and may not be as distinct as suggested by current theoretical conceptualizations.
Correspondence: *Zachary J. Schwab, BS, Neuroimaging Center, McLean Hospital, 115 Mill St., Belmont, MA 02478. E-mail: zschwab@mclean.harvard.edu*

Z.J. SCHWAB, M.R. WEINER, S.L. RAUCH & W.D. KILLGORE. Discrepancy Scores Between Cognitive and Emotional Intelligence Predict Neural Responses to Affective Stimuli.
Objective: Emotional intelligence (EI) is the ability to perceive, understand, and manage emotional information. As a construct, EI is posited to be independent of cognitive intelligence (IQ). We examined discrepancy scores between both constructs and correlated these difference scores with neural responses during a passive affect perception task. We hypothesized that discrepancies favoring EI over IQ ("Feeling" types) would correlate with task-related activation of limbic and paralimbic emotion processing regions than those with greater IQ than EI ("Thinking" types).
Participants and Methods: Twelve healthy adults ranging in age from 19 to 45 (6 male) underwent functional magnetic resonance imaging (fMRI) while viewing a masked angry-face perception task that minimizes conscious perception of the affective stimulus. Participants completed measures of EI (BarOn Emotional Quotient Inventory (EQ-i); Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)), and IQ (Wechsler Abbreviated Scale of Intelligence (WASI)). Discrepancy scores (EQ-i–WASI; MSCEIT–WASI) were calculated and correlated voxel-wise with activation within the search territory defined by the medial prefrontal cortex, insula, and amygdala during the masked anger > neutral contrast using SPM5 ($p<.005$, $k\geq5$).
Results: On the EQ-i, feeling scores correlated with activation of the right amygdala and anterior cingulate gyrus. Similarly, on the MSCEIT, feeling correlated with activation in the anterior cingulate gyrus. In contrast, discrepancy scores favoring a "thinking" style were unrelated to activation within the limbic and paralimbic search territories.
Conclusions: During a passive emotion-viewing task, participants with relatively greater EI than IQ scores showed increased activation within a network of regions involved in emotional processing. Findings support the construct validity of EI by showing that it may provide useful information about emotional functioning when juxtaposed with measures of related but distinct constructs.
Correspondence: *Zachary J. Schwab, BS, Neuroimaging Center, McLean Hospital, 115 Mill St., Belmont, MA 02478. E-mail: zschwab@mclean.harvard.edu*

J. SHIN, G. KIM & D.L. NA. Change in default mode network in resting fMRI related to depression in subjective memory impairment.
Objective: Subjective memory impairment (SMI) can be considered when there is subjective complaint of failing memory, but no objective evidence of cognitive decline. Depression has been found to be more prevalent in patients with SMI. Change in default mode network connectivity in resting fMRI has been reported in major depressive disorder, but this has not been investigated in patients with SMI. This study aims to investigate change in functional connectivity in default mode network in resting fMRI that relates to depression in patients with SMI.
Participants and Methods: 92 Patients (26 male, 67 female) who visited the Samsung Medical Center memory Disorder Clinic complaining of memory decline during 2009,who did not show objective cognitive decline on neuropsychological testing (Seoul Neurpsychological Battery) and who did not have history of vascular incident or space occupying CNS lesion on MRI review were selected. The average age of these patients was 66±7.26. Resting fMRI and Geriatric Depression Scale (GDS) scores of these patients were obtained. Correlation of change in default mode network and GDS scores was
Results: A PCC seed was selected and functional connectivity in the default mode network was reviewed and correlation between this and GDS score was compared with and without global signal, and with p values of $p<0.01$ and $p<0.001$. Increased connectivity in the left inferior parietal cortex was shown to be related to higher GDS scores when global signal was not removed, and with $p<0.01$
Conclusions: This study shows that depression in patients with SMI may have different structural basis compared to these patients with MDD in previous studies. Further study and comparison of functional connectivity in resting fMRI and GDS scores of patients with MCI and/or dementia may be able to help with realizing what the role of depression in patients with memory complaint may be.
Correspondence: *Ji Soo Shin, MA, Neurology, Samsung Medical Center, 202-605 City Park, Hangangro3-ga, Yongsan-gu, Seoul 000, Republic of Korea. E-mail: celedine@freechal.com*

D.P. TERRY, C. FARACO, D.M. SMITH, K. MASON & L.S. MILLER. Effects of multiple concussive injuries on working memory after 6-months: A functional MRI study.
Objective: Mild traumatic brain injuries (MTBI), or concussions, have been associated with several cognitive symptoms, including working memory (WM) deficits. We examined the effects of multiple concussions on neuropsychological functioning and a priori WM regions of interest (ROIs) following a minimum of 6 months after any traumatic events.
Participants and Methods: Ten right-handed male athletes with history of at least two concussions and ten age/pre-morbid IQ/athletic experience matched controls underwent neuropsychological assessment and an fMRI scan targeting WM. Functional images were acquired during an arithmetic task and during an operation span (OSPAN) task, where subjects remembered target stimuli while their attention was displaced by a competing task. Images were preprocessed using FSL software and analyzed using a mask that targeted specific WM ROIs (Faraco, et al., in Submission) at a cluster level of $Z>2.3$, $p<0.05$.
Results: No main effect of group was exhibited on any subtests in the Repeatable Battery for the Assessment of Neuropsychological Status ($p=0.07$ to $p=0.19$), or in the reaction time or accuracy of the functional

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

tasks (Arithmetic: p=0.50 and p=0.07; OPSAN: p=0.41 and 0.20, respectively). There were no activation differences between groups on the OSPAN task; however, the control group showed greater activation of the left superior parietal lobe and precuneus (Z=3.97, p=0.032) than the MTBI group during the arithmetic task.
Conclusions: Surprisingly, there were only minor differences between our two closely matched groups, which were observed between simple WM and baseline conditions in primarily integrative areas. Results point to the relative plasticity of younger adults' cognitive abilities following concussion.
Correspondence: *Douglas P. Terry, B.S., Psychology, University of Georgia, 1287 Cedar Shoals Dr, Apt 1020, Athens, GA 30605. E-mail: dpterry@uga.edu*

A.D. THAMES, J.M. FOLEY, C. CULBERTSON, M. ETTENHOFER, M. KIM, M. COLE, S.Y. BOOKHEIMER, A. BRODY, S. EL-SADEN, S. GOODWIN & C. HINKIN. Neuroimaging of Lexico-semantic Retrieval Impairments Among Older HIV-infected Adults: An fMRI Study.
Objective: Word retrieval impairments have been repeatedly documented in neuropsychological (NP) investigations of HIV. However, given that the neural networks underlying phonemic vs. semantic retrieval are ultimately dissociable, it is unclear how HIV infection disrupts access to phonemic and semantic lexicons. Furthermore, the degree to which normal aging exacerbates retrieval impairments requires further scrutiny. Functional magnetic resonance imaging (fMRI) was used to assess the effects of aging and HIV-associated cognitive impairment on neural functioning during lexico-semantic word retrieval.
Participants and Methods: 12 older (50+) HIV + adults (age M = 54.25 [4.2], education 13.5 [2.0]) underwent fMRI while engaged in word retrieval tasks. Using a median age split (53 years), participants were classified into age groups of young and old. Cognitively unimpaired (n = 6) and impaired (n = 6) groups were created based upon a global NP deficit score cutoff (0.5) obtained from a comprehensive NP battery.
Results: Activation differences were found as a function of age as well as cognition, with older HIV+ individuals demonstrating increased activation in prefrontal cortices, and cognitively impaired HIV+ individuals demonstrating greater activation in the medial prefrontal cortex and basal ganglia structures. Younger HIV+ adults with cognitive impairment produced similar activation patterns when compared to older cognitively intact HIV+ adults, suggesting that cognitive impairment among younger HIV + may resemble advanced aging.
Conclusions: These findings suggest that tasks of word retrieval may involve different neural systems for older and cognitively impaired individuals with HIV, and are consistent with recent fMRI studies demonstrating HIV-associated neuroanatomical changes.
Correspondence: *April D. Thames, Ph.D., Psychiatry and Biobehavioral Sciences, University of California Los Angeles, 760 Westwood Plaza, Los Angeles, CA 90095. E-mail: athames@mednet.ucla.edu*

A.D. THAMES, J.M. FOLEY, M. WRIGHT, M. ETTENHOFER, M. COLE, S.Y. BOOKHEIMER, V. STREIFF, A. RAMEZANI, L. HINES, S. EL-SADEN, S. GOODWIN & C. HINKIN. Basal Ganglia Structures Differentially Contribute to Word Generation and Task Switching During a Verbal Fluency Task Among Older HIV-infected Adults.
Objective: The basal ganglia are involved in executive language functions (i.e., verbal fluency) through its connections with cortical structures. The caudate and putamen receive separate inputs from prefrontal and premotor cortices (respectively), and may differentially contribute to verbal fluency performance. Furthermore, HIV infection preferentially targets basal ganglia functions. This studied examined the role of the striatum in verbal fluency performance among older HIV infected adults.
Participants and Methods: 20 older (> 50 years) HIV + adults (age M = 53.25 [4.2], education 13.5 [2.0]) underwent magnetic resonance imaging (MRI) and standard neuropsychological assessment. Basal ganglia (caudate, putamen) regions of interest (ROI's) were extracted using an automated brain segmentation algorithm BrainParser (Tu et al., 2008).
Results: Left caudate volume was strongly associated with letter (r = .45, p = .05) and semantic (r = .60, p = .001) word generation, but weakly associated with letter (r = .33, p = .17) and semantic (r = .11, p =.65) correct switches. Left putamen volume was strongly associated with task switching in both letter (r = .782, p <.001) and semantic (r = .716, p < .001) word conditions, but not with letter (r = .264, p = .25) or semantic (r = .30, p = .19) word generation.
Conclusions: These findings demonstrate differential striatal involvement in word retrieval and switching. Our results are consistent with studies implicating premotor and prefrontal involvement in verbal fluency. The ability to adjust to changing task demands is an important aspect of cognitive control, which for HIV-infected individuals, is critical to everyday functioning.
Correspondence: *April D. Thames, Ph.D., Psychiatry and Biobehavioral Sciences, University of California Los Angeles, 760 Westwood Plaza, Los Angeles, CA 90095. E-mail: athames@mednet.ucla.edu*

A. UENO, A. ITO, Y. KOSEKI, A. HAYASHI, E. MORI, Y. MATSUE & T. FUJII. Distinct brain activations predicting the choice of likes and dislikes.
Objective: Recent neuroimaging studies have sought brain systems related to subjective values and preferences. However, few studies have explored brain systems involved in the psychological state of dislike. We used functional magnetic resonance imaging (fMRI) to elucidate whether the psychological states of "like" and "dislike" are represented in the same psychological axis and hence in the same brain system.
Participants and Methods: Fourteen healthy volunteers were paid for their participation in this study (9 males, mean age 22.9 years). During fMRI scanning, subjects were presented with 240 face photographs (120 male and 120 female photographs) one by one, and were asked to rate each picture for pleasantness. This rating was graded from 1 (very unpleasant) to 6 (very pleasant). After scanning, subjects were shown 120 pairs of face photographs and were required to make binary choices between two face photographs presented side by side. Subjects were asked to choose photographs they like for 60 pairs and those they dislike for the remaining pairs. Thus, 60 faces were chosen as "like" and 60 faces were not chosen as like ("not like"). In the same way, 60 faces were chosen as "dislike" and 60 faces were not chosen as dislike ("not dislike"). Data preprocessing and statistical analysis were performed using SPM8 (Wellcome Department of Imaging Neuroscience, London, UK).
Results: We found significantly different activations in various brain regions between the contrast of "like" with "not like" and the contrast of "not dislike" with "dislike" as well as between the contrast of "dislike" with "not dislike" and the contrast of "not like" with "like".
Conclusions: Distinct brain regions were associated with predictions of "like" and "not dislike" in the choice task; the same is true of predictions of "dislike" and "not like". These preliminary findings suggest that the psychological states of "like" and "dislike" may not be represented in the same axis but in different axes.
Correspondence: *Aya Ueno, Tohoku university graduate school of medicine, 2-1 Seiryo-machi, Aoba-ku, Sendai 980-8575, Japan. E-mail: uenoaya@med.tohoku.ac.jp*

M.R. WEINER, Z.J. SCHWAB, S.L. RAUCH & W.D. KILLGORE. Impulsiveness Predicts Responses of Brain Reward Circuitry to High-Calorie Foods.
Objective: Impulsive individuals often fail to inhibit behavioral responses to rewarding stimuli. Thus, impulsiveness may be a risk factor for making unhealthy food choices and overeating. We hypothesized that impulsiveness would be positively correlated with activation in areas involved in the anticipation of reward (i.e., nucleus accumbens) and negatively correlated with regions involved in inhibitory control and evaluation of punishing stimuli (i.e., lateral orbitofrontal cortex) during passive perception of high-calorie food images.
Participants and Methods: Eleven healthy adults (5 men) aged 19 to 45 underwent functional magnetic resonance imaging (fMRI) while viewing pictures of high-calorie foods, low-calorie foods, and control images of plants and rocks. Subjects viewed 5 alternating 30-second blocks

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

of experimental and control stimuli, each consisting of ten images. Participants completed the Barratt Impulsiveness Scale (BIS-11A), a self-report questionnaire of impulsive personality traits. Contrast images comparing brain activation to high-calorie versus low-calorie conditions were created using SPM5 and then correlated voxel-wise with total BIS scores in a second-level regression model ($p<.005$, $k>10$).
Results: As hypothesized, total BIS scores were positively correlated with activation for high-calorie versus low-calorie foods in the left nucleus accumbens ($r=0.89$, $p<.001$). BIS scores were negatively correlated with activation in the left lateral orbitofrontal cortex ($r=-0.85$, $p=0.001$) and left anterior insula ($r=-0.92$, $p<.001$).
Conclusions: Results are consistent with our hypothesis that when confronted with unhealthy high calorie food options, individuals with greater impulsiveness show increased activation in regions involved in the anticipation of reward and reduced activation within regions involved in suppression and control of appetite and behavior. Findings suggest a potential neurobiological link between impulsiveness and responses to food stimuli that may relate to unhealthy food intake.
Correspondence: *Melissa R. Weiner, B.S., Neuroimaging Center, McLean Hospital, 115 Mill St., Belmont, MA 02478. E-mail: mweiner@mclean.harvard.edu*

M.R. WEINER, Z.J. SCHWAB, S.L. RAUCH & W.D. KILLGORE. Conscientiousness Predicts Brain Responses to Images of High-Calorie Foods.
Objective: With the growing obesity epidemic, it is important to understand the behavioral, characterological, and neural bases of human responses to unhealthy food stimuli. Conscientiousness (C), a personality trait defined by the tendency be self-disciplined, controlled, and motivated, may contribute to an individual's behavioral responses when confronted with unhealthy dietary choices. We hypothesized that C would be positively correlated with activation in areas involved in inhibitory control (i.e. prefrontal cortex) and negatively correlated with regions involved in hunger, craving, and other visceral responses (i.e., insula) during passive viewing of high-calorie food images.
Participants and Methods: Eleven healthy adults (5 men) aged 19 to 45 underwent functional magnetic resonance imaging (fMRI) while viewing images of high-calorie foods, low-calorie foods, and control images of plants and rocks. Subjects viewed 5 alternating 30-second periods of experimental and control stimuli, each consisting of ten images (2500 msec stimulus presentation; 500 msec inter-stimulus interval). Subjects completed the Revised NEO personality inventory (NEO-PI-R), which includes a factor scale measuring C. Contrast images comparing high-calorie versus low-calorie conditions were correlated voxel-wise with C scores in a random-effects regression model in SPM5 ($p<.005$, $k>10$).
Results: C positively correlated with greater activation to high-calorie foods in the left medial orbitofrontal cortex. In contrast, C was negatively correlated with activation in the dorsal anterior cingulate gyrus as well as anterior and posterior insular cortex bilaterally.
Conclusions: Individuals with higher C responded to appetizing high calorie food images with increased activation of regions involved in inhibitory control and reduced activation within areas involved in craving, hunger, and visceral sensations. Understanding the neural basis of C may contribute to efforts help individuals modulate their responses to food and minimize dietary excesses.
Correspondence: *Melissa R. Weiner, B.S., Neuroimaging Center, McLean Hospital, 115 Mill St., Belmont, MA 02478. E-mail: mweiner@mclean.harvard.edu*

J. WU. Diffusion Tensor Imaging (DTI) and Positron Emission Tomography (PET) scan findings and Neuropsychological Tests in mild traumatic brain injury.
Objective: The objective of this study is to examine the relationships between diffusion tensor imaging (DTI) findings, local cerebral glucose metabolic findings on positron emission tomography (PET) and neuropsychological abnormalities in patients with mild traumatic brain injury. We hypothesize that patients with mild traumatic brain injury with neuropsychological deficits will show abnormalities in fractional anisotropy and tractography in brain regions associated with the function in question. We further hypothesize that these patients will also show metabolic abnormalities on PET scan in brain regions that are the neural substrate for function in question.
Participants and Methods: Ten patients with mild traumatic brain injury with neuropsychological test battery deficits will have these deficits correlated with MRI diffusion tensor imaging fractional anisotrophy (FA) and tractography reconstruction and FDG PET scan. MRI FA in patients will be compared with normative controls using statistical parametric mapping (SPM). FDG PET scsns in patients will be compared with normative controls using SPM.
Results: Significant patterns of correlation were found between DTI FA abnormalities in corpus callosum in TBI patients with neuropsychological deficits on memory and executive function and attention using SPM. Significant patterns of correlation were also found between FDG PET scan abnormalites in cortical regions such as frontal and temporal cortex in TBI patients.
Conclusions: MRI diffusion tensor imaging (DTI) studies of fractional anisotropy (FA) and tractography reconstructions and FDG PET are sensitive measures of white matter tract disruptions that are correlated with neuropsychological testing deficits of memory and executive function and attention. Examples of such clinical correlations will be discussed.
Correspondence: *Joseph Wu, M.D., Psychiatry, Univ Calif Irvine, Room 109, Irvine Hall, UCI-COM BIC, Irvine, CA 92697-3960. E-mail: jcwu@uci.edu*

Imaging (Structural)

R. BIEU, M.W. JERRAM, T. SUSMARAS & D.A. GANSLER. The NEO Five-Factor Inventory (NEO-FFI) and Voxel-Based Morphometry: Exploring Neural Correlates of Personality.
Objective: The Five-Factor Model (FFM) of personality describes personality along the dimensions of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. While neuroticism and extraversion have seemingly received universal acceptance and are prominent in the personality literature, the same is not true of the remaining three factors. The purpose of this study was to explore the neural correlates of the personality dimensions as assessed by the NEO-FFI in healthy controls and psychiatric patients.
Participants and Methods: Participants were all male and included 17 controls and 24 heterogeneous psychiatric patients. To investigate the association of brain volume and personality trait, whole brain VBM correlation was performed within each group; group difference VBM was also performed to investigate overlap between correlation analyses and group differences.
Results: The groups differed on the five personality dimensions in the hypothesized direction, with differences being statistically significant on all dimensions except extraversion and conscientiousness. In the psychiatric group, agreeableness was significantly positively associated with R-middle temporal gyrus and R-middle temporal sulcus, brainstem, insula, and cerebellum. Specific foci within the cerebellum also indicated larger volume in the patients versus controls in the group comparison, suggesting this result may best be explained by diagnosis rather than personality. In the control group, extraversion was positively associated with cerebellum and negatively associated with medulla and rectal gyrus. No overlap between these regions and VBM group comparisons were noted. No other significant correlations were found in either group for the other traits.
Conclusions: The findings of the present study add to a growing literature demonstrating the utility of neuroimaging in the exploration of the neurobiological underpinnings of personality.
Correspondence: *Rachel Bieu, M.A., Suffolk University, 91 Melrose St, Arlington, MA 02474. E-mail: Rachel0207@hotmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A.M. BUTTS, K.A. NIELSON, N. HANTKE, M.A. LANCASTER, S. DURGERIAN, J.L. WOODARD, M. SEIDENBERG, J.C. SMITH, M.A. MATTHEWS & S.M. RAO. White Matter Integrity as a Predictor of Cognitive Decline in Asymptomatic Elders.

Objective: Identification of imaging biomarkers that predict future cognitive decline in asymptomatic elders is essential for designing prevention trials in Alzheimer's disease. We have previously demonstrated that brain activation patterns from a semantic memory fMRI task were accurate in distinguishing elders who later demonstrated cognitive decline from those who remained cognitively stable. Here, we examine whether measures of white matter (WM) integrity, i.e., diffusion tensor imaging (DTI) and regional changes in WM volume, are sensitive to cognitive decline observed over an 18 month retest interval.

Participants and Methods: At study entry, 71 cognitively intact elders underwent DTI and an anatomical MRI scan. WM parcellation, using Freesurfer methodology, yielded 68 regions of interest. DTI measures included fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AxD), and radial diffusivity (RadD). Repeat neuropsychological testing, administered at entry and at 18 months, was used to classify participants as Decliners (n= 24; ≥ 1 SD reduction in memory performance) or Stable (n=47; < 1 SD reduction). T-tests were used to compare Decliners and Stable participants on MRI measures.

Results: No group differences were observed in whole brain and regional WM volumes. Decliners demonstrated significant alterations in FA and AxD within the right and left parahippocampal gyri compared to Stable participants.

Conclusions: These data suggest that abnormalities in WM integrity may precede cognitive decline in healthy elders. These changes are revealed by DTI than by regional WM volumetric measurements. Our results also suggest that the WM changes during the asymptomatic stage are confined primarily to the parahippocampal gyri.

Correspondence: *Alissa M. Butts, M.S., Psychology, Marquette University, 1570 N. Prospect Ave, Apt. 308, Milwaukee, WI 53202. E-mail: Alissa.m.butts@gmail.com*

F. CHRISTIDI, E.D. BIGLER, S.R. MCCAULEY, K.P. SCHNELLE, T.L. MERKLEY, M.B. MORS, M. MACLEOD, Z. CHU, J.V. HUNTER, X. LI, H.S. LEVIN & E.A. WILDE. The Relation of Perforant Pathway and Temporal Lobe Structures to Memory Function in Patients with Severe Traumatic Brain Injury.

Objective: This study investigated in vivo changes in the perforant pathway (PP), hippocampus, and temporal lobe white and gray matter using diffusion tensor imaging (DTI) and volumetric analysis and relations with memory performance in participants with severe traumatic brain injury (TBI).

Participants and Methods: Fourteen adult participants with severe TBI underwent neuroimaging and neuropsychological (verbal and nonverbal memory: Verbal Selective Reminding Test and Rey-Osterreith Complex Figure Test, respectively) assessment, approximately six months post-injury. Fourteen demographically-similar, neurologically-intact adults were examined for comparison.

Results: The TBI group had significantly decreased fractional anisotropy (FA) and higher apparent diffusion coefficient (ADC) for the PP bilaterally (right, p=0.025; left, p=0.014; ADC, p<0.001 bilaterally), lower FA for left hippocampus (p=0.001) and higher ADC bilaterally (p<0.001). Volumetric analysis revealed significantly decreased volume in both hippocampi (p<0.001) and temporal gray matter bilaterally (right, p=0.001; left, p=0.003). Verbal memory (long-term storage[LTS]; consistent long-term retrieval[CLTR]; delayed recall) was significantly related to 1) right (r=-0.55; r=-0.73; r=-0.68) and left (r=-0.77; r=-0.81; r=-0.82) PP ADC, 2) left hippocampus (r=-0.68; r=-0.58; r=-0.59) ADC, and 3) left hippocampal volume (LTS, r=0.63; CLTR, r=0.61). Nonverbal memory (immediate and delayed recall) was significantly associated with: 1) right (r=-0.52; r=-0.49) and left (r=-0.53; r=-0.59) PP ADC, 2) left hippocampal volume (r=0.72; r=0.58), 3) gray (immediate, right, r=0.63; left, r=0.69) and white (immediate, right, r=0.81; left, r=0.76; delayed, left, r=0.62) matter temporal volumes.

Conclusions: Advanced neuroimaging analysis can detect changes in the PP and temporal structures in patients with TBI, with these changes being associated with memory impairment.

Correspondence: *Foteini Christidi, B.S., Neuropsychological Lab., 1st Department of Neurology, Eginition Hospital, Medical School, National&Kapodistrian University, Athens, GR and Postgraduate Program of Clinical Neuropsychology, Medical School, National&Kapodistrian University, Athens, GR, 72-74, Vass. Sofias Avenue, Athens 11528, Greece. E-mail: christidi.f.a@gmail.com*

D. COBIA, J. CSERNANSKY & L. WANG. Thalamic abnormalities in neuropsychologically defined schizophrenia subtypes.

Objective: Neuropsychological deficits are particularly marked in schizophrenia; however, there exists a subset of ill patients who function at or near cognitively normal levels. Recent efforts have sought to understand this heterogeneity through use of various statistical and imaging approaches. The aim of this study was to characterize the neuroanatomic abnormalities of the thalamus in neuropsychologically impaired (NPI) and neuropsychologically near-normal (NPNN) schizophrenia subtypes. It was hypothesized that the NPI group would demonstrate greater abnormalities in volume and shape deformation of the thalamus when compared to NPNN subjects.

Participants and Methods: Schizophrenia (SCHIZ; n=82) and matched healthy comparison (COM; n=70) subjects were included in this study. Neuropsychological functioning was assessed through a comprehensive battery, and scores were used in a k-means clustering algorithm to define SCHIZ NPI (N=35) and NPNN (N=47) subtypes. MR scanning included T1 weighted MPRAGE images. Large Deformation Diffeomorphic Mapping was used to generate thalamic measures of volume and shape. PCA characterized shape deformations using eigenvectors that captured 80% of the variance. MANOVA and logistic regression models were used to test differences and discrimination between groups.

Results: Results from volumetric analysis revealed significantly smaller thalamic volumes in NPI when compared with COM and NPNN groups; COM and NPNN volumes did not differ. There was a main effect for group in the multivariate shape analysis. Logistic regression for shape deformations revealed non-overlapping sets of eigenvectors that discriminated NPI from COM, and NPNN from COM.

Conclusions: Results reveal a stepwise loss of thalamic volume in schizophrenia subtypes that matches their cognitive profiles. Shape analysis indicates spatially distinct regions that discriminate each SCHIZ subtype from COM. This suggests separate neurobiological processes may underlie each group, and informs theory on disease heterogeneity.

Correspondence: *Derin Cobia, PhD, Psychiatry and Behavioral Sciences, Northwestern University, 710 N. Lake Shore Drive, Abbott Hall 1316, Chicago, IL 60611. E-mail: d-cobia@northwestern.edu*

S.W. DUVALL, J. LOWE, P. MACLEAN, A. CAPRIHAN, R. OHLS, C. QUALLS & J. PHILLIPS. The Relationship Between Development and Brain Structure in Toddlers Born Preterm and Full Term.

Objective: Even children born very low birth weight (VLBW; <1500 grams) without major handicap are at risk of long-term cognitive and behavioral deficits. Research suggests that regional structural differences may be associated with the neurodevelopmental impairments faced by children who were born VLBW. However, most studies have only used MRI during the neonatal period or during adolescence. This study attempts to address this gap in the literature by utilizing MRI and neurodevelopmental measures in toddlers.

Participants and Methods: The current study used structural MRI images to examine the relationship between regional volume differences in toddlers (18-22 months adjusted age) born VLBW (n=16) and full term (n=10). Additionally, we examined the relationship between brain volume and neurodevelopmental outcomes, including cognition, language and early executive functioning.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Compared to the full term group, the VLBW group had larger 3rd ventricles and smaller cerebral white matter, thalamus, hippocampus, cerebellum white matter and anterior cingulate volume. A significant interaction was found between the two groups for cerebral white matter brain volume in relation to language development. Additionally, a significant interaction was found between early executive function scores and cerebral white matter volumes between groups.
Conclusions: Neuroimaging may help us better identify those children with structural differences associated with early learning and executive function deficits and thus help us to guide and develop optimal intervention techniques. This study infers that infants born VLBW may have different trajectories in the growth and development of overall brain structure as well as their development. A combination of neuroimaging and developmental testing may be the most informative in identifying those children at highest need for early intervention, and provide guidance for future intervention techniques.
Correspondence: *Susanne W. Duvall, MS, University of New Mexico, Psychology Department, University of New Mexico, Albuquerque, NM 87131. E-mail: swduvall@unm.edu*

J. HISER, A. WILLETTE, G. LUBACH & C. COE. Postnatal Iron Deficiency Changes the Developmental Trajectory of Hippocampus and Corpus Callosum in Young Rhesus Monkeys.
Objective: Iron deficiency (ID) results in insufficient iron availability to meet the needs for infant growth and brain development. Iron is crucial for the synthesis of neurotransmitters, such as dopamine, and the generation of myelin by oligodendrocytes. Thus, our analyses focused on the dopaminergic projection area of the striatum, myelin-rich hippocampus (HC), and corpus callosum (CC).
Participants and Methods: Fifty-five infant rhesus monkeys were scanned, and seventy-two T1-weighted scans were collected at 9 and 18 months. Region of interest (ROI) tracings were then defined. The CC was subdivided into the genu, body, and splenium. Criterion for ID was established as having hemoglobin below 11 g/dl at any point during the first eight months of life. Severity and duration of ID (severe:<8.0; moderate:8.0–9.5; mild:9.5-13.0), and gender were also considered. Thirty animals met clinical criteria for ID. Both raw and ROI values adjusted by total brain volume were analyzed.
Results: No significant effects were found for the striatum. However, a significant interaction between iron status and infant age was evident in the HC. For the CC, ID animals had smaller total volumes at 9 months, and the CC of males had a significantly smaller body than females. Unexpectedly, at 18 months, previously iron deficient infants had a larger adjusted total CC, along with greater genu and body volumes.
Conclusions: This rebound effect may reflect recovery or the fact that ID is prevalent in rapidly growing infants. ID may initially hamper brain maturation during lactation, creating the potential for a compensatory 'overshoot' during a period of recovery.
Correspondence: *Jaryd Hiser, University of Wisconsin-Madison, 932 Blayden Dr., Janesville, WI 53546. E-mail: jhiser@wisc.edu*

R. KEHOE, M.A. LANCASTER, J.A. PEYKANU, M.T. MORAN & M.W. HAUT. Grey Matter Correlates of Working Memory in Healthy Young Adults: A Voxel-Based Morphometry Study.
Objective: Efforts to establish neuroanatomical correlations of working memory (WM) in healthy adults have primarily utilized functional neuroimaging techniques. Studies examining WM with structural imaging have focused on clinical populations, or used lesion based analysis. To fill this gap, we used voxel-based morphometry (VBM) to study the grey matter correlates of WM in healthy young adults.
Participants and Methods: Participants were 51 (26 female) healthy, young (18-27, mean = 21.9 years), adults. High resolution SPGRs were obtained using a 3 Tesla GE Horizon Lx MRI scanner. We utilized an optimized method of VBM within SPM2 to examine grey matter volume (GMV). We used an uncorrected p <.001 and a minimum cluster size of 50 voxels. WM was represented by the Working Memory Index (WMI) of the Wechsler Adult Intelligence Scale-3rd Edition (WAIS-III). WMI scores ranged from 88 to 144 (mean = 114.5, SD = 15.05). We correlated WMI with GMV.
Results: WMI was positively correlated with GMV in the left inferior frontal lobe (x, y, z= -48,32,0, z= 3.99, voxels=62) and the left inferior parietal lobe (x,y,z=-56,-42,26, z=3.92, voxels=51). In addition, WMI was positively correlated with GMV in two regions of the right inferior posterior cerebellum (x,y,z=20,-74,-64, z=3.75, voxels=135 and x,y,z=32,-82,-54, z=3.36, voxels=67).
Conclusions: Our results are consistent with the findings of previous functional neuroimaging studies, suggesting that in healthy young adults, better WM performance is associated with greater GMV in the left inferior frontal lobe, the left inferior parietal lobe, and the right inferior posterior cerebellum. Replicating these findings with more theoretically driven measures of working memory is recommended.
Correspondence: *Reid Kehoe, Psy.D., Dartmouth Hitchcock Medical Center, 19 Spencer St. #208, Lebanon, NH 03766. E-mail: rkehoe1@gmail.com*

G.J. LEE, P.H. LU, P.M. THOMPSON, A.D. LEOW, S. WU, L. ORMISTON, M. MEGHPARA & G. BARTZOKIS. Performance on Digit Symbol Predicts Rates of Ventricular Expansion in a Group of Healthy Elderly Adults: A Tensor-Based Morphometry Study.
Objective: Slowing in cognitive processing speed and enlarged ventricles are arguably the most reliable measures of cognitive and brain changes associated with aging. We used tensor-based morphometry (TBM) to examine whether slower cognitive speed performance at baseline predicts higher rates of ventricular expansion (often a proxy for generalized brain or adjacent white matter atrophy) over time in a sample of cognitively intact, healthy elderly adults.
Participants and Methods: One-hundred healthy elderly participants (M=68.1, SD=4.5, range=60-77) were evaluated with baseline and follow-up MRI scans (M interval=4.8 years, SD=0.5) and completed the Digit Symbol subtest (DSYM) at baseline. TBM was used to create 3D maps of regional brain atrophy and ventricular expansion rates for individual participants. Participants were then stratified into FAST (n=23) and SLOW (n=25) performers according to their DSYM scores (upper 25th versus lowest 25th percentile, respectively). The FAST and SLOW groups did not differ significantly on any demographic characteristics. The 3D Jacobian maps of longitudinal ventricular volume change were compared between the two groups.
Results: In the total sample, a significant correlation was observed between baseline DSYM score and percent volume change in ventricles (r=.282, p=.004). Statistical analyses of the annualized Jacobian maps using permutation tests revealed significantly higher annual rates of ventricular expansion in the SLOW group compared to the FAST group (p=.006, corrected for multiple comparisons).
Conclusions: SLOW performers on a measure of processing speed (DSYM) demonstrated significantly greater rate of ventricular expansion compared to FAST performers, supporting the hypothesis that cognitive slowing may predict higher rates of brain and/or adjacent white matter atrophy.
Correspondence: *Grace J. Lee, PhD, Neurology, UCLA, 10911 Weyburn Ave. #200, Los Angeles, CA 90095. E-mail: GJLee@mednet.ucla.edu*

T. MCQUEENY, S. PATEL, J. PRICE, C. PADULA & K. MEDINA. Prefrontal Cortical Thickness and Executive Functioning Variations in COMT.
Objective: Gene variants of the COMT enzyme are related to cognitive performance and psychopathology. Compared to the Methionine (Met) allele, a Valine (Val) substitution is linked to lower synaptic dopamine availability in prefrontal cortex (PFC). Imaging genetics research reports smaller Val-related cortical thickness in high-order cognition areas, such as PFC. Neuropsychological studies suggest relatively worse

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

working memory and executive function (EF) in Val carriers. However, whether neurocognitive relationships vary by Met/Val status in healthy adults remain unclear. We compared cerebral width and EF by COMT genotype hypothesizing Val carriers would show smaller cortical thickness in areas showing links to worse EF.
Participants and Methods: Fifteen Val (Val/Val or Val/Met) and 20 demographically similar Met/Met carrying healthy adults (mean=21.6 years) provided DNA, underwent T1 MRI and completed EF tests. Whole-brain cortical thickness was assessed using Freesurfer's surface-based analysis and regression (p's<.05, corrected). Objective Working Memory & Switching/Inhibition composite scores (Cronbach's α=.72, .80) and the FrSBE's Disinhibition & Executive Dysfunction self-report scores measured EF.
Results: Val carriers had smaller thickness in left: anterior/posterior cingulate, insula, inferior, dorsolateral and dorsomedial PFC; and right: dorsolateral and orbital PFC. Behaviorally, Val individuals reported *more* Executive Dysfunction than Mets (t=2.6, p=.02). *Larger* cortical thickness was furthermore linked to *lower* self-report Disinhibition, and *better* Working Memory performance in Met individuals.
Conclusions: Consistent with previous work, we observed Met>Val cortical thickness in PFC and EF relationships indicated advantages with greater gray matter width. If replicated, COMT and EF may serve as clinically useful target endophenotypes in studying disease states like addiction. (R03 DA27457, Medina)
Correspondence: *Tim McQueeny, B.A., Psychology, University of Cincinnati, 4150 Edwards One, PO Box 210376, Cincinnati, OH 45221-0376. E-mail: mcqueety@mail.uc.edu*

P. NGUYEN, J. TANNER, N. SCHWAB, J. WARD, N. HWYNN, M. OKUN & C. PRICE. Cortical and Sub-cortical Volumes in Cognitively Intact Right-onset Parkinson's Disease.
Objective: Little is known about cortical volumes in idiopathic Parkinson's Disease (PD), especially in regards to side of onset. Some research has suggested that PD may be associated with cortical atrophy in addition to sub-cortical atrophy via connections between the cortex and subcortical structures. We hypothesize that PD patients with right-side onset will show decreased volume in the left caudate and left frontal lobe relative to their right-sided measurements, and decreased volumes compared to matched controls.
Participants and Methods: A group of 19 idiopathic non-demented right-sided onset PD and 28 age-matched controls (Age: PD = 67.86 ± 6.010, Controls = 68.29 ± 5.513) completed brain MRI (3Tesla) that included volumetric protocols. Caudate and frontal lobe masks were segmented out using semi-automated methods (Freesurfer auto-segmentation / ITK-Snap with manual clean up from an expert rater (Intra-rater Dice-Similarity Coefficient > .95). Analyses controlled for intracranial and brain volume.
Results: PD and controls were matched on age, education, and comorbidity (all $p > .05$). For PD, left caudate < right caudate (left = 2.982, right = 3.133; $p = .004$), with no laterality for controls. PD caudate volumes were smaller overall (PD = 6.183, controls = 7.185; $p = .030$). Left and right frontal volumes were less in PD than controls ($p = .025$; $p = .029$, respectively), but no within-group laterality differences were identified.
Conclusions: Findings lend support to the hypothesis that PD may not be an entirely sub-cortical disease. The interaction between frontal and sub-cortical structures through white matter circuits should be explored. Supported by: K23NS60660 (CP)
Correspondence: *Peter Nguyen, University of Florida, 1700 SW 16th Ct., Apt P-28, Gainesville, FL 32608. E-mail: peternguyen@phhp.ufl.edu*

C. PENDERGRASS, A. LEWIS & A. BIRMINGHAM. A Neuroimaging Study of the Hippocampus during Motor Inhibition in Bipolar Disorder.
Objective: Abnormal hippocampal function has been implicated in the pathphysiology of bipolar disorder. Abnormalities in the hippocampus may contribute to impairments commonly seen in Bipolar disorder, such as impaired inhibition, through disruption of its many interconnections. The present study evaluated the structure and function of the hippocampus during motor inhibition.
Participants and Methods: Euthymic patients with Bipolar Disorder, type I, and matched healthy controls performed a stop-signal motor task while undergoing fMRI. Volumetric estimates of the hippocampus were obtained by conducting manual tracings based on an accepted manual segmentation protocol. Between-group and within-group correlations for performance and neural response during task engagement were calculated.
Results: There was a trend for the BP group to make more errors on go trials of the stop-signal task, but no group differences were detected in the estimated duration of the stop process or in the number of errors on the stop trials. Both groups demonstrated a right>left asymmetry in hippocampal volume; however, no group hippocampal volume differences were detected. Right and left posterior and total hippocampal volumes were positively related to the number of stop signal errors in the BP group but not in controls. In contrast, right and left posterior hippocampal volumes were positively related to the number of correct stops during the task for controls but not the BP group. Functional ROI analysis revealed significant hippocampal activation during the task in the control group that was not present in the BP group.
Conclusions: Results from the current study did not identify abnormalities in hippocampal volume in patients with Bipolar disorder. However, the results are consistent with previous research suggesting differential involvement of neural regions known to contribute to regulation of response in Bipolar disorder. Further studies are needed to examine the functional role of the hippocampus in inhibition in Bipolar disorder.
Correspondence: *Cara Pendergrass, Ph.D., Psychiatry, Vanderbilt University Medical School, 1601 23rd Avenue South, Suite 3057, Nashville, TN 37212. E-mail: cara.pendergrass@vanderbilt.edu*

D.J. POGASH, K. BLACKMON, W.B. BARR, C. CARLSON, J. DUBOIS, O. DEVINSKY, R. KUZNIECKY, E. HALGREN & T. THESEN. Cortical and Subcortical Structural Correlates of Subclinical Anxiety Symptoms.
Objective: Neuroanatomical models of fear processing propose that anxiety emerges from irregular signaling by the amygdala, which is modulated by top-down inhibition from pre-frontal regions. The involvement of amygdala-frontal circuitry in anxiety regulation has been studied extensively with functional MRI. Our goal is to identify the morphometric characteristics of such a network, which have been only minimally investigated in normal populations.
Participants and Methods: A sample of 28 neurologically healthy right-handed adults with no clinical history of anxiety disorders completed a 3T MRI scan, along with the Beck Anxiety Inventory (BAI) and the Beck Depression Inventory-II (BDI-II). Post-processing quantitative MRI image analysis (Freesurfer) included segmentation and volume estimation of subcortical structures, which were then regressed on BAI and BDI-II scores. We then used a quantitative vertex-based post-processing method of correlating BAI scores and left amygdala volumes with cortical thickness, accounting for age.
Results: Left amygdala volumes significantly predicted anxiety scores, after controlling for age, with decreased amygdala volume associated with higher anxiety scores. Higher anxiety scores were associated with thicker cortex in bilateral orbitofrontal regions, superior and ventromedial frontal regions, left temporal, inferior parietal, and anterior cingulate regions, and right inferior frontal, temporal, and cingulate regions. Left amygdala volumes were associated with increased thickness in the left rostral anterior cingulate, right posterior cingulate and occipital-temporal regions, as well as thinner cortex in left inferior frontal, orbitofrontal and superior temporal regions.
Conclusions: These results identify a structural anxiety network in a non-clinical population that corresponds with functional imaging findings, and indicate areas for future investigation in clinical populations.
Correspondence: *Daniel J. Pogash, Psychology, New York University, 2908 31st Ave, Apartment D6, Long Island City, NY 11106. E-mail: Djp329@nyu.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

B.K. SCANLON, A.J. FURST, P.J. BAYLEY, M.M. ADAMSON, J. ASHFORD & J.L. TAYLOR. Voxel-Based Morphometry in Healthy Aging: Education Forms the Common Mind.

Objective: Voxel-based morphometry (VBM) is an important tool used to study the impact of structural changes in the brain and their relationship to cognitive performance. However, methodological differences between studies often make the interpretation of results challenging. The purpose of this study was to examine the impact of education on a VBM analysis of healthy middle-aged and older individuals.

Participants and Methods: After giving informed consent, 43 healthy individuals (mean age = 63.0 +/- 6.6 years; range 52-76 years) completed a battery of neuropsychological tests and underwent structural 1.5T MRI scanning. VBM (SPM5) was used to investigate the relationship between education and gray matter density. Additional VBM analyses were performed to examine the relationship between gray matter density and performance on semantic fluency, phonemic fluency, and verbal learning and memory tasks with adjustments for age, gender, and total intracranial volume (TIV). These analyses were compared to those that also adjusted for educational attainment.

Results: VBM analyses, adjusted for age, gender, and TIV, identified correlations between gray matter density and educational attainment in the right and left middle frontal gyri, right inferior frontal gyrus, and left precentral gyrus. Adjusting for educational attainment in the cognitive performance analyses accounted for enough variance in gray matter density to alter the outcomes of the analyses.

Conclusions: Educational attainment has a strong positive relationship with gray matter density in several areas of the frontal lobes, lending relevance to theories of cognitive and brain reserve. Studies designed to evaluate relationships between neuropsychological performance and underlying neural substrates should consider the inclusion of educational attainment as a potentially important covariate in VBM analyses.

Correspondence: *Blake K. Scanlon, Ph.D., Sierra-Pacific MIRECC, VA Palo Alto/Stanford University, 3801 Miranda Ave, (151Y), Palo Alto, CA 94304. E-mail: bscanlon@stanford.edu*

T.G. SPARKS, A. SUDHYADHOM, J. TANNER, K.D. FOOTE, M.S. OKUN & C. PRICE. Identifying the Subthalamic Nucleus on MRI in Parkinson's Disease: a Test of Reliability.

Objective: The subthalamic nucleus (STN) is difficult to identify on structural brain imaging, but is often a deep brain stimulation (DBS) target for treatment of Parkinson's disease (PD) motor symptoms. This study is a first step towards acquiring STN region of interest measurements using novel imaging parameters and measurement software. We examined whether a novice to imaging could achieve reliability with a trained neurosurgeon (KF) for identifying the STN. Intra-rater reliability was also examined.

Participants and Methods: Inverted T1 scans (FGATIR; Sudhyadhom et al., 2009) and in-house DBS-FIGS software that incorporates the Schaltenbrand and Bailey (1959) stereotactic atlas were used to locate the STN in 15 PD brains. A neurosurgeon and a novice rater used these tools to identify the STN in axial, coronal, and sagittal views. The STN was identified by adjusting controls for the scaling (stretch/shrink of atlas) and movement in the anterior-posterior (a-p), lateral, and axial directions, and the rotation (around each axis) of the atlas. The novice rater completed 90 separate measurement trials to assess reliability to surgeon and also to self (intra-rater). Reliability was tested using ICC.

Results: Although the ICC for lateral movement remained low, reliability to surgeon improved overall (ICC's > .75) Intra-rater reliability improved and remained stable.

Conclusions: After ninety trials, reliability could be achieved for identification of the STN. Best reliability was achieved for axial controls likely due to the clearly defined border between STN and substantia nigra (SNr) which will be demonstrated at the conference. Findings will improve STN identification for future studies.

Supported by: K23NS60660 (CP)

Correspondence: *Tyler G. Sparks, University of Florida, 1500 nw 4th ave, Unit 304, Gainesville, FL 32603. E-mail: mxsparky107@aol.com*

Memory Functions

R.L. ERICKSON, L.K. PAUL & W.S. BROWN. Deficient Delayed Memory on the CVLT-II in Individuals with Agenesis of the Corpus Callosum.

Objective: Recent confirmatory factor analysis of the California Verbal Learning Test—Second Edition (CVLT-II) in the normative sample has yielded a four-factor model of Attention Span (AS), Learning Efficiency (LE), Delayed Memory (DM), and Inaccurate Memory (IM) (Donders, 2008). The purpose of the present study was to compare, using this more robust and parsimonious model of interpretation, aspects of verbal learning and memory in individuals with Agenesis of the Corpus Callosum (ACC).

Participants and Methods: Twenty-six adults with complete and partial ACC (FSIQ > 80; age 16-52) and 27 age, education, and FSIQ-matched controls were administered the California Verbal Learning Test-Second Edition (CVLT-II). It was hypothesized that individuals with ACC would exhibit significantly deficient performance on all of Donder's four factors.

Results: A one-way MANOVA was utilized to determine the effect of Group (ACC versus Controls) on four dependent variables (AS, LE, DM, and IM factors). There was not a significant overall effect of group on the dependent variables, $F(4, 48) = 1.55$, $p = .20$, $\mu p2 = 0.11$. Post-hoc one way ANOVAs revealed that individuals with ACC performed significantly worse from controls on the DM factor, $F(1, 51) = 4.75$, $p = .03$, $\mu 2 = .56$.

Conclusions: Intact performance by the ACC group on the AS, LE, and IM factor, and deficient performance on the DM factor, suggests a deficit only in the consolidation or retrieval of previously learned verbal information. Specifically, deficient performance by the ACC group on Donder's DM factor could have been the result of their having encoded the verbal information in a less elaborate form, or the result of decreased access to and retrieval of information encoded within the right hemisphere.

Correspondence: *Warren S. Brown, Ph.D., Fuller Graduate School of Psychology, Travis Research Institute, 180 N. Oakland Ave, Pasadena, CA 91101. E-mail: wsbrown@fuller.edu*

R. BURTON, R. DIXON, I. LEK & J.B. CAPLAN. Qualitatively similar associative interference across the lifespan.

Objective: AB/AC learning has been used to investigate associative interference in cognitive aging and clinical populations. On average, older adults are more susceptible to interference than controls, but the mechanisms for this susceptibility are unclear. Our objectives were to compare how old and young adults manage interference, and how this is effected by strategy use.

Participants and Methods: To address this gap in the literature, fifty-eight neurologically intact old (60-74 years) participants and eighty-five young participants studied and were later tested with cued recall for two lists of pairs of unrelated words. To create interference some words from the first set (A) were presented in new pairs (AC; i.e., AB: Apple - Table; AC: Apple - Castle). To probe the mechanism by which participants handle interference, we assessed the relationship between the overlapping pairs by correlating recall of B with recall of C for each pair. Strategy instructions for learning the overlapping pairs were manipulated between subjects.

Results: Classic findings suggested that B and C are recalled independently (i.e., Wichawut & Martin, 1971), but we found independence was illusory, and reflected a summation of both competition and facilitation effects between B and C due to individual variability.

Older adults were more susceptible to proactive interference than young, but the relationship (correlation) between overlapping pairs was consistent across lifespan. The between-subjects strategy instruction manipulation revealed that deliberately studying AB and AC together resulted in more facilitation for both young and old adults.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: In sum, slightly reduced associative-interference handling in aging may be unrelated to interference handling in particular, contrary to what one might expect due to age-linked degeneration of hippocampus and prefrontal cortex.
Correspondence: *Rachel Burton, Psychology, University of Alberta, 202-215 Tait Place, Saskatoon, SK S7H 5L5, Canada. E-mail: rlburton@ualberta.ca*

S. CHRISTMAN & A. SAHU. Individual Differences in Prospective Memory, Working Memory, and Executive Function.
Objective: A growing body of research indicates a robust advantage in retrospective episodic retrieval in mixed-handers relative to strong right-handers, interpreted in terms of mixed-handers' greater access to right hemisphere-based retrieval mechanisms. The purpose of the current study was to explore whether handedness differences are obtained with measures of prospective memory (e.g., memory for future intentions).
Participants and Methods: The Memory for Intentions Screening Test (MIST; Raskin, 2009), along with measures of working memory (digit span) and executive function (pair cancellation) and a self-report metamemory inventory (Everyday Memory Questionnaire), were administered to college students.
Results: Although no handedness differences in prospective memory were found, mixed-handers scores were nominally higher across all six MIST subscales. A significant advantage for females was found; to our knowledge, this is one of the first reports of a sex difference in prospective memory. A number of interesting modulatory effects were also found. First, working memory capacity showed positive versus negative correlations with prospective memory for females versus males, respectively. Second, better executive function predicted better prospective memory in females but not males. Third, self-reported prospective memory ability predicted observed behavioral prospective memory ability in females but not males. Finally, a mixed-handed advantage in working memory capacity was found.
Conclusions: The results suggest that sex (and possibly handedness) should be added to age as individual difference variables of interest in prospective memory research.
Correspondence: *Stephen Christman, Ph.D., Psychology, University of Toledo, 2801 W. Bancroft, Toledo, OH 43606. E-mail: stephen.christman@utoledo.edu*

B.J. DIAMOND, A.R. MAYES & P.R. MEUDELL. Priming, Recognition and Autonomic Discrimination in Amnesia.
Objective: This study examined encoding, autonomic priming and recognition in amnesia. There were three objectives: First, determine the relationship between autonomic priming and recognition. Second, determine the relationship between activity at encoding and whether an item is autonomically primed and/or recognized. Third, examine whether autonomic priming and recognition are supported by different mneumonic processes.
Participants and Methods: Participants consisted of six individuals with amnesia, including two patients with ruptured and repaired anterior communicating artery aneurysms, one Korsakoff patient, one post-meningitic patient, two post-encephalitic patients and six healthy controls. Behavioral and physiological measures (electrodermal activity and heart rate) were collected.
Results: In individuals with amnesia, items that were "not-recognized" were associated with better autonomic discrimination and lower levels of physiological activity at encoding. Greater levels of electrodermal activity at encoding were correlated with better recognition in both healthy and amnesic participants (rho = .64, p = .03). There was an inverse relationship between recognition and autonomic discrimination across all participants showing that higher levels of recognition were associated with lower levels of autonomic discrimination (rho = -.72, p = .01).
Conclusions: The findings appear to suggest that autonomic priming and recognition reflect the operation of two separate and dissociated memory systems. A state-dependent activation-fractionation-inhibition (AFI) model is proposed involving an orienting response elicited by familiarity, preference and search and modulated by underlying memory strength. The model may provide a framework for testing existing models of episodic memory and to help reconcile and integrate findings using physiological indices of priming.
Correspondence: *Bruce J. Diamond, Ph.D., Psychology, WPU/UMDNJ, Box 43592, Upper Montclair, NJ 07043. E-mail: diamondb@wpunj.edu*

B. DYER, M. DANIEL & P. MICHAEL. The Association Between Measures of Intelligence and Memory In a Clinical Sample.
Objective: Discrepancy analysis is a method of indentifying memory impairment which involves comparing the patient's current memory test scores with an expected level of performance, frequently an IQ score. If the memory score is significantly below the intelligence score, this discrepancy is taken as indication of a memory deficit. However, there are differing views of the relationship between intelligence and memory and accurate understanding of this relationship is critical for discrepancy analysis.
Participants and Methods: One hundred sixty-seven adult patients [Mean (SD): age = 29.76 (10.84); education = 13.83 (2.32)] referred for neuropsychological assessment to a university doctoral training and research center were divided into three groups based on FSIQ and GAI: below average (Λ 89), average (90-109), and above average (110). The groups' memory performance was compared on: California Verbal Learning Test- 2nd Edition (CVLT-II), Rey-Osterrieth Complex Figure Test (RCFT), WMS-III Logical Memory (LM), and WMS-III Visual Reproduction (VR).
Results: Results indicated the relationship between memory and intelligence scores was very similar for FSIQ and GAI. The memory test differences between the below average (*M*: FSIQ = 86.54; GAI = 86.52) and average (*M*: FSIQ = 99.37; GAI = 98.59) groups were greater than the memory test differences between the average and above average (*M*: FSIQ = 107.28: GAI = 105.20) groups.
Conclusions: Although memory scores increased with intelligence scores, they were not linear correlates. Memory tended to be lower than intellectual ability in individuals with above average intelligence, while the opposite pattern held true for individuals with below average intelligence.
Correspondence: *Brienne Dyer, Psy.D., Pacific University, 511 SW 10th Ave., Portland, OR 97229. E-mail: fost8619@pacificu.edu*

M.A. ETCHELLS, M. DANIEL, J. POWELL & K. WYMAN. Association Between Verbal "Intelligence" and Verbal Memory in the Elderly.
Objective: Research on intelligence has indicated a relationship between memory test performance and IQ levels. However, the degree of this association varies between studies. In neuropsychological testing, differences between intelligence performance and memory ability could indicate cognitive deficits. Research on older adults in this area is scarce therefore in this study we aim to determine if there is an association between verbal "intelligence" and verbal memory and learning in elderly adults.
Participants and Methods: Volunteer participants were 43 men and 96 women without significant history of, or current, medical / psychological problems or substance use. Subjects were administered WAIS-III Vocabulary and the Rey Auditory Verbal Learning Test (AVLT) as part of a larger neuropsychological battery.
Results: The correlation between Vocabulary scaled scores and AVLT Total Recall raw scores was significant ($r(137) = .24$, $p < .004$). Subjects were divided into two groups based on Vocabulary scaled score: 7-12 (n = 63) and 13-18 (n = 76). The groups' mean (standard deviation) Total Recall scores were significantly different: 7-12 = 31.46 (8.74); 13-18 = 35.80 (10.25) ($F = 7.05$, $p < .009$). The correlation between Vocabulary scaled scores and AVLT Delay Recall was also significant ($r(137) = .17$, $p < .047$). The groups' mean (standard deviation) Delay Recall scores were significantly different: 7-12 = 5.40 (2.63); 13-18 = 6.57 (3.46) ($F = 4.87$, $p < .029$).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: For patients in their 80's, overall verbal ability is significantly associated with efficiency of learning verbal information. Verbal ability is also significantly associated with delayed verbal memory.

Correspondence: *Meagan A. Etchells, M.S., School of Professional Psychology, Pacific University, 3125 Westwood Northern Blvd, Cincinnati, OH 45211. E-mail: etch8571@pacificu.edu*

J.H. ATKINS, A. GRIGOROVICH, L. LEACH, M. GOMEZ & J. FISH. Electrical Injury and PTSD: An Episodic Memory Deficit.

Objective: This study investigated the nature of neuropsychological dysfunction in electrical injury (EI) patients with post traumatic stress disorder (PTSD). Previous studies of PTSD and EI (Pliskin et al, 2006; Ammar, 2006) have found that similar to other PTSD populations, EIs with PTSD show impairments in attention, working memory and episodic memory (EM). Hippocampal dysfunction is implicated in EM and neuroimaging studies have confirmed this area's involvement in PTSD (Shin et al, 2005). Although studies have shown EM impairments in patients with PTSD, relative deficits on recall measures do not necessarily reveal a loss in retention, particularly in diagnoses like PTSD, where initial acquisition of new information is impaired (Vasterline & Brevin, 2005).

Participants and Methods: Adult EI patients were recruited from an outpatient clinic of a rehabilitation hospital between January 2008 and July 2010. Participants completed psychological questionnaires measuring depression, anxiety and PTSD, and a series of standardized psychometric measures of neuropsychological functioning. Student's t-tests were conducted to examine the effects of injury factors and PTSD on functioning. 26 patients (24 males) were studied, with a mean (±SD) age of 43.62±10.47 years and a mean education of 11.88±2.52 years.

Results: Type of voltage, injury and demographic factors were not significantly different between PTSD groups. Subjects with PTSD had significantly ($p<0.05$) worse scores on verbal and visual memory than those without PTSD. Measures of learning, attention, working memory and executive functioning were not significantly different between groups.

Conclusions: The findings suggest that in EIs with PTSD there is an EM impairment, possibly due to encoding and retention of information, as opposed to general difficulties in attention or learning as previously hypothesized.

Correspondence: *Alisa Grigorovich, MA, Clinical Research, St John's Rehab Hospital, A089- 285 Cummer Ave, Toronto, ON M2M2G1, Canada. E-mail: agrigorovich@stjohnsrehab.com*

A. HAZAMY, J.P. WILSON & L.J. ALTMANN. Differences in Visual-Spatial Memory for Item Identity versus Item Order.

Objective: Visual-spatial working memory (vs-WM) retains information about object identity and location. This study tests whether vs-WM is restricted by a capacity limit of about 4 objects, by comparing memory for stimulus identity versus stimulus order in healthy younger adults.

Participants and Methods: Thirty college students completed 2 computer-based, vs-WM tasks in which 1-4 stimuli were presented individually. Participants verified whether a subsequent array displayed the same stimuli in the same order. In the Identity task, distracter trials displayed the same figures in the same order; however, one figure had the dots displaced by one cell. In the Order task, the same stimuli were shown but two were transposed in the verification sequence. Response accuracy was transformed to A' scores (Stanislaw & Todorov, 1999).

Results: Accuracy decreased as sequence length increased. Scores in the Identity task were significantly lower than in the Order task. An interaction between task and sequence length revealed that accuracy in the two tasks only differed significantly at sequence length 3. A' scores for the 4-item Identity condition was at chance.

Conclusions: Participants detected changes in item order more accurately than changes in item identity, particularly in 3-item sequences, which may have been due to reliance upon a primacy/recency strategy. This strategy was not helpful for the Identity task. Therefore, different types of distracters in vs-WM tasks may encourage the use of different strategies, which can lead to differences in performance across superficially similar tasks. Additionally, vs-WM capacity may be less than four for abstract figures.

Correspondence: *Audrey Hazamy, MS, University of Florida, 336 Dauer Hall, Box 117420, Gainesville, FL 32611-7420. E-mail: Ahazamy1@ufl.edu*

E. HESSEN. A rehearsal strategy significantly improves immediate and delayed recall on the Rey Auditory Verbal Learning Test.

Objective: A repeated observation during memory assessment with the Rey Auditory Verbal Learning Test (RAVLT) is that those who spontaneously employ a memory rehearsal strategy by repeating the word list more than once, achieve better scores than those who only repeat the word list once. This observation led to concern about the ability of the standard test procedure of RAVLT and similar tests, in eliciting the best possible recall scores. The purpose of this study was to test the hypothesis that a rehearsal recall strategy, of repeating the word list more than once, would result in improved scores of recall on the RAVLT.

Participants and Methods: We report on differences in outcome after standard administration and after experimental administration on immediate and delayed recall measures from the RAVLT of 50 patients.

Results: The experimental administration resulted in significantly improved scores for all the variables employed. Additionally, it was found that patients who failed effort screening showed significantly poorer improvement on delayed recall, compared to those who passed the effort screening.

Conclusions: The general clear improvement both in raw scores and T-scores demonstrates that recall performance can be significantly influenced by the strategy of the patient or small variations in instructions by the examiner.

Correspondence: *Erik Hessen, PhD, Akershus University Hospital, Lorenskog, Oslo 1478, Norway. E-mail: erik.hessen@nevropsykologi.no*

L. KNUYCKY, H.M. KLEIDER, PH.D. & T.Z. KING, PH.D.. Event Valence Affects False Alarm Rate for Never Before Seen Actions Under Conditions of High Arousal.

Objective: Research suggests that high levels of arousal facilitate memorial errors. However, arousal is often manipulated such that it simultaneously evokes negative emotionality (e.g., gross or scary pictures). Furthermore, the arousing stimulus commonly serves as the memorial event. Thus, it is our aim to investigate whether the valence of the arousal and/or the valence of the memorial event differentially affect event memory.

Participants and Methods: Sixty-nine students of diverse ethnicities were randomly assigned to one of two pre-arousal conditions (positive or negative video) in order to evoke increased arousal. Then participants were randomly assigned to one of three non-arousing memorial-events that varied by valence (positive, negative, or neutral video). Experimental conditions were confirmed by self-report measures of arousal and valence (pre and post each video). A recognition memory test was administered after a twenty minute delay.

Results: The main effect of memorial event-type was significant ($F(2)=19.68$, $p<.001$). False alarms were significantly greater in the negative condition (M=37%; $t(45)=3.41$, $p<.01$), relative to neutral (M=22%), and significantly lower in the positive condition (M=10%; $t(44)=-3.22$, $p<.01$). The pattern of false alarms was consistent across both arousal conditions.

Conclusions: These data suggest that under conditions of high arousal false memories are facilitated by negative events regardless of whether the arousal was positively or negatively valenced. These findings extend previous word memory research (Brainerd et al., 2008) wherein negative word lists were found to evoke a high rate of false alarms due to increased familiarity for distractors and decreased verbatim memory.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Leslie Knuycky, M.A., Georgia State University, 2024 Reserve Parkway, McDonough, GA 30253. E-mail: leslie.knuycky@gmail.com*

D.A. LOWE & S.A. ROGERS. Does Level of Extroversion Impact Memory Performance in Older Adults?

Objective: Little research considers personality when assessing cognitive functioning. This study examines the impact of extroversion on memory performance among older adults.

Participants and Methods: Eighty-four older adults (M age = 79.29, SD = 9.53) completed a neuropsychological battery. Memory measures included California Verbal Learning Test (CVLT-II), Rey-O Complex Figure (ROCF 3' & 30'), and WMS-III Logical Memory (LM I & II) and Visual Reproduction (VR I & II). The NEO-FFI was administered to assess five factors of personality, including extroversion. Based on participants' NEO-FFI Extroversion score, they were divided into three groups: extroverts, introverts, and ambitents.

Results: Extroversion was positively correlated with CVLT-II Trials 1-5 Total and List B, ps < .05. ANOVAs revealed significant differences between extroverts, introverts, and ambitents for LM I and CVLT-II List B, Long-Delay Free Recall, and False Positives, Fs > 3.32, ps < .05. Post-hoc analyses indicated that extroverts performed better than introverts on all these measures, ps < .04. Ambitents performed better than introverts on CVLT-II Long-Delay Free Recall and False Positives, ps < .04.

Conclusions: Level of extroversion appears to impact one's memory performance, particularly verbal learning and memory. Compared to extroverts and ambitents, introverts seem to be more susceptible to proactive interference and may find it harder to learn, retain, and recall verbal information. Some of this may be related to verbal fluency, although there was no significant difference between groups for number of repetitions or intrusions. These results suggest it is important to consider older adults' extroversion when assessing their memory and making aging-related diagnoses.

Correspondence: *Deborah A. Lowe, Department of Psychology, Westmont College, 955 La Paz Road, Santa Barbara, CA 93108. E-mail: deborah.a.lowe@gmail.com*

D.G. MCLAREN, G. XU, M.L. RIES, M.A. SAGER & S.C. JOHNSON. FMRI Activity and Context-Dependent Connectivity Reveals Brain-Behavior Differences in Middle-Aged Adults at Risk for Alzheimer's Disease.

Objective: The present study aims at characterizing the brain responses during memory encoding in individuals at increased risk for Alzheimer's disease (AD).

Participants and Methods: 18 cognitively normal adults with an apolipoprotein E e4 (APOE4+) allele and 23 without an APOE e4 (APOE4-) allele aged 39-66 years old underwent fMRI scanning during an episodic memory encoding task with repeated line drawings. Analysis of fMRI data consisted of investigating group differences in relationships of the task-related BOLD signal of each repetition and the context-dependent connectivity with the right anterior hippocampus with d', a measure of successful memory encoding.

Results: We found that APOE4 carriers had more adaptation, or a larger decrease in BOLD signal, between the first and third picture presentations compared to APOE4 non-carriers in the middle frontal gyrus, bilaterally, and right angular gyrus. Additionally, we found that the amount of adaptation was more positively related to d' in APOE4+ individuals in the right angular gyrus and left intraparietal sulcus. Context-dependent connectivity revealed that the decrease in connectivity between the first and second picture presentations was significantly greater in APOE4- individuals in the left insula, parahippocampal gyrus, and anterior insula. Additionally, the relationship of adaptation with d' was greater in the APOE4- group in the insular region.

Conclusions: Differences in brain-behavior relationships in the absence of a behavioral impairment potentially represent a pattern of preclinical AD. More specifically, these differences provide evidence of compensatory mechanisms. Ongoing longitudinal studies will validate the ideas of compensation and preclinical AD.

Correspondence: *Donald G. McLaren, Ph.D., University of Wisconsin - Madison, 42 Pondview Rd., Arlington, MA 02474. E-mail: mclaren.donald@gmail.com*

K.M. QUINN, P.A. PHILLIPS & B.M. HAMPSTEAD. Age Related Temporal Order Memory Deficits Are Exacerbated by Medial Temporal Lobe Dysfunction in Mild Cognitive Impairment.

Objective: Both the frontal and medial temporal lobes have been implicated in remembering the order of events (temporal order memory – TOM). Frontally-based memory abilities generally demonstrate an age-related decline. However, it is unclear which of these processes accounts for the previously reported TOM deficits in Alzheimer's disease given the pervasiveness of their deficits. Mild cognitive impairment (MCI) typically precedes Alzheimer's disease and provides a more focally impaired population since their primary deficits are medial temporal (encoding/consolidation) in nature. Therefore, we directly compared performances on a novel TOM test in healthy young (HY), healthy elderly (HE), and MCI.

Participants and Methods: HY (20.6 yrs (SD=2.3)), HE (67.6 yrs (SD=9.2)), and MCI (68.7 yrs (SD=9.64)) participants were asked to remember sequences of 3, 4, or 5 line-drawings that were presented 1 at a time, for 3 seconds each. Participants were then asked to reconstruct the sequence order both immediately after presentation and following a 10 minute delay.

Results: There were significant main effects of group (HY>HE=MCI) and time (immediate>delay), as well as significant group x time interaction. The HY outperformed the other groups at both time points. There were no significant differences between HE and MCI during the immediate recall, but the MCI performed significantly worse than HE after the delay.

Conclusions: Results suggest a general age-related reduction of frontally-based functioning that is similar between HE and MCI. TOM deficits emerge in MCI patients once the task becomes dependent on medial temporal functioning; thus, deficient encoding/consolidation appears to be primarily responsible for TOM impairment in MCI patients.

Correspondence: *Kristen M. Quinn, Vanderbilt University, 9305 Stoney Ridge Lane, Alpharetta, GA 30022. E-mail: kristen.m.quinn@vanderbilt.edu*

J. TEDJOPRANOTO & B.M. HAMPSTEAD. Assessing the Relationship between RBANS Normative Data and Medial Temporal Volumetrics in Mild Cognitive Impairment.

Objective: The current study 1) directly compared the diagnostic utility of the standard (manual-based) and age/education corrected norms (Duff et al., TCN, 17, 351-366) for the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) in patients with mild cognitive impairment, and 2) examined the relationship between RBANS Immediate (IM) and Delayed memory (DM) indices and medial temporal lobe volumetrics.

Participants and Methods: Twenty-seven MCI patients and 17 healthy elderly completed a brief neuropsychological screening protocol that included the RBANS and underwent MRI during a larger study. Discriminant function analysis was performed, a cutoff score was determined using the Youden index, and areas under the receiver operating characteristic curves were determined for the IM and DM indices using both the standard and corrected norms. IM and DM performances were correlated with hippocampal, amygdala, and inferior lateral ventricle volumes.

Results: The standard (.871) and corrected (.878) scores yielded highly similar areas under the curve for the IM. Both scores were correlated with amygdala volumes but only the corrected norms were related to the left hippocampal volume. For the DM, both sets of norms yielded a cutoff score of 89; however, the area under the curve was slightly better for the standard (.983) than the corrected norms (.971). DM performances were significantly related to hippocampal and amygdala volumes but only the standard norms were also related to the size of the inferior lateral ventricles.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The standard and corrected normative data appear to yield similar areas under the curve and similar relationships with medial temporal lobe integrity.
Correspondence: *Jessica Tedjopranoto, Bachelor of Science, Neuropsychology, Emory University, 1441 Clifton Road NE, Suite 150, Atlanta, GA 30322. E-mail: jtedjop@emory.edu*

A. WAHLEN, L. NAHUM, D. GABRIEL & A. SCHNIDER. Cortical Dissociation Between Reality Filtering and Strategic Monitoring: an Evoked Potential Study.
Objective: Behaviourally spontaneous confabulation constitutes a confusion of reality in thinking, characterized by false statements, inappropriate acts, and disorientation. We have postulated that it results from the failure of a preconscious orbitofrontal mechanism, which normally filters upcoming memories according to their relation with ongoing reality. An alternative interpretation has been that it emanates from deficient Strategic monitoring, of which Reality filtering would be a component.
Participants and Methods: In this study, we used high-density evoked potentials in healthy subjects to compare the electrocortical mechanisms underlying Reality filtering and Strategic monitoring. 16 healthy subjects performed a continuous recognition task, which combined the challenges typical of the two forms of memory control: distinction between similar pictures (Strategic monitoring) and sense of pictures' occurrence within the ongoing, rather than a previous run (Reality filtering).
Results: We found that the two mechanisms electrophysiologically dissociate. At 200-300 ms, processing of items that do not relate to present reality (Reality filter) and processing of items resembling previously presented items (Strategic monitoring) evoked an opposite electrocortical response both in terms of electrocortical map configuration and frontal potentials. Between 300-400 ms, real repetitions evoked a specific cortical map associated with a specific frontal potential.
Conclusions: In summary, to sense that a memory does not relate to the present ("no, I do not have this meeting today") invokes different brain mechanisms than to verify whether a memory about the past is accurate or not: orbitofrontal Reality filtering is distinct from Strategic monitoring.
Correspondence: *Aurélie Wahlen, Division of Neurorehabilitation - Geneva University Hospitals, av. de Beau-Séjour 26, Geneva 1211, Switzerland. E-mail: aurelie.wahlen@gmail.com*

Paper Session 4: Executive Functions

Moderator: Scott Langenecker

1:30–3:15 p.m.

J. IUDICELLO, S. WOODS, R. DEUTSCH & I. GRANT. Additive Effects of Aging and HIV Infection on Semantic Verbal Fluency: An Analysis of Clustering and Switching.
Objective: Although both aging and HIV infection are independently associated with semantic fluency impairment, the possible additive effects of these risk factors are unknown. This study examined the influence of age on the component cognitive processes of semantic fluency in HIV-infected adults and their associations with everyday functioning.
Participants and Methods: Participants included 257 individuals across 4 demographically matched groups: Younger (i.e., Λ40 years) Healthy (n=93), Younger HIV-infected (n=50), Older (i.e., >50 years) Healthy (n=51), and Older HIV-infected (n=63) individuals. Participants were administered a standard semantic fluency protocol scored according to established clustering and switching guidelines (Troyer et al., 1997) as part of a comprehensive neuropsychological evaluation in our HIV Neurobehavioral Research Programs (HNRP).
Results: Jonckheere-Terpstra tests revealed a significant stepwise additive effect between the groups for overall semantic fluency output ($p = 0.004$) and a trend for declining switching performance ($p = 0.056$), but not cluster size ($p = 0.826$), with greatest deficits evident in the Older HIV-infected participants. Results were not better explained by confounding psychiatric, medical, or HIV disease characteristics. Within the Older HIV-infected adults, poorer switching was associated with deficits in learning and executive functioning and self-reported declines in everyday functioning.
Conclusions: Results suggest that HIV infection and aging may confer adverse additive effects on the executive components of semantic fluency (i.e., switching), which was associated with poorer everyday functioning outcomes and may be driven by the combined frontostriatal neuropathological burden of these two conditions. These findings underscore the need to address increased neurocognitive morbidity as the HIV population lives longer with effective antiretroviral treatment.
Correspondence: *Jennifer Iudicello, M.S., Psychiatry, HIV Neurobehavioral Research Center; SDSU/UCSD, 220 Dickinson Street, Suite B, San Diego, CA 92103. E-mail: jennifer.iudicello@gmail.com*

M.A. COLE, D. PARTOVI, J. MUIR, D.J. SORENSEN, L.M. SHIN, R.T. KNIGHT & M. D'ESPOSITO. Psychiatric Symptomatology, but Not Mild Traumatic Brain Injury, Is Associated with Cognitive Deficits in OEF/OIF Veterans.
Objective: Traumatic brain injury is widely cited as the "signature injury" of the conflicts in Iraq and Afghanistan (OEF/OIF), the most common of which being mild traumatic brain injury (mTBI). Although the mTBIs are often of a repeated nature and of a potentially more deleterious injury mechanism (blast wave exposure), it remains unclear whether they are necessarily associated with the frequently observed post-deployment syndrome symptoms such as cognitive deficits, especially given the significant psychiatric comorbidity. It was hypothesized that cognitive deficits in OEF/OIF veterans with mTBI history are more strongly associated with psychiatric symptomatology than mTBI history.
Participants and Methods: 112 OEF/OIF veterans with history of mTBI(s) were administered PTSD and depression measures and a battery of neuropsychological tests that is sensitive to TBI sequelae. Extent and severity of mTBI history was quantified by employing a system that tallies both the number of mTBIs as well as associated loss of consciousness and posttraumatic amnesia.
Results: Neuropsychological deficits were observed in each of the domains: $z = -0.72$ for attention/processing speed, $z = -1.26$ for verbal learning/memory and $z = -0.61$ for executive systems. Simultaneous multivariate regression and communality analyses revealed that psychiatric symptomatology was significantly associated with neuropsychological deficits, whereas mTBI history had no association with neuropsychological performance.
Conclusions: Although these results do not preclude a small subset of individuals experiencing long-term mTBI-related cognitive sequelae, a clear pattern of psychiatric contribution to neuropsychological deficits was found across each cognitive domain. Implications of this study in conjunction with other recent findings will be discussed in the context of clinical service provision and public policy.
Correspondence: *Michael A. Cole, Ph.D., Michael Cole, VA Northern California Health Care System, 150 Muir Road, Martinez, CA 94553. E-mail: michaelallancole@gmail.com*

D.D. BRAGA, S.F. SORG, N.K. LUC, E. LANNI, D. SCHIEHSER, M.W. BONDI, A.J. JAK, S.I. DEV, D.C. DELIS, L. FRANK & L. DELANO-WOOD. Anterior Cingulum Integrity Predicts Neurocognitive Performance in Traumatic Brain Injury: A Quantitative Tractography Study.
Objective: Since traditional MRI is frequently not sensitive enough to capture subtle TBI-related white matter changes in the context of mild to moderate TBI (mTBI), we used a diffusion tensor imaging (DTI) to quantify integrity of the anterior cingulum (AC), a white matter structure that is especially vulnerable to diffuse axonal injury. Associations between white matter integrity of the AC and executive functioning were also examined.
Participants and Methods: Patients with mTBI (n = 32; 29/32 = male; mean age = 33) underwent 3T-DTI scans as well as a comprehensive

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

neuropsychological and psychosocial evaluation. An executive functioning composite score (derived from demographically-corrected scores from the Wisconsin Card Sorting Test and the DKEFS Verbal Fluency Switching) was computed and white matter integrity was measured and quantified via mean fractional anisotropy (FA) values.
Results: Correlational analyses demonstrated that FA of the AC was significantly positively related to the executive functioning composite score (r=.52, p=.018). Additionally, hierarchical regression showed that increased FA of the AC significantly predicted better executive functioning performance, even after adjusting for volume of the AC as well as post-traumatic stress symptomatology (≥=.55, ΔR2=.26, p=.036).
Conclusions: Findings of the current study suggest that, in our sample of veterans with mTBI, poorer white matter integrity of the AC is predictive of executive dysfunction over and above the effects of post-traumatic stress symptomatology and AC volume. Importantly, these findings provide evidence that the anterior WM is vulnerable in mTBI, and they further show that AC integrity may represent a potential biomarker for TBI-related cognitive dysfunction.
Correspondence: *Lisa Delano-Wood, Ph.D., Psychiatry, University of California, San Diego, 3350 La Jolla Village Dr, Bldg 13 —151B, San Diego, CA 92161. E-mail: ldelano@ucsd.edu*

A.J. MOFFITT, K.E. BODNER, L. BODNER, J.H. MILES & S.E. CHRIST. Are Autism-Related Impairments in Executive Control More Apparent in the Presence of Multiple Demands?
Objective: Executive function is postulated as one of the core areas of impairment in individuals with an autism spectrum disorder (ASD). When measured in isolation, however, aspects of executive function such as working memory and inhibitory control have often been found to be intact in ASD cohorts. It remains unclear to what extent impairments may be more readily observed when demands are placed concurrently on multiple aspects of executive function. The objective of the present study was to evaluate whether ASD-related impairments in inhibitory control are exaggerated (and thus easier to detect) in the presence of additional demands on other aspects of executive function (i.e., working memory).
Participants and Methods: An antisaccade eye movement task was used to assess inhibitory performance in 15 individuals with ASD (Mean age = 15.1 years) and an age-matched comparison group of 49 typically developing individuals (Mean age = 14.3 years). To evaluate the impact of secondary memory load on inhibitory performance, each participant completed the task in the presence of low and high secondary working memory demands.
Results: ASD-related impairments were evident on the antisaccade task, $p < .05$. Consistent with an emerging deficit, the impairment was more evident in older as compared to younger children with ASD, $p < .05$. Contrary to expectations, however, increasing concurrent working memory load did not appear to differentially affect the ASD group as compared to the control group, p = ns.
Conclusions: The current findings suggest that ASD-related impairments in executive control, particularly as it relates to coordinating multiple cognitive abilities, may become more apparent with increased age in children with ASD.
Correspondence: *Shawn E. Christ, Ph.D., Psychological Sciences, University of Missouri-Columbia, 210 McAlester Hall, Columbia, MO 65211. E-mail: research@shawnchrist.com*

A. DUDANI, R. GHASSEMI, S. NARAYANAN, D.L. ARNOLD, J.G. SLED, B. BANWELL & C. TILL. Clinical and Neuroimaging Correlates of Executive Functioning in Pediatric-Onset Multiple Sclerosis.
Objective: To evaluate the components of executive function (EF) that are impaired in pediatric-onset multiple sclerosis (MS), and determine the clinical and neural correlates of impaired EF.
Participants and Methods: Participants included 32 MS patients (27 females) and 30 age- and sex-matched controls (24 females), with a mean age at assessment of 16.1 years (SD = 2.1) for patients and 15.7 years (SD = 2.1) for controls. EF components measured were attentional control, working memory, inhibition, cognitive flexibility, information processing, and behavioural manifestation of EF (as measured by parent-report on the BRIEF). Clinical (age of disease onset, disease duration) and neuroimaging (T1- and T2-weighted total brain lesion volume (LV), and T2 frontal lobe LV) correlates of EF were examined for MS patients, adjusting for sex and Full Scale IQ.
Results: Patients had a mean age of disease onset of 12.0 years (SD = 3.6), mean disease duration of 4.0 years (SD = 3.2), and an average of 3.5 relapses (SD = 2.2). Relative to controls, MS patients had significantly lower IQ (t=-3.99, p<.001), and performed significantly poorer on measures of information processing and cognitive flexibility. In MS patients, poor EF was significantly associated with both clinical and neuroimaging measures. The associations were strongest for T2-weighted total brain and frontal lobe LV, with adjusted r^2 values ranging from 0.43 to 0.46 (p<.01 for all).
Conclusions: Pediatric-onset MS patients may face greater challenges in day-to-day tasks involving cognitive efficiency and mental flexibility, which are strongly impacted by global and frontal-specific pathological processes.
Correspondence: *Ameeta Dudani, Psychology, York University, 1204 - 5 Shady Golfway, Toronto, ON M3C 3A5, Canada. E-mail: ameetad@yorku.ca*

D. KRCH, J. SUMOWSKI, J. LENGENFELDER, G. WYLIE & N. CHIARAVALLOTI. Thalamic Integrity Predicts Processing Speed, Verbal Memory, and Executive Function.
Objective: Traumatic brain injury (TBI) causes multiple primary and secondary pathophysiologic changes which results in both gray and white matter (WM) tissue loss. Resulting sequalae include cognitive impairment, with deficits found most commonly in areas of processing speed, learning and memory, executive functioning, and working memory. However, the relationship between neurometrics and neuropsychological deficits is weak and poorly understood. The current pilot research explored whether atrophy and white matter integrity metrics are predictive of cognitive functioning in individuals with moderate to severe TBI.
Participants and Methods: Fifteen individuals with moderate to severe TBI were evaluated. Brain atrophy was estimated from measurements of third ventricle width (TVW) using high-resolution anatomical brain magnetic resonance imaging (magnetization-prepared rapid gradient echo). Diffusion tensor imaging fractional anisotropy (FA) values were derived for the corpus callosum and thalamus. Dependent measures of information processing speed, verbal and visual memory, executive function, and working memory were administered. Stepwise multiple regression analyses were performed separately for each dependent variable, with TVW, corpus callosal FA, and thalamic FA entered as the independent variables.
Results: Thalamic WM integrity and atrophy were significant predictors of processing speed. Thalamic WM integrity was the best predictor of verbal memory and executive function. None of the neurometrics accounted for significant variance in visual memory and working memory.
Conclusions: The consistent finding of thalamic integrity as a predictor of several cognitive domains provides preliminary evidence that diffuse axonal injury damages thalamic projection fibers, warranting further research in this area.
Correspondence: *Denise Krch, PhD, Neuropsychology & Neuroscience Laboratory, Kessler Foundation Research Center, 300 Executive Dr., Suite 10, West Orange, NJ 07052. E-mail: dkrch@kesslerfoundation.org*

J.K. JANECEK, L.A. ROG, M. PROSJE, M.S. OKUN, C.C. PRICE, R.M. BAUER & D. BOWERS. MCI in Parkinson Disease: Measures Matter.
Objective: Previous studies examining mild cognitive impairment (MCI) in Parkinson disease (PD) report rates ranging from 29% to 54%, reflecting wide variability in specific cognitive measures, domains of interest, and classification criteria. In this study, we compared the clinical characteristics and prevalence of MCI in a group of PD patients when two types of memory measures [word lists vs stories] were used to define objective memory impairment. Based on known relationships between list learning and executive function, we anticipated higher MCI rates when memory was indexed using word list learning.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants included 284 non-demented idiopathic PD patients who underwent routine neuropsychological evaluation assessing memory, executive function, processing speed, language, and visuospatial skills. Memory measures included the Hopkins Verbal Learning Test- Revised (HVLT-R) and WMS-III Logical Memory (LM). Impaired performance on each domain was 1.5 SD below published normative means on an averaged composite of constituent measures. Two analyses were conducted, one using the HVLT-R as the memory indicator and the other using LM.
Results: Nearly half the PD group was classified as MCI (43%, N=122) using the HVLT-R versus 28% (N=79) with LM stories. In the HVLT-R analysis, the greatest proportion of MCI was due to amnestic deficits (79%), either singly (40%) or combined with other domains (39%). In the LM analysis, the majority of PD-MCI participants had nonamnestic deficits (72%), primarily involving processing speed and executive function. MCI in both analyses was associated with greater disease severity and lower DRS-2 scores.
Conclusions: We found that the method for evaluating memory performance dramatically influenced the likelihood that a PD patient would be classified as MCI. Findings will be discussed in terms of implications for understanding the concept of MCI in PD, candidacy for DBS surgery, and progression towards PD dementia.
Correspondence: *Julie K. Janecek, M.S., Counseling Psychology, Marquette University, PO Box 1881, Schroeder Health Complex, Milwaukee, WI 53201. E-mail: jjanecek@phhp.ufl.edu*

Student Research Symposium:

Chair: Sommer Thorgusen

2:00–3:15 p.m.

S.R. THORGUSEN. Student Symposium: Translational Research.
Objective: Translational research is a key element of successful clinical research, allowing for an exchange of ideas and techniques between scientists and clinicians. While many exciting new technologies are advancing the field of basic science, the resulting advances are often slow to carry over into clinical practice. Likewise, there can be barriers to translating clinical insights into feasible questions for further scientific investigation. In an effort to stimulate greater exchange between basic science and clinical practice, funding organizations are eager to support translational research endeavors. This symposium is designed to highlight student work that makes a significant contribution to the field of neuropsychology by bridging the divide between basic science and clinical practice.
Participants and Methods: x
Results: x
Conclusions: x
Correspondence: *Sommer R. Thorgusen, M.S., Psychology, University of Utah, 380 S 1530 E, Room 502, Salt Lake City, UT 84112. E-mail: sommer.thorgusen@hsc.utah.edu*

P. BREWSTER, H. TUOKKO & S. MACDONALD. Measurement Equivalence of the Neuropsychological Test Battery of the Canadian Study of Health and Aging Across Two Levels of Educational Attainment.
Objective: To determine the configural and metric measurement equivalence of a battery of neuropsychological tests when administered to older adults with lower vs. higher levels of education. If the conceptual and quantitative association between individual tests and their corresponding latent constructs are not invariant across levels of education then their use in studies that group participants by education may be problematic.
Participants and Methods: Participants were cognitively intact English-speaking older adults who completed the neuropsychological battery of the Canadian Study of Health and Aging (CSHA) in 1995-96. Those with Λ8 years of education (n=120) comprised the lower-educated (LE) sample. Those with □9 years (n=385) comprised the higher-educated (HE) sample. Confirmatory factor analysis was used to confirm the three latent constructs (verbal ability, visuospatial ability, long-term retention; Tuokko et al., 2009) measured by the 12 tests in the CSHA battery. Measurement equivalence across HE and LE samples was evaluated using invariance analysis. Model fit was assessed using Chi-square goodness-of-fit, comparative fit index (CFI), root mean square error of approximation (RMSEA) and a parsimony index (α2/df).
Results: Fit between the three-factor model and the observed indicators was good (Parsimony=2.36; CFI=0.93; RMSEA=0.05). Invariance testing revealed a loss of model fit following constraint of the factor loadings (α2(8)=25.89, p=0.001), but when constraints on the verbal ability factor were released, this effect was no longer significant (α2(4)=4.89, p=0.30). Specifically, verbal ability factor loadings for animal fluency (α2(1)=5.24, p=0.02) and the token test (α2(1)=7.20, p=0.01) could not be constrained equal across the HE and LE samples.
Conclusions: Two measures of verbal ability (Token Test, Animal Fluency) were not invariant across HE and LE samples of older adults, suggesting that cognitive processes underlying performance on these tests may vary as a function of educational attainment.
Correspondence: *Paul Brewster, Psychology and Centre on Aging, University of Victoria, 450 Dallas Rd, Apt 704, Victoria, BC V8V 1B1, Canada. E-mail: pbrew@uvic.ca*

A.J. SZABO, T. STRATTON, P. LONG, L. DENT, C. WELLS & J. GUNSTAD. Prevalence of Invalid Performance on the IMPACT in Division I Football Players.
Objective: Many student-athletes are assessed using computerized test batteries due to the ease of administration and relatively complete screen of cognitive functions. The widely-used ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) describes two types of suspicious assessments: "sand-bagging", or faking bad with the possible intent of not appearing impaired post-concussion, and invalid responses due to a lack of attention to testing. No study has determined the prevalence of these responses.
Participants and Methods: For the current study, baseline measures from a division I collegiate football team were examined to determine the frequency of invalid profiles. Baseline testing was conducted during pre-season practices in group format. A total of 290 baseline assessments were collected over three seasons and some athletes are represented more than once. Average age was 20.3 ± 1.37 years.
Results: Analyses revealed that 73.8% of assessments were valid, as 12.1% of assessments suggested invalid responding and 22.1% sandbagging. One measure (i.e. Visual Memory Composite) identified 17% of the profiles as invalid. Approximately 72.9% of assessments were valid prior to education on the importance of concussion and 76.3% after.
Conclusions: In summary, although most student-athletes produce valid results on IMPACT testing, the current findings raise concern about valid responding and sand-bagging during baseline assessments. This pattern may complicate interpretation of post-concussion testing and place athletes at risk for subsequent injury. Future studies should develop strategies to improve effort during testing and indices to clarify invalid scores.
Correspondence: *Ashley J. Szabo, M.A., Kent State University, PO Box 5190, Kent, OH 44240. E-mail: aszabo6@kent.edu*

J.M. SCHUH, D. MIRMAN & I. EIGSTI. Perspective Taking in Autism Spectrum Disorder: Relative Contributions of Theory of Mind and Working Memory.
Objective: Pragmatic language impairments in autism spectrum disorders (ASD) are significant, and likely include difficulty in monitoring what information is known between partners in a conversation, termed

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

"common ground" (Clark, 1992). Common ground impairments in ASD could potentially reflect limitations in Theory of Mind (ToM) or working memory (WM). This study assessed: 1) the ability of individuals with ASD to use common ground; and 2) the contributions of ToM and WM to such representations.
Participants and Methods: Adolescents with ASD (n=13) and typical development (TD; n=22) ages 9-16 years completed a problem-solving task with a research assistant "partner" in which some information was "secret" (known only to the participant). Participants' eye movements and behavioral responses were recorded. As a manipulation of WM load, the amount of secret information varied. Task performance was compared to standardized measures of ToM and WM.
Results: Accuracy was high across groups (M= .89 ASD, .93 TD). Eye-movement data indicated that all participants were slower when required to integrate secret information, p<.001, and this difficulty increased under high WM demands, p<.002. The ASD group was slower to incorporate partner perspective, p<.05, as they considered "secret" information longer. Across groups, performance errors were associated with standardized scores of ToM and WM, and (for the ASD group) correlated with symptom severity, all p's<.05.
Conclusions: Differences for low/high WM loads suggest that WM modulates the ability to incorporate shared information, with the ASD group particularly susceptible to WM demands. Results are consistent with research suggesting that perspective-taking places significant demands on cognitive processes.
Correspondence: *Jillian M. Schuh, University of Connecticut, 5230 S. Drexel Ave Apt 3SW, Chicago, IL 60615. E-mail: jillian.schuh@gmail.com*

T. KANE, W. PACKMAN, B. HORN, B. CHESTERMAN & M. CRITTENDEN. Cognitive Functioning Associated with Pediatric Bone Marrow Transplant.
Objective: Studies of cognitive functioning following bone marrow transplant (BMT) in pediatric patients have found age-related decline. We hypothesized that neuropsychological test scores would decline at 1 year post-BMT and stabilize by 3 years post-transplant. We compared participant scores to normative means and examined the influence of demographic, family contextual, and medical treatment variables on longitudinal change.
Participants and Methods: 89 participants (mean age = 3.9 years, SD = 3.9) who received BMT for heterogeneous malignant (55%) and non-malignant (45%) disorders were administered age-appropriate global intellectual functioning measures, as well as the Beery-Buktenica Developmental Test of Visual-Motor Integration and the Wide Range Achievement Test, prior to and 1 and 3 years following BMT.
Results: Repeated measures ANOVA revealed significant longitudinal decline in FSIQ (F=16.84, p=.001) and PIQ (F=12.23, p=.007), with FSIQ reflecting the hypothesized pattern of change. Participant means were lower than normative means (p<.05) on PIQ, quantitative reasoning and spelling achievement at pre-transplant, on VIQ, PIQ, memory and achievement at 1 year post-transplant, and on FSIQ, VIQ, PIQ, memory, visual-motor integration and achievement at 3 years post-transplant. Regression analysis showed that, beyond the contribution of pre-BMT test scores (p<.05), gender (R^2 change=.087, p=.029) uniquely explained 11% of the variance in PIQ, and post-BMT survival (R^2 change=.144, p=.018) contributed 34% unique variance to spelling achievement.
Conclusions: Results indicate decline in cognitive abilities up to 3 years post-BMT, with partial stabilization at 3 years. Lower pre-BMT performance, male gender, and post-BMT non-survival predicted decline in cognitive abilities. Findings suggest areas for preventive and rehabilitative intervention.
Correspondence: *Tara Kane, MS, Psychology, Palo Alto University, 1038 Natchez Point, Apt. 266, Memphis, TN 38103. E-mail: tkane@paloaltou.edu*

C.R. WENDELL, L.I. KATZEL, W.F. ROSENBERGER, V. PLAMADEALA, M.M. HOSEY & S.R. WALDSTEIN. Plasma Lipid Levels and Neuropsychological Function: Nonlinear Relations and Effect Modification by Age.
Objective: Prior literature has revealed conflicting findings regarding lipid levels as risk factors for poor neuropsychological function. A paucity of research has examined nonlinear effects of lipids, an approach that may further clarify the existing literature. We examined quadratic relations of total, low-, and high-density lipoprotein cholesterol (TC, LDL-C HDL-C) to performance on an extensive neuropsychological battery.
Participants and Methods: Participants were 190 older adults (53% men, mean age=66 yrs) free of major medical, neurologic, and psychiatric disease. Measures of fasting plasma TC and HDL-C were assayed, and LDL-C was calculated. Participants completed a neuropsychological battery assessing attention, verbal/visual memory, psychomotor speed, visuo-perception/construction, and executive function. Multiple regression analyses examined lipids as quadratic predictors of each measure of cognitive performance, with age (dichotomized as <70 vs. 70+) as an effect modifier. Analyses were adjusted for sex, education, alcohol, smoking, depression, antihypertensives, statins, glucose, and systolic blood pressure.
Results: Significant quadratic effects of TC*TC*age were identified for Logical Memory II (b=-.001, p=.02) and Digits Backward (b=-.001, p=.02), such that the 70+ group performed better at high and low levels of TC than at mid-range TC (U-shaped), whereas the <70 group performed worse at high and low levels of TC than at mid-range TC (inverted U-shape). Similarly, significant U- and J-shaped effects of LDL-C*LDL-C*age were identified for Visual Reproductions II (b=-.002, p=.02), Digits Backward (b=-.0004, p=.019), log of Trails B (b=.0001, p=.02), and Block Design (b=-.002, p=.02). Quadratic effects of HDL on cognitive performance were nonsignificant.
Conclusions: Results indicate differential associations between lipids and neuropsychological function across different ages and domains of function. High and low TC and LDL may confer both risk and benefit for suboptimal cognitive function at different ages.
Correspondence: *Carrington R. Wendell, MA, Psychology, University of Maryland, Baltimore County, 101 Basset Hall Drive, Durham, NC 27713. E-mail: carringtonwendell@gmail.com*

Paper Session 5: Pediatric Neuropsychology

Moderator: Paul Cirino

3:15–4:45 p.m.

K. YEATES, E. KAIZAR, B. BANGERT, A. DIETRICH, K. NUSS, J. RUSIN, M. WRIGHT & G. TAYLOR. Reliable Change in Postconcussive Symptoms among Children with Mild Traumatic Brain Injury.
Objective: This study sought to determine whether children with mild traumatic brain injury (TBI) are more likely than children with orthopedic injuries (OI) to display reliable increases in post-concussive symptoms (PCS). The study also sought to examine whether reliable increases in PCS after mild TBI are associated with poorer health-related quality of life (HRQOL).
Participants and Methods: Participants included children aged 8-15 years with mild TBI (n = 186) or mild orthopedic injuries (OI, n = 99). They were recruited prospectively from emergency departments at two large children's hospitals. Parents rated PCS at an initial assessment within 3 weeks of injury and again at 1, 3, and 12 months post-injury.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

They also rated pre-injury symptoms retrospectively at the initial assessment. They rated HRQOL at the initial assessment and at 3 and 12 months post-injury. Standard regression-based methods were used to predict post-injury ratings of PCS from retrospective ratings of premorbid symptoms in the OI group. Cutoffs for reliable increase (i.e., >1.65 SE) were established at each post-injury assessment.
Results: Children in the mild TBI group were significantly more likely than those in the OI group to display reliable increases in PCS. Mixed-model logistic regression showed a significant group by time interaction for somatic PCS, with the largest differences at baseline, 1, and 3 months, and a significant main effect of group for cognitive PCS. Reliable increases in PCS were especially likely among children with mild TBI who displayed a loss of consciousness or abnormalities on MRI. Reliable increases in PCS were associated with significantly poorer HRQOL at 3 and 12 months post-injury.
Conclusions: The findings suggest that mild TBI is associated with meaningful increases in PCS for many children, and that such increases are especially likely among children with complicated mild TBI. Reliable increases in PCS are associated with functional disability, as reflected in sustained deficits in HRQOL.
Correspondence: *Keith Yeates, Pediatrics, The Ohio State University, Nationwide Childrens Hospital, 700 Childrens Dr, Columbus, OH 43205. E-mail: keith.yeates@nationwidechildrens.org*

K.A. MCNALLY, B. BANGERT, A. DIETRICH, K. NUSS, J. RUSIN, M. WRIGHT, G. TAYLOR & K.O. YEATES. Relative Contributions of Injury Characteristics versus Non-injury Child and Family Factors in Predicting Postconcussive Symptoms Following Mild Traumatic Brain Injury in Children.
Objective: To examine the relative contributions of injury characteristics and non-injury child and family factors as predictors of postconcussive symptoms (PCS) following mild traumatic brain injury (TBI) in children.
Participants and Methods: Participants were 8- to 15-year-old children, 186 with mild TBI and 99 with mild orthopedic injuries (OI). Parents and children rated PCS shortly after injury and at 1, 3, and 12 months post-injury. Hierarchical regression analyses were conducted to predict PCS from (1) demographic variables (family SES; child age, race, and sex); (2) pre-morbid child factors (WASI IQ score; WRAT-3 Reading; Child Behavior Checklist Total T score; Coping Strategies Inventory scores; and retrospective ratings of pre-injury PCS); (3) family factors (Family Assessment Device General Functioning Scale; Brief Symptom Inventory rating of parent distress; and Life Stressors and Social Resources Inventory scores); and (4) injury characteristics (injury group: OI vs. mild TBI without loss of consciousness vs. mild TBI with LOC; and Modified Injury Severity Scale).
Results: For both parent and child ratings of somatic PCS and symptom counts, injury characteristics accounted for decreasing variance over time; at 3 and 12 months post injury, injury characteristics did not predict somatic PCS. Injury characteristics did not predict child ratings of cognitive PCS at any occasion, but predicted parent ratings of cognitive PCS at baseline and 3 months. Demographic and premorbid child factors consistently predicted PCS ratings, without a clear change in contribution over time. Premorbid family factors did not consistently predict child ratings of PCS, but did predict parent ratings, showing a decreasing contribution over time.
Conclusions: Injury characteristics predict PCS in the first months following mild TBI but show a decreasing contribution over time. In contrast, non-injury factors are more consistently related to persistent PCS.
Correspondence: *Kelly A. McNally, Ph.D., Psychology, Nationwide Childrens Hospital, 700 Children's Drive, Columbus, OH 43205. E-mail: kelly.mcnally@gmail.com*

H.M. CONKLIN, J.M. ASHFORD, T.N. SKINNER, M. MCCOOL, T.E. MERCHANT, V. SANTANA, M. DI PINTO, C. VAUGHAN, G. GIOIA, S. WU & X. XIONG. Computerized Assessment of Cognitive Late Effects among Childhood Brain Tumor Survivors: An Alternative Use for the ImPACT Battery.
Objective: Advantages to computerized assessment of neuropsychological functions include improved standardization, increased reliability of response time variables, and increased availability of alternate forms facilitating longitudinal assessment. ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) is a computerized battery developed for monitoring recovery following mild brain injuries that assesses attention, memory and processing speed. Despite evidence that core areas of deficit in cancer survivors are among those assessed by ImPACT, it has not previously been used with this population.
Participants and Methods: Twenty four childhood brain tumor (BT) survivors treated with conformal radiation therapy (mean age= 15.7±1.6; mean age at irradiation= 9.8±2.5), twenty solid tumor (ST) survivors treated without CNS-directed therapy (mean age= 16.2±1.8) and twenty healthy siblings (mean age= 15.1±1.6 years) were administered an age modified version of ImPACT. Additional computerized working memory and recognition memory measures were administered.
Results: Univariate ANOVAs revealed group differences ($p<.05$) on measures of recognition memory (Word Memory, Design Memory), spatial working memory (Xs & Os), processing speed (Symbol Match) and reaction time (Speed Click, Color Match), with BT survivors performing significantly worse than ST survivors and siblings. Multiple surgical resections, hydrocephalus and CSF shunt placement predicted worse performance ($p<.05$). Pearson correlation coefficients revealed significant associations between ImPACT memory tasks and computerized forced choice recognition tasks (rs= .30-.33, $p<.05$).
Conclusions: ImPACT demonstrated sensitivity to cognitive late effects experienced by some BT survivors with clinical predictors of performance consistent with the pediatric oncology literature. Correlations with measures of similar constructs provide evidence for criterion-oriented validity. Findings offer initial support for the utility of ImPACT for monitoring of cognitive late effects.
Correspondence: *Heather M. Conklin, Ph.D., Psychology, St. Jude Children's Research Hospital, 262 Danny Thomas Place, Mail Stop 740, Memphis, TN 38105-2794. E-mail: heather.conklin@stjude.org*

K.R. KRULL, N. JAIN, C. LI, D.K. SRIVASTAVA, L.L. ROBISON & M.M. HUDSON. Neurocognitive Functions in Aging Adult Survivors of Childhood Leukemia.
Objective: Survivors of childhood ALL are at risk for neurocognitive impairment beginning within five years of diagnosis and associated with cranial radiation therapy (CRT). The degree of impairment in very long-term survivors is unknown, however, impairment is expected to evolve with maturation.
Participants and Methods: Neurocognitive functions were evaluated in 285 adult survivors of childhood ALL (mean [range] current age = 35.0 yrs [20.4–49.9], age at diagnosis = 6.0 yrs [0.2–18.8]). Treatment involved either 24Gy CRT (56.7%), 18 Gy CRT (21.1%), or no CRT (22.2%). Associations with CRT, sex, age at diagnosis, and educational and vocational outcomes were examined.
Results: 72.6% of survivors demonstrated impairment (i.e. standard scores <10th %ile) on at least one direct measure of executive function (EF). Rates of impairment were higher for measures of verbal fluency (28%), flexibility (34%), and working memory (39%) compared to general intelligence (14%) and processing speed (15%). CRT was associated with impaired EF ($p's <0.01$) and other cognitive skills ($p's <0.005$). Female sex was associated with impairment on measures of other cognitive skills ($p's <0.01$), but not EF. Younger age at diagnosis was associated with poorer verbal flexibility ($p<0.01$) and poorer problem solving ($p<0.0001$), as well as lower intelligence ($p<0.004$). Survivors with impaired EF were less likely to have graduated college (RR=1.76, 95% CI 1.28–2.64, $p<0.005$) and were less likely to be employed fulltime (RR=1.68, 95% CI 1.28–2.19, $p<0.0001$).
Conclusions: Survivors of childhood leukemia continue to be at risk for neurocognitive impairment well into adulthood. Impairment appears common in executive functions, which is related to educational and vocational outcomes.
Correspondence: *Kevin R. Krull, PhD, Epidemiology & Cancer Control, St. Jude Children's Research Hospital, 262 Danny Thomas Place, MS 735, Memphis, TN 38105-3678. E-mail: kevin.krull@stjude.org*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

D.T. PULSIPHER, K. DABBS, J. JONES, R. SHETH, B. HERMANN & M. SEIDENBERG. Neuropsychological Performance and Brain Structure in Early Remission New-Onset Pediatric Epilepsy.

Objective: Childhood-onset epilepsy is associated with impaired neuropsychological performance early in its course with developmental cognitive trajectories related to clinical seizure factors. Most literature examining seizure remittance has focused on predicting factors and long-term outcome. Neuropsychological and neurostructural variables within close proximity to onset have not been examined.

Participants and Methods: 75 children with new-onset epilepsy underwent comprehensive neuropsychological evaluation and quantitative MRI within 12 months of epilepsy diagnosis and again 2 years later. 50 healthy controls were also examined. At follow-up, 15 epilepsy subjects remitted (20%) and 60 subjects had ongoing epilepsy. Subjects were compared on 7 cognitive domains. Additionally, brain tissue and CSF volumes were compared. Demographic, developmental, family history, and clinical seizure variables were also examined.

Results: At baseline, remitted subjects had longer duration of epilepsy, longer time since last seizure, and were receiving fewer special education services than non-remitted subjects. The non-remitted group had significantly lower scores than the remitted group on IQ, academic skills, executive functions, and learning/memory at baseline, while there were no significant differences between the remitted and control groups. The non-remitted group had significantly more CSF and less total grey matter volume than the remitted and control groups.

Conclusions: New-onset epilepsy patients that remitted within 2 years of diagnosis resembled healthy controls and had significantly higher neuropsychological scores and greater grey matter volumes than non-remitted patients within 12 months of seizure onset. Individuals with early remission have protective factors (e.g., brain volume, genetic) that protect them from the deleterious effects of pediatric epilepsy and its course.

Correspondence: *Dalin T. Pulsipher, Ph.D., New Mexico Veteran's Affairs Health Care System, 1501 San Pedro Dr. SE (116), Behavioral Health Care Line (116), Albuquerque, NM 87108, NM 60064. E-mail: dalin.pulsipher@my.rfums.org*

S.R. MCCAULEY, E.A. WILDE, E.D. BIGLER, Z. CHU, R. YALLAMPALLI, M.B. ONI, T.C. WU, M.A. RAMOS, C. PEDROZA, A.C. VASQUEZ, J.V. HUNTER & H.S. LEVIN. Diffusion Tensor Imaging of Incentive Effects in Prospective Memory Three Months after Pediatric Traumatic Brain Injury.

Objective: Although brain-behavior relations of episodic memory have been frequently studied in children with traumatic brain injury (TBI), few studies exist investigating the brain-behavior relations of event-based prospective memory (EB-PM) impairments following TBI or their remediation.

Participants and Methods: As part of a prospective study of children with TBI, children with moderate to severe TBI performed an EB-PM test with two motivational enhancement conditions (dollars and pennies) and underwent concurrent diffusion tensor imaging (DTI) at three months postinjury. Children with orthopedic injuries (OI; n=37), or moderate-to-severe TBI (n=40) were compared. Major white matter (WM) structures and cortical areas related to memory and motivation were analyzed.

Results: A previous study in this sample found significant between-group differences for EB-PM performance such that children with moderate TBI performed poorer than controls and children with severe TBI performed poorer than both groups. For this study, analyses included between-group contrasts of DTI metrics and brain-behavior correlations. Significant group differences were found for fractional anisotropy (FA) and apparent diffusion coefficient (ADC) for orbitofrontal white matter (OFWM), cingulum bundles (CB), and uncinate fasciculi (UF). The FA of these WM structures in children with TBI was significantly correlated with EB-PM performance in the high, but not low motivation condition. Regression analyses within the TBI group indicated that the FA of the left CB ($p=.003$), left OFWM ($p<.02$), and left ($p<.02$) and right ($p<.008$) UF significantly predicted EB-PM performance in the high motivation condition.

Conclusions: This is the first known study of DTI and EB-PM in children with TBI. Results suggest that the cingulum bundles, orbitofrontal WM, and uncinate fasciculi are important WM structures mediating motivation-based EB-PM responses following moderate-to-severe TBI in children.

Correspondence: *Stephen R. McCauley, PhD, Physical Medicine and Rehabilitation, Baylor College of Medicine, Cognitive Neuroscience Laboratory, 1709 Dryden Rd., Ste. 1200, Houston, TX 77030. E-mail: mccauley@bcm.edu*

Symposium 5: Applying Neuroplasticity to Rehabilitation

Chair: Sarah Raskin

Discussant: Catherine Mateer

3:15–4:45 p.m.

S. RASKIN, C. MATEER, L. GONZALEZ-ROTHI, I. ROBERTSON, S. RASKIN & K. KERNS. Applying Neuroplasticity to Rehabilitation.

Symposium Description: Research is only beginning to reveal the mechanisms that lead to plastic changes in the adult brain. However, recent literature on experience-dependent changes, including ones that are practice-dependent, can be used to inform future studies in rehabilitation. The aim for cognitive rehabilitation is that benefits should generalize to any un-practiced task that recruits the same underlying cognitive function and so the ultimate goal is to produce improvements that are transferable beyond a controlled laboratory setting and to alleviate functional impairments in everyday-life activities. Towards this end, this symposium will review current critical issues and recent findings in which plasticity has been used to inform rehabilitation research and/or neuroimaging techniques are used to measure brain changes related to treatment.

Correspondence: *Sarah Raskin, Ph.D., Psychology, Trinity College, 300 Summit Street, Hartford, CT 06119. E-mail: sarah.raskin@trincoll.edu*

L. GONZALEZ-ROTHI. Neurorehabilitation: Translation from Discovery to Care.

Objective: Recent advances in our knowledge of neuroplastic capacity of the mature CNS in response to enriching experience have led to a newly emerging optimism about neurorehabilitation. Unfortunately we have precious little evidence to guide our treatment of cognitive deficits associated with neurologic disease or injury. While Randomized Clinical Trials (RCTs) are commonly referred to as the "gold standard" of treatment research, Class 1 level clinical evidence (Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology, 1994) evolves through a series of treatment research phases, much like those used in the preparation of pharmaceutical agents. RCT characterizes the method most typical of late (Phase 3) clinical development. However, each phase asks an important but different question; each requires rigorous but different scientific methods including sophisticated experimental designs specifically tailored to answer questions asked within the maturity of the treatment method. Each phase may involve revision of the treatment method based upon what was learned; each subsequent phase reliant on successful resolution/completion of the prior phase question. Unfortunately, views of RCT as "gold standard" serve to de-emphasize the importance of the earlier trials leading to the RCT; seriously undermining investment in the necessary evolutionary process for treatment development.

Participants and Methods: This presentation reviews the process of clinical trials which by definition is a process of evolution.

Results: N/A

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Balas et al (2004) report the average lag between discovery and application in biomedical research is 16 years. Neurorehabilitation must begin to appreciate the value and sophistication of the evolutionary process of all phases that contribute to the development of effective clinical interventions, and most especially with cognitive dysfunction which offers the greatest barrier to successful re-entry into purposeful life participation.
Correspondence: *Leslie Gonzalez-Rothi, Department of Neurology, University of Florida, Gainseville, FL 32608. E-mail: gonzalj@neurology.ufl.edu*

I. ROBERTSON. Attention and arousal in cognitive enhancement.
Objective: Adequate attentional focus demands reasonable levels of alertness/arousal, as do complex executive processes.
Participants and Methods: In this paper, I review a series of experiments which explore, using behavioural, EEG, ERP, SCR, fMRI and pupillometery, the relationships between attentional and executive performance on the one hand, and putative measures of alertness/arousal on the other. The conclusions from these studies are tested in a series of cognitive genomic studies where attentional performance in relation to genetic differences in the availability of alertness-related neurotransmitters are measured. Thirdly, I describe a series of experimental neurorehabilitation studies where alertness is systematically manipulated and/or trained, in individuals with ADHD, Traumatic Brain Injury, and in healthy elderly., which show that it is possible to improve attentional and executive performance by the systematic manipulation of low-level alertness levels.
Results: These studies show that it is possible to improve attentional and executive performance by the systematic manipulation of low-level alertness levels.
Conclusions: As awareness of deficits is one of the key issues in neurorehabilitation, I consider how alertness impacts on awareness, in particular in relation to awareness of errors and insight.
Correspondence: *Ian Robertson, Institute of Neuroscience, Trinity College Dublin, Dublin 2, Ireland. E-mail: iroberts@tcd.ie*

S. RASKIN, M. SMITH, E. JONES, G. MILLS & J. GARBARINO. Prospective Memory Intervention.
Objective: Although some preliminary evidence has demonstrated the efficacy of restorative approaches to prospective memory impairments, most studies have used only compensatory strategies. This study separated individuals with brain injury according to their prospective memory impairment and targeted treatment aimed at improving encoding, monitoring or retrieval of the to-be-recalled intention.
Participants and Methods: Twenty individuals with traumatic brain injury were included. All had survived a traumatic brain injury from a motor vehicle accident. All participants were at least one year post injury and had baseline ProM performance of less than 10 minutes. Age mean 42.3 years (sd 10.2) and GCS at admission mean 8.1 (sd 2.3).Each participant was screened with the Memory for Intentions Screening Test. Based on the results at baseline, for ten subjects, each individual was trained with a method designed to aid in encoding (visual imagery), one designed to aid in monitoring (an alarm that vibrates every ten minutes) or one designed to aid in retrieval (elaboration of the environment cues associated with time of retrieval). The other ten subjects were given rote repetition of prospective memory tasks, based on the notion that brain reorganization responds to repetition. All subjects attended sessions once per week for 12 weeks. Testing before and after training consisted of the MIST, the Comprehensive Assessment of Prospective Memory, a diary study and an Einstein prospective memory task.
Results: All subjects showed a significant improvement on the total MIST and diary study but not the CAPM. Individuals given rote repetition showed the greatest improvement.
Conclusions: It is possible that rote repetition is the best method to activate lasting changes in brain organization. However, more research is needed to modify the training modules and to better characterize which individuals will do best with each method.
Correspondence: *Sarah Raskin, Dept. of Psychology, Trinity College, Hartford, CT 06106. E-mail: sarah.raskin@trincoll.edu*

K. KERNS, J. MACSWEEN & J. ENGLE. Rehabilitation of Attention in Children.
Objective: A number of developmental and acquired disorders of childhood share a common feature of deficits in attention and in aspects of executive function (working memory and inhibitory control). While these deficits are quite common, beyond medications, there are very few established interventions which directly impact these abilities. In adults with acquired brain damage, research provides evidence that targeted, direct process specific interventions can improve attention and aspects of executive function, and these interventions are considered empirically validated treatments for the treatment attention and EF impairments in the post-acute stage of traumatic brain injury (TBI) and stroke in adults.
Participants and Methods: Results from a literature review compiling and examining the use of process specific interventions in childhood populations will be presented. We will also describe a number of studies utilizing process specific interventions in childhood disorders and provide information from ongoing work in this area from our own lab in children with fetal alcohol spectrum disorders (FASD), epilepsy and ADHD.
Results: Research over the last decade has also shown attention process training to be a useful intervention method for children and adolescents. Randomized, placebo-controlled research has found that attention process training and/or working memory training improves targeted cognitive functions, as well as being associated with improvement in other aspects of cognitive and behavioral functioning in children with TBI, with cognitive deficits following cancer treatment and with ADHD.
Conclusions: Process specific interventions hold promise for improved cognitive function in children with developmental disorders or attention and executive function.
Correspondence: *Kimberly Kerns, Dept. of Psychology, Victoria, BC V8W P5, Canada. E-mail: kkerns@uvic.ca*

Poster Session 5: Genetic Disorders, Cerebral Asymmetry, Traumatic Brain Injury

3:15–4:45 p.m.

Genetics/Genetic Disorders

D.J. BEARDEN, A.M. MELTON & K. O'TOOLE. A Longitudinal Case Study of the Neuropsychological Impact of CHARGE Syndrome.
Objective: CHARGE syndrome is an identifiable pattern of birth defects involving an autosomal-dominant condition with genotypic heterogeneity occurring in approximately one in every 9-10,000 births worldwide. Neurological abnormalities include cranial nerve palsy, glossopharyngeal and vagus nerves, microcephaly, and neonatal brainstem dysfunction. In addition, problems in areas of adaptive, executive, social, and communicative functioning have been identified. However, due to the rarity of this syndrome and its heterogeneous impact on cognitive functioning, there is currently a dearth of empirical data regarding the full range of its neuropsychological impact.
Participants and Methods: This case study involves a female diagnosed with CHARGE syndrome who received five neuropsychological evaluations between 9- and 14-years-old, offering a longitudinal view of the syndrome's neuropsychological progression.Utilizing an explanation-building method, data collected over the five-year period were visually inspected to identify patterns in the patient's neuropsychological functioning.
Results: Findings over the five-year period revealed cognitive functioning in some areas consistent with extant literature (e.g., low average

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

communication skills), whereas other findings yielded informative data highlighting the importance of individual cognitive differences among individuals diagnosed with CHARGE syndrome (e.g., differences in verbal and nonverbal functioning). Possible links between neurological anomalies and neuropsychological function are discussed, followed by consideration of the impact of caregiver involvement on progression and outcome. Implications and recommendations for treatment are discussed.
Conclusions: A distinct neuropsychological profile for CHARGE syndrome is currently unavailable. The current study offers longitudinal data regarding its neuropsychological impact and progression on behavior, providing important information necessary in profile development.
Correspondence: *Donald J. Bearden, Masters, Neuropsychology; Georgia State University/ Children's Hospital of Atlanta, 1001 Johnson Ferry Road NE, Atlanta, GA 30342. E-mail: dbearden2@student.gsu.edu*

J. CHANG, J. SHOFFNER & R.D. MORRIS. Relationships Among Attention, Processing Speed, and Biochemical Features in Children Identified with Mitochondrial Disease.
Objective: Mitochondrial Diseases (MD) are disorders of function in cellular oxidative phosphorylation (also called Oxphos Disease) caused by diverse nuclear DNA and mtDNA mutations and seen in 1/5,000 births. A critical problem in understanding MD is quantifying all their clinical manifestations due to the large spectrum of symptoms presented. The purpose of this study was to examine relationships among medical indices, biochemical measures, and neurobehavioral functioning of children with MD. In particular, biochemical findings were assessed in relation to children's processing speed and attention.
Participants and Methods: Twenty-five children (ages 4-13) were recruited from a research clinic focused on neurogenetic disorders. Participants were administered subtests from the DAS-II, NEPSY-II, and WIAT-II. The BASC-II Parent Rating Form and Vineland-2 Survey Interview were also completed. The biochemical findings used in this study were from the Western Blot, Native Gels, High Resolution Respirometry, and the Nijmegen diagnostic criteria.
Results: Multiple regression analyses were conducted to explore associations between processing speed and attention, and biochemical abnormalities and medical indices. DAS-II Processing Speed Cluster and BASC-II Attention Problems were significant predictors of the total number of abnormal Complexes (I through V) detected through Western Blot; the total variance explained by the model as a whole was 61.7%, $F(2, 9) = 7.25$, $p = .01$. Furthermore, the same two predictor variables significantly accounted for abnormal cellular respiration detected through High Resolution Respirometry. The total variance explained by the model was 13%, $F(2,5) = .79$, $p = .02$.
Conclusions: The results of this study suggest that poor processing speed and attention-related problems may be an indication of the level of biochemical dysfunction that is present in the oxidative phosphorylation process that is responsible for producing ATP. Implications for future research are presented.
Correspondence: *Jihye Chang, M.A., Georgia State University, 933 Garrett Street, Atlanta, GA 30316. E-mail: jchang15@student.gsu.edu*

E. WINGBERMÜHLE, J.I. EGGER, W.M. VERHOEVEN, M.W. DIJKMAN, D.A. KOOLEN, B.B. DE VRIES & R.P. KESSELS. Neuropsychology of 17q21.31 microdeletion syndrome.
Objective: In 2006, a novel chromosomal disorder was identified, the 17q21.31 microdeletion syndrome (Koolen et al). Estimated prevalence is 1 in 16000 and characteristic features include moderate mental retardation, developmental delay, severe hypotonia and facial dysmorphisms. Anecdotal evidence from clinical observations refers to a remarkably amiable, friendly disposition, reminiscent of the phenotypes of Angelman and Williams syndrome. Cognitive functioning has not been examined in 17q21.31 yet, which is the aim of the current study.
Participants and Methods: Neuropsychological assessment was performed in three out of the four diagnosed 17q21.31 patients in the Netherlands and Belgium (aged 21, 28 and 29; one male), using an explorative multiple case design. Three control participants were recruited, matched on intelligence. Besides widely used instruments to evaluate intelligence, memory, attention and executive functioning, specific tests (Perret's emotion recognition task, Theory of Mind test) and questionnaires (Toronto Alexithymia Scale, Bermond Vorst Alexithymia Questionnaire) were included to assess social emotional functioning. Additionally, experimental tasks regarding approach-avoidance effects and tendencies in generosity were employed.
Results: The general cognitive profile of all participants was in accordance with their (low) intellectual disabilities, with the exception of a relatively strong memory for social-contextual information in the patient group. Basic emotion recognition was intact in both groups; alexithymic features were more prevalent in the controls. Furthermore, patients showed more phobic symptoms, but less social fear and more approaching behaviour.
Conclusions: These findings suggest that 17q21.31 syndrome is characterized by discrepancies in social emotional functioning. Different explanatory hypotheses will be discussed.
Correspondence: *Jos I. Egger, MSc, PhD, Centre of Excellence for Neuropsychiatry; Vincent van Gogh Institute for Psychiatry; Stationsweg 46, Venray 5821 AJ, Netherlands. E-mail: j.egger@psych.ru.nl*

J.B. EISENGART. Sanfilippo Syndrome: Characterization of a Childhood Dementia.
Objective: Sanfilippo syndrome, or Mucopolysaccharidosis Type III (MPS III), is a lysosomal storage disease caused by accumulation of cell waste that leads to progressive cognitive and behavioral deterioration. Although it is the most common of the MPS disorders, it has not been comprehensively studied, in part because there is no known treatment. Our current aims are to characterize and quantify the course of dementia in children with MPS IIIA. We hypothesize that, much like adult dementias, cognitive decline follows a predictable course, by which symptoms worsen with age.
Participants and Methods: Data were gathered from the first wave of a prospective longitudinal study of MPS IIIA. We conducted neuropsychological testing of children with the MPS Type IIIA in the early to moderate stage of disease progression ($N = 10$).
Results: A strong negative correlation between Developmental Quotient (ratio of mental age to chronological age) and age was found ($r = -0.91$). Negative correlations were also found between adaptive skill domains and age (motor $r = -0.89$, communication $r = -0.84$). The correlation between overall adaptive skills and age was -0.80.
Conclusions: Our findings support the hypothesis that Sanfilippo syndrome follows a course of neurocognitive decline that is similar in progress and rate to an adult dementia. By five years of life (an approximation for five years of adult-onset dementia), most children were functioning in the impaired range for cognitive abilities and adaptive skills. Understanding and documenting disease course is a critical step toward development of interventions.
Correspondence: *Julie B. Eisengart, Ph.D., Pediatrics and Neurology, University of Minnesota, 400 Spring St., Apt 140, Saint Paul, MN 55102. E-mail: jbeisengart@yahoo.com*

N. GOODRICH-HUNSAKER, L.M. WONG, Y. MCLENNAN, S. SRIVASTAVA, F. TASSONE, D. HARVEY, S.M. RIVERA & T.J. SIMON. Young Adult Female Fragile X Premutation Carriers Show Age- and Genetically-Modulated Spatiotemporal Cognitive Impairments.
Objective: Fragile X premutation carriers (fXPCs) have a trinucleotide expansion between 55 and 200 CGG repeats in the 5' UTR of the fragile X mental retardation 1 gene (FMR1). The high frequency of the fragile X premutation in the general population and its emerging neurocognitive implications highlight the need to investigate the effects of the premutation on lifespan cognitive development. The overall objective was to understand and quantify how variations in the mutation of a single gene (FMR1) produce a spectrum of cognitive impairments in female fXPCs.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: We examined spatiotemporal processing across various tasks such as line bisection, magnitude estimation, enumeration, and multiple object tracking in young, adult female fXPCs and neurotypical (NT) control participants.
Results: Our results appeared to be consistent with previous studies that detect no cognitive impairments in female fXPCs as a group. However, our in-depth analyses beyond the main effects indicate that female fXPCs have disrupted spatiotemporal cognitive function on several of the tasks, specifically magnitude comparison and enumeration, that appears to be associated with the "dosage" of the FMR1 gene mutation and possibly age.
Conclusions: Identifying the cognitive domains in which impairment does and does not exist, begins to define the neurocognitive endophenotype of the premutation in young adult female fXPCs. This description may help early detection, and possibly prevention, of possible neurocognitive FMR1-associated degeneration before any significant symptoms are evident in those who might be most at risk.
Correspondence: *Naomi Goodrich-Hunsaker, PhD, University of California Davis, 2825 50th Street, Room 1362, Sacramento, CA 95817. E-mail: naomihunsaker@me.com*

D.A. JACOBSON, S.L. ROWE, R. LAJINESS-O'NEILL & J. GDOWSKI. Effects of Hippocampal and Temporal Lobe Volume on Social Functioning and Memory Performance in Children with Velocardiofacial Syndrome.
Objective: Velocardiofacial Syndrome (VCFS) is a common genetic disorder associated with physical, cognitive, and psychiatric deficits. MRI was used to examine differences in temporal lobe and hippocampal volumes. It was hypothesized that decreased hippocampal and temporal lobe volumes would correlate with cognitive and behavioral measures in children with VCFS.
Participants and Methods: Measures included subscales of the Child Behavior Checklist (CBCL), Conners' Parent Rating Scale-Revised (CPRS-R), and Test of Memory and Learning (TOMAL). Twelve subjects (6 VCFS, 6 controls) were scanned with MRI. Temporal and hippocampal volumes were compared and then correlated with cognitive and behavioral measures.
Results: Mean bilateral and unilateral temporal lobe volumes were significantly smaller in people with VCFS (bilateral: $t = 2.41$, $p < .05$; left: $t(10) = 2.18$, $p < .05$; right: $t(10) = 2.64$, $p < .05$) and volume of the right hippocampus was significantly smaller in people with VCFS ($t(10) = 2.19$, $p<.05$). Bilateral temporal lobe correlated positively with subscales of anxiety, depression, and shyness (CBCL:$r=.923$, $p<.011$; CPRS-R:$r = .834$, $p<.05$). Left temporal lobe correlated positively with subscales of anxiety/shyness (CPRS-R: $r = .812$, $p<.05$). Right temporal lobe correlated positively with anxiety/depression scales (CBCL: $r = .918$, $p<.01$). Right hippocampus correlated positively with visual memory ability (TOMAL: $r = .854$, $p<.05$) and story memory (TOMAL: $r = .871$, $p<.05$).
Conclusions: Results suggest volumetric anomalies in the temporal lobe underlie aspects of affective regulation and memory, providing evidence for neurological substrates of the nonverbal learning disability profile in VCFS.
Correspondence: *Daniel A. Jacobson, M.S., Psychology, Eastern Michigan University, 520 Mark Jefferson, Eastern Michigan University, Ypsilanti, MI 48197. E-mail: gattaca2383@gmail.com*

L.A. KAIS, K.M. JANKE & B.P. KLEIN-TASMAN. Inattention and Impulsivity in Young Children with Neurofibromatosis-1.
Objective: Neurofibromatosis type 1 (NF1) is a neurocutaneous disorder affecting approximately 1 in 3,000 persons. Previous research has found that individuals with NF1 are at greater risk for experiencing attention and inhibition problems than the general population; however, very little work has been done with young children. The goal of the current study was to use both parent report and laboratory-based measures to investigate these difficulties in young children.
Participants and Methods: Participants were 25 children with NF1 between the ages of 3 and 6 ($M = 4.58$, $SD = 1.17$). ADHD symptomatology was examined using two parent questionnaires (BASC-II, Conners-PRS) and a semi-structured interview (KDBDS). Performance on lab-based measures (Lab-TAB Tower of Patience and Snack Delay) was also examined.
Results: Significant difficulties were seen on the Conners Inattention scale [$t(24) = 2.83$, $p = .009$] and ADHD Index [$t(24) = 2.59$, $p = .016$] compared to standardized means. Difficulties approached significance on the Conners Hyperactivity subscale and the BASC-II Attention subscale. Five (20%) children met research criteria for ADHD on the KDBDS. Prompting the examiner during Tower of Patience was related to elevated scores on the Conners Inattention scale and ADHD Index. Significant relations between Snack Delay performance and parent report were not observed.
Conclusions: Monitoring the presence of attention difficulties in young children with NF1 is imperative for early intervention. Additional implications and directions for future research will be discussed.
This research was supported by a UWM Research Growth Initiative grant.
Correspondence: *Kelly M. Janke, Psychology, University of Wisconsin-Milwaukee, 2441 E Hartford Ave, GAR 325, Milwaukee, WI 53211. E-mail: kmz@uwm.edu*

N.S. KOVEN & L.H. CARR. The Role of the BDNF C270T Polymorphism in Executive Functioning.
Objective: Neurotrophins such as BDNF are known to play an important role in the proliferation, differentiation, and survival of cholinergic, dopaminergic and serotonergic neurons. With high BDNF gene expression in the hippocampus and prefrontal cortex, BDNF is speculated to serve as a regulatory factor for building and maintaining cognitive reserves. While numerous neurogenetic studies have explored the relationship of the BDNF val66met polymorphism to cognitive functioning, the more recently identified C270T polymorphism is understudied, especially in non-clinical samples.
Participants and Methods: In this study, 104 community adults completed a comprehensive battery of executive function measures and were genotyped using polymerase chain reaction.
Results: The resultant C/C ($n = 62$) and C/T ($n = 42$) genotype groups did not differ in age, years of education, gender distribution, or intelligence (WASI). Analysis of variance indicated that the C/T group outperformed the C/C group in measures of fluency (D-KEFS Verbal and Design Fluency total scores), set-shifting (D-KEFS Verbal Fluency category switching), response inhibition (Continuous Performance Test commission errors), and planning (Tower of London total achievement score). No genotype effects emerged for measures of working memory, abstract reasoning, or sequencing.
Conclusions: The mechanism of C270T gene expression as it relates to BDNF availability and action in the brain is still unknown, but the present data suggest that the C/T polymorphism is related to better cognitive performance in several executive function domains among healthy adults.
Correspondence: *Nancy S. Koven, Ph.D., Psychology, Bates College, 4 Andrews Road, 365 Pettengill Hall, Lewiston, ME 04240. E-mail: nkoven@bates.edu*

N.S. KOVEN & L.H. CARR. Interactions of Catechol-O-Methyltransferase Genotype and Age in Verbal Intelligence in Healthy Adults.
Objective: The catechol-O-methyltransferase polymorphism of the COMT gene (Val108/158Met) has substantial effects on catecholaminergic availability in the prefrontal cortex and, as such, is thought to modulate cognitive performance. Research has found that Val allele load, associated with decreased prefrontal dopamine transmission, is negatively correlated with performance on certain neuropsychological tests in healthy adults. Additional research has documented cognitive decline over time in middle- and older-aged men with the Val/Val genotype.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: In the present cross-sectional study, we examined the effects of COMT genotype-by-age interactions on cognition in a mixed gender group of 106 adults that spanned a broader age range.
Results: Genotype-by-age interactions emerged in the WASI Verbal IQ and VIQ subscales (Vocabulary and Similarities). Specifically, Met/Met homozygotes outperformed Val/Val and Val/Met individuals in the 30-49 year age bracket, with a dramatic crossover of effects in the 50+ year age group. There were no genotype differences in VIQ in the 29 and younger age group bracket. Furthermore, there were no genotype effects in any age group in Performance IQ or PIQ subscales.
Conclusions: These results suggest that COMT Val108/158Met influences verbal processing skills associated with VIQ in an age-specific manner. While the current study indicates an association between COMT enzyme function and cognitive ability, additional genetic studies are needed to specify the catecholamine(s) active in age-specific VIQ performance.
Correspondence: *Nancy S. Koven, Ph.D., Psychology, Bates College, 4 Andrews Road, 365 Pettengill Hall, Lewiston, ME 04240. E-mail: nkoven@bates.edu*

J.L. LEE, A.M. MELTON & D.J. MARCUS. Neuropsychological Sequelae in Neurofibromatosis, Type I: A Sibling Case Study.
Objective: Neurofibromatosis, Type I (NF-1), a genetic disorder with autosomal dominant inheritance resulting from a mutation on chromosome 17, is characterized by café-au-lait spots, freckling, neurofibromas, and Lisch nodules. Neuroimaging reveals areas of abnormal signal intensity in multiple brain regions called unidentified bright objects (UBOs); however, impact of these UBOs on neuropsychological functioning is not fully understood. Children with NF-1 experience a higher occurrence of attention disorders, visual-perceptual deficits, fine motor impairments, atypical intellectual capabilities, and an overall nonverbal learning disability (NVLD) profile. This study presents neuropsychological test data and neuroimaging results to illustrate the prototypical neuropsychological profile of NF-1, while demonstrating variability that can exist among children with NF-1.
Participants and Methods: Neuropsychological test results of two brothers with NF-1 (ages 15 and 13) are presented, along with MRIs demonstrating characteristic UBOs. Comparisons to prototypical neuropsychological NF-1 profiles, and discussion of the current research regarding the impact of UBOs, are offered.
Results: Both brothers demonstrated the characteristic NVLD profile that includes impairments in nonverbal skills compared to verbal abilities. Math skills were also relatively weak in both brothers, as were aspects of executive functioning. Despite similarity between the neuroimaging results and neuropsychological data, one brother demonstrated greater cognitive difficulties while the other showed greater medical complications resulting from NF-1.
Conclusions: Results suggest that even when genetic, environmental, and neuroimaging variables are similar, variability exists in the neuropsychological profiles of children with NF-1. Variability may be related to UBO characteristics, but more research is necessary to elucidate the impact of these abnormalities on functioning.
Correspondence: *Jennifer L. Lee, B.S., Neuropsychology, Children's Healthcare of Atlanta - University of Georgia, Psychology Building, University of Georgia, Athens, GA 30609. E-mail: jenlee09@gmail.com*

E. NEWMAN, S. PRIMAK, S. DURGERIAN, J. ZIMBELMAN, C. REECE, A. BEA, A. JUHL, K. KOENIG, M. LOWE, V. MAGNOTTA, J. PAULSEN & S. RAO. An fMRI Study of Inhibitory Control in Prodromal Huntington's Disease.
Objective: Neuropsychological impairments on measures of inhibitory control have been previously reported in individuals during the prodromal phase of Huntington's disease (HD). Inhibitory functions often involve an inability to suppress ongoing motor programs. In this event-related fMRI study, we used a Stop Signal task to compare task performance and brain maps obtained from gene positive vs. gene negative individuals participating in the PREDICT-HD study.
Participants and Methods: 72 participants (52 female; mean age = 43) were imaged at the Cleveland Clinic or University of Iowa using identical 3T Siemens Trio MR scanners. The sample was subdivided into two groups: gene negative (GN; n=34), gene positive (GP; n=38). The Stop Signal task was selected for fMRI scanning because the number of correct and incorrect inhibitory trials could be set at 50% by adjusting the length of the Stop Signal Reaction Time (SSRT; interval between Go and Stop signals). A functional ROI approach was used to compare groups on Correct (CI) and Incorrect (II) Inhibitions.
Results: The GP group had a significantly shorter SSRT than the GN group (p=.04), indicating poorer inhibitory control. fMRI results for the CI condition indicated that the GP group showed significantly less activation in the anterior and posterior cingulate, superior frontal gyrus, thalamus, and cerebellum relative to the GN group; for the II condition, additional under-activation of the right middle frontal gyrus (BA44) was observed in the GP group.
Conclusions: These results suggest that impairments in inhibitory control in individuals during the prodromal stage of HD are mediated by under-activation of brain circuitry involving thalamo-cortical and cerebellar circuits.
Correspondence: *Emily Newman, B.A., Neurological Institute, Cleveland Clinic, 9500 Euclid Ave, Mellen Center U/10, Cleveland, OH 44195. E-mail: newmane@ccf.org*

E. BRAVO, A. NORRIS-BRILLIANT & P. PRAMATARIS. The Neuropsychological Profile of a Low-Income Nine Year Old Child of Puerto Rican Descent Diagnosed With Tyrosinemia - Type I.
Objective: Tyrosinemia is a rare genetic disorder in which the patient develops elevated levels of tyrosine in the bloodstream. Tyrosinemia can lead to liver and kidney failure, problems affecting the nervous system, and an increased risk of liver cancer. While much is known about the cognitive effects of chronic liver disease on the adult brain, there is little research on the cognitive effects of long term liver damage to the developing brain of a child. In addition, there is a dearth of research on the cognitive effects of Tyrosinemia in children. This poster will present a case study of a low-income nine year old child of Puerto Rican descent diagnosed with Tyrosinemia - Type I.
Participants and Methods: This is a case study of 1 child, who has received a full neuropsychological evaluation.
Results: The authors provide 1) a comprehensive medical and psychosocial history, and 2) the results of a neuropsychological assessment which includes measures of intellect, executive functions, memory, fine-motor development, and academic development.
Conclusions: Recommendations for enhancing cognitive development and improving quality of life are discussed.
Correspondence: *Ami Norris-Brilliant, PsyD, Center for Attention and Learning Disorders, Lenox Hill Hospital, 210 East 64th Street, 4th Floor, New York, NY 10065. E-mail: Abrilliant@lenoxhill.net*

D.G. OLIVEIRA, T.P. MECCA, M. SEGIN, L. CARREIRO & E. MACEDO. Face perception in children and adolescents with Williams-Beuren Syndrome and control group.
Objective: Individuals with Williams-Beuren syndrome (WBS) present hypersociability and language skills which contrast with deficits in global cognitive and visual-spatial functioning. Studies investigating eye tracking pattern to social figures of these individuals can improve the comprehension of cognitive processes and provide measurements psychophysiological. The present study aim to compare the number of eye region fixations during faces screening in individuals with WBS and control group.
Participants and Methods: Participated five male subjects with WBS (mean age=12), paired by gender and age with twelve healthy subjects (mean age= 11,5). The measures of saccades, time and number of fixations was recorded using a Tobii 1750 eye-tracking. 25 black and white faces, upright or rotated in 1800, were presented to participants.
Results: Multivariate ANOVA was conducted to verify differences on eye movements pattern between groups according the face rotation.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

For vertical faces, there was no significant difference to number of eye region fixation between the WS participants (M = 5,20; SD = 2,86) and controls (M = 5,80; SD = 1,93). Significant difference was found in eye region fixation for inverted faces [F (1,13)= 8,416; p= 0,012] and fixation number average in WS group (M= 2,40; SD= 2,30) was approximately half of control participants average (M= 5,30, SD= 1,56).
Conclusions: These results replicate previous studies data and indicate a difficulty in stimuli integration if they do not appear in standard format, as in inverted faces, and this characteristic is related to visuospatial deficits present in WBS.
Correspondence: *Darlene G. Oliveira, Graduated, Universidade Presbiteriana Mackenzie, Rua da Consolação, São Paulo 01302-907, Brazil. E-mail: darlenegodoy@gmail.com*

J. PRICE, J.A. STRONG, J. ELIASSEN, T. MCQUEENY, M. MILLER, C.B. PADULA, P.K. SHEAR & K.L. MEDINA. Gender and Depressive Symptoms Moderate the Effects of the Serotonin Transporter Gene on Hippocampal Structure and Memory in Healthy Young Adults.
Objective: The short (S) allele of the 5-HTTLPR polymorphism within the serotonin transporter gene SLC6A4 is associated in Caucasians with reduced serotonin turnover compared to the long (L) allele in Caucasians. Carriers of S and LG (a variant within the rs25531 SNP that is functionally similar to S) alleles have smaller hippocampal volumes (HC) and memory deficits following a serotonin stressor. This study examined the contribution of two biomarkers of the SLC6A4 genotype (5-HTTLPR and rs25531 SNP) on neurocognitive variables in a healthy young adult population.
Participants and Methods: Participants were 51 healthy young adults (25 female; 70% Caucasian; ages 18-25). Multiple regressions examined the independent contribution of 5-HTTLPR single biomarker genotype (S/S, S/L vs. L/L) and rs25531 SNP two biomarker genotype (S or LG vs. LA/LA) and their interactions with gender and sub-clinical depressive symptoms on HC and memory.
Results: For single biomarker genotype: there were biomarker*gender, biomarker*depressive symptoms, and biomarker*gender*depressive symptoms interactions. Results reflected poorer visual recall among S females ($p<.05$) compared to L females or males and marginally poorer verbal immediate memory with increased symptoms in S carriers only ($p<.09$). The three-way interaction reflected larger left HC as symptoms increased among S females (opposite direction for S males; $p<.04$). For two biomarker genotype: an interaction with gender predicted larger HC among S or LG females and smaller HC among S or LG males ($p<.03$).
Conclusions: In the presence of depressive symptoms, the S allele was associated with poorer memory in both genders, correlated with larger HC in females and smaller HC in males, a likely reflection of gender differences in adolescent HC development. Larger longitudinal studies should examine whether the impact of SLC6A4 biomarkers on cognition differs according to gender, ethnicity, and extent of depression across the developmental spectrum.
Correspondence: *Jenessa Price, M.A., University of Cincinnati, 2339 Madison Rd., Apt. 305, Cincinnati, OH 45208. E-mail: jenessaprice@gmail.com*

M.A. PROSJE, C.E. TYNER, M.S. OKUN & D. BOWERS. Cognitive Decline Starting in the 4th Decade: A Female Carrier of the Pelizaeus-Merzbacher's (PLP1) Gene.
Objective: Pelizaeus-Merzbacher's disease (PMD) is a rare hereditary x-linked neurodegenerative disorder that disrupts myelin formation and is associated with a mutation of the proteolipid protein 1 (PLP1) gene. Although female carriers are typically asymptomatic, recent case series indicate a lifelong pattern of below average intelligence with development of progressive neurologic signs (e.g., tremors, dystonia, nystagmus) in their 4th decade. In this case report, we describe the neuropsychological profile of a genetically documented carrier of PMD.
Participants and Methods: The patient is a 46-year-old, right-handed, single Caucasian woman who was referred for neuropsychological evaluation by the UF Movement Disorders Center in light of concerns about her vagueness in providing a personal history. Her only son was diagnosed with PMD during infancy, experienced severe disability, and died at age 16. History is remarkable for childhood learning disability, severe depression starting in her 30s, and motor and cognitive symptoms emerging in her 40s. A timeline of symptoms and results of diagnostic, neuroimaging, and neuropsychological procedures will be presented.
Results: Neuropsychological testing revealed low intellect (FSIQ = 64) with impaired-to-borderline performance across multiple domains (working memory, language, visuospatial, and executive skills). Her score on a dementia screener was impaired. In contrast, she demonstrated overall learning capacity with adequate retention for semantically meaningful information during memory testing but showed significant impairment on word lists.
Conclusions: The patient's abnormal neurocognitive profile partially reflects a childhood learning disorder, may be longstanding, or might be suggestive of an active dementing process. Findings corroborate previous case studies that have found late onset progressive decline starting in the fourth decade. Diagnostic and clinical implications, including the need for serial assessments, will be discussed.
Correspondence: *Michelle A. Prosje, Doctor of Psychology, Clinical & Health Psychology, University of Florida, PO Box 100165, Gainesville, FL 32610-1065. E-mail: mprosje@phhp.ufl.edu*

D. RACHES & M.M. MAZZOCCO. Early Indicators of a Cognitive Phenotype in Barth Syndrome.
Objective: Barth syndrome (BTHS) is a rare, X-linked, recessive disorder affecting primarily males (incidence of 1/500,000). A cognitive phenotype has been described in primary school-aged children with BTHS, with intact verbal skills relative to visual-spatial and mathematics weaknesses. This study explores whether this phenotype is evident before first grade and whether mathematics weaknesses in BTHS reflect domain-specific or domain-general difficulties.
Participants and Methods: Cognitive skills were examined in twelve, four to six-year-olds with BTHS over a multi-year period using measures including the Test of Early Mathematics Ability–Second/Third Editions (TEMA-2/3) and the Behavior Rating Inventory of Executive Function - Preschool Version (BRIEF-P). Outcomes were compared to published norms via one-sample T-tests and Chi Squares.
Results: Young children with BTHS demonstrated weaknesses on select age-sensitive TEMA-2/3 items predictive of mathematical learning disability (MLD) (i.e., number constancy and counting backwards). However, they were accurate on other early MLD predictors (i.e., addition with manipulatives). Executive functioning (EF) concerns (i.e., BRIEF-P Working Memory and Inhibition) were endorsed for those children with BTHS whose TEMA-2/3 performance was below age expectations. In contrast, no EF concerns were endorsed for children with average TEMA-2/3 performance.
Conclusions: Children with BTHS and low math achievement present with domain-general working memory and inhibition difficulties. These weaknesses likely contribute to the significantly lower mathematical performance that has been reported in school-aged children with BTHS. Further exploration of executive functioning, domain-specific numerical skills, and long term mathematical outcomes in this population is recommended to identify early predictors of MLD in BTHS and a possible model of MLD subtypes.
Correspondence: *Darcy Raches, Ph.D., Neuropsychology, Kennedy Krieger Institute, 1750 E Fairmount Avenue, 3rd floor, Baltimore, MD 21205. E-mail: raches@kennedykrieger.org*

M. SEGIN, M.T. TEIXEIRA, A.G. SEABRA, E.C. MACEDO, N.M. DIAS & L.R. CARREIRO. Behavioral and Neuropsychological assessment of children and adolescents with Williams-Beuren Syndrome.
Objective: Williams-Beuren Syndrome (WBS) is a genetic disorder caused by the microdelation of multiples genes in 7q11.23. The genetic

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

profile of WBS characterizes peculiar cognitive and behavioral phenotype. Our objective is to describe the pattern of competences in tasks of linguistic abilities in 22 children and adolescents with WBS, aged between 7 and 18 (M=11,6; DP=3,7), students of the 1st to 6th grades of elementary schools and compare their Behavioral and Neuropsychological assessments.
Participants and Methods: We used the instruments: WISC-III; Wisconsin; CBCL/6-18; Token-Comp (TT); Peabody Picture Vocabulary Test (PPVT); Phonological Awareness by Oral Production Test; Syntactic Awareness Test; Word-Reading Efficiency Test; Test of Naming Images by Choosing Words; Test of Naming Images by Writing. The results of WISC-III, Wisconsin and CBCL/6-18 demonstrate mild to moderate intellectual disability, difficulty in concentration and identification of patterns of change, emotional problems, lack of attention and behavior disorders.
Results: The results of TT and PPVT show that the receptive vocabulary is below expected for schooling and age. In the abilities of phonological and syntactic awareness, results indicate great deficiencies. The tests Word-Reading Efficiency, Naming Images by Choosing Words and Naming Images by Writing were taken by 4 participants that presented deficits in the reading ability with graphophonemic decoding. They make more orthographic and semantic mistakes and show low capacity of naming by writing.
Conclusions: Thus, it was possible to verify deficits in receptive language and work memory, difficulties in phonological and syntactic processing tasks, which are important factors to the proper development of the capacity to read and write.
Correspondence: *Luiz Renato R. Carreiro, Universidade Presbiteriana Mackenzie, Rua Lourenço Prado, 209, Apartamento 502, Bloco 4, São Paulo 05596-150, Brazil. E-mail: renato.carreiro@gmail.com*

J. SNOW, L. MYERBERG, C.J. O'SHEA, E.A. WIGGS, G. GOLAS, W.J. INTRONE, W.A. GAHL & M. PAO. Neuropsychology of Chediak-Higashi Syndrome.
Objective: Chediak-Higashi syndrome (CHS) is a very rare (200-300 cases reported worldwide) autosomal recessive disorder caused by mutations in the LYST gene. Features include severe immunodeficiency, albinism, neutropenia, mild bleeding tendency, neurodevelopmental disorders, high-risk of pediatric mortality, as well as a progressive neurocognitive decline in young adulthood. Prior neuropsychological literature on CHS is limited.
Participants and Methods: Six young adults (mean age=23.8±4.6) with CHS (including 2 pairs of siblings) were evaluated. All patients were administered Wechsler intelligence scales and NAB Memory Module. Most also received WRAT4, BDI, MSVT, and other measures.
Results: Mean FSIQ (n=5) was 78±13, borderline. Mean Matrix Reasoning (n=5) was 9±3, average. Mean WRAT4 Word Reading (n=5) was 88±11 and mean Math (n=4) was 80±4, both low average. Effort was good (MSVT, n=4, passed). Mean Digit Span (n=5) was 10±3, average. Psychomotor speed was slowed on Grooved Pegboard (n=3; right T=16±12, left T=17±11) and on Coding (n=6; SS=4±1). Mean NAB memory (n=6) was borderline/mildly impaired, including both recall (e.g., list-learning delay T=30±9) and recognition. WCST (n=3) was borderline (perseverative responses T=32±7). Depressed mood was not evidenced (BDI, n=5, raw=7±6).
Conclusions: Generally, young adults with CHS manifest markedly impaired psychomotor speed, borderline/mildly impaired memory, and borderline executive functioning. Reading and Wechsler measures suggest that prior functioning was in the low average range. Serial follow-up studies are necessary to further understand the pattern, rate, and correlates of neurocognitive impairment in this disorder. Standard medical surveillance of CHS should include neurocognitive assessment to determine realistic goals for adult living, employment, and needed support over the lifespan.
Correspondence: *Joseph Snow, Ph.D., Office of the Clinical Director, NIMH, 10 Center Drive, BLDG 10 RM 3N218, Bethesda, MD 20902. E-mail: joseph.snow@nih.gov*

K.S. WALSH, K. ROSENBAUM, I. PALTIN, D. COPENHEAVER, P. KARDEL, M. ACOSTA, D. ZAND & R. PACKER. Differential Neurocognitive Phenotype in Neurofibromatosis Type 1 (NF1) Children with Noonan-like Features.
Objective: Identification of children with concurrent features of NF1 and Noonan syndrome (NFNS) has occurred as recognition of the RAS-MAPK pathway syndromes has emerged. NFNS has been shown to be associated with NF1 mutations, occurring in approximately 12% of NF1 patients. The biological and genetic mechanisms are not well defined, and there have been no neurocognitive outcome studies in this group.
Participants and Methods: Ten children were identified within our clinic as having NFNS (e.g., NF1 features plus relative macrocephaly, ptosis, mid-face hypoplasia, short neck). To examine potential differential neurocognitive profiles in these unique children, they were matched by age, gender, and maternal education to children with NF-1 exclusive (n=10) and non-NF-1 controls (n=5).
Results: The majority of children were male (92%) and all represented de novo cases of NF1. Overall, the NFNS group demonstrated significantly poorer global cognitive development than both the NF1 and control groups (X2=10.74, p=.005). The NFNS group fell in the low average range (M=86, SD=17.50) while the NF1 and control groups were average (M=110.4, SD=17.02 and M=110.6, SD=7.96, respectively), with the latter demonstrating less variability in the group.
Conclusions: While these patients share Noonan and NF1 phenotypes, the genotype has not been defined. These results suggest distinct neurological and genetic processes in NFNS resulting in more cognitive impairment than in NF1 exclusive. In the past, these children have not been approached differentially in the clinic setting, although this study suggests greater risk for more significant developmental disruptions in this population, which may require additional assessment and treatment approaches.
Correspondence: *Karin S. Walsh, PsyD, Division of Pediatric Neuropsychology, Children's National Medical Center, 111 Michigan Avenue NW, Suite 1200, Washington, DC 20010-2970. E-mail: kwalsh@cnmc.org*

K. WHIGHAM & D.J. MARCUS. An Investigation of the Development of Executive, Behavioral, and Emotional Functioning in a Clinic Referred Sample of Patients with 22q11.2 Deletion Syndrome.
Objective: 22q11.2 Deletion syndrome presents with a variety of medical complications and neurobehavioral deficits. Prior studies have identified deficits in executive skills and emotional functioning; however, investigation of these domains across ages has been limited.
Participants and Methods: Patients were drawn retrospectively from consecutive referrals to a pediatric hospital-based outpatient clinic. Nineteen patients were referred for neuropsychological evaluation, which included assessment of intellectual functioning, as well as parent and teacher ratings on the Behavior Rating Inventory of Executive Function (BRIEF) and Behavior Assessment System for Children, Second Edition (BASC-2). Patients were divided into an older and younger group based on median age in the sample.
Results: An independent samples t-test was performed to examine IQ scores, as well as BRIEF and BASC-2 index scores. For this sample, IQ was in the borderline range, consistent with typical findings in this population. IQ scores did not differ by group. Results indicated that the BASC-2 Internalizing Index was significantly higher for the older age group on the parent rating scale. Post-hoc analysis revealed that this was due to the anxiety subscale being significantly higher for older children. There also was a trend towards higher BRIEF Metacognitive and Global Executive Composite indexes for the older age group on the teacher rating scale.
Conclusions: Results suggest that as children with 22q11.2 Deletion Syndrome grow older, they are at risk for increasingly greater internalizing problems, such as anxiety, and metacognitive difficulties. As such, they may benefit from therapeutic interventions to address these areas of need.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Kristine Whigham, Psy.D., Neuropsychology, Children's Healthcare of Atlanta, 1001 Johnson Ferry Road, NE, Atlanta, GA 30342. E-mail: kristine.whigham@choa.org*

K. WINGEIER, E. GIGER, R. KREIS, F. JONCOURT, S. GALLATI, F. KAUFMANN & M. STEINLIN. Duchenne Muscular Dystrophy: Relationship between Cognitive Functioning, Gene Mutations and Metabolites in the Brain.

Objective: In contrast to the ongoing muscular degeneration, patients suffering from DMD seem to have non-progressive cognitive deficits. The reason for this divergence remains unclear, however, it has been associated with dystrophin isoforms (e.g. Dp 140) normally expressed during early brain development. The absence of Dp140 in some DMD patients probably has an influence both on cognitive functioning and on metabolites expressed in the brain.

Participants and Methods: Sixteen boys with a genetically confirmed diagnosis of DMD performed an age-scaled cognitive assessment. For each patient, we determined whether the location of the mutation on the dystrophin gene was compatible with formation of an intact Dp140 isoform. Furthermore, quantitative metabolic analysis by localized 1H-MR spectroscopy was performed in the cerebellum and the temporo-parietal area in DMD patients and healthy controls to investigate possible metabolic abnormalities.

Results: Full scale IQ was significantly higher in patients with Dp140 compared to the other patients. Nevertheless, the entire patient group still had below average IQ and a consistent choline deficit in the cerebellar white mater as well as in the temporo-parietal cortex. Remarkably, choline levels did not correlate with IQ. Furthermore, the level of other metabolites was not associated with mutations causing the formation of Dp140.

Conclusions: In contrast to cognitive performance, the metabolic brain composition did not significantly depend on whether or not gene mutations concerned the expression of the dystrophin isoform Dp140 in DMD patients' brain. Thus, the effect of the missing Dp140 isoform on cognitive performance is not mediated through the observed metabolite composition.

Correspondence: *Kevin Wingeier, MSc, Pediatric Neurology, University Children's Hospital, Inselspital, Bern 3010, Switzerland. E-mail: kevin.wingeier@insel.ch*

Hemispheric Asymmetry/Laterality/Callosal Studies

S.N. LEGARDY, L.K. PAUL & W.S. BROWN. Longitudinal Study of Crystallized versus Fluid Intelligence in Agenesis of the Corpus Callosum.

Objective: Individuals with agenesis of the corpus callosum (ACC) often exhibit normal performance in basic over-learned (crystallized) cognition, but show deficits in more complex cognitive processes involving reasoning and problem solving in novel contexts (fluid cognition). This study hypothesizes that performance (relative to norms) will tend to improve in ACC from childhood to adulthood on tests involving crystallized cognition (i.e., VIQ, Reading, Spelling, Literal Language). However, no change or continued decline will be observed for fluid cognition (i.e., PIQ, Arithmetic, Non-literal language).

Participants and Methods: Six individuals with ACC (80-123 FSIQ) were given measures of intellectual functioning in childhood (7-13 years-old) and in adulthood (16-22 years-old). Mean child-adult difference scores were statistically compared to zero.

Results: PIQ did not change ($p = 0.78$), but there was a trend suggesting positive change in VIQ, $t(5) = 1.64$, $p = 0.16$. In academic performance, there was a significant decline on WRAT-3 Arithmetic, $t(5) = 2.48$, $p = 0.05$; but no change in Reading ($p = 0.89$) or Spelling ($p = 0.45$). In literal and non-literal language (the Familiar and Novel Language Comprehension test), there was no change in comprehension of either familiar or novel non-literal phrases ($p = 0.63$ and $p = 0.35$, respectively).

Conclusions: The hypothesis was partially supported. While performance of the ACC group remained constant on most measures of crystallized cognition, there was a trend suggesting improvement on measures relying on fund of information (VIQ). Only one test of fluid reasoning (arithmetic calculations) suggested increasing deficit over time in ACC.

Correspondence: *Warren S. Brown, Ph.D., Fuller Graduate School of Psychology, Travis Research Institute, 180 N. Oakland Ave, Pasadena, CA 91101. E-mail: wsbrown@fuller.edu*

S. CHRISTMAN. Individual Differences in Body Dysmorphic Disorder: Handedness is More Important Than Sex.

Objective: The right hemisphere has been specifically implicated in disorders of body image, and strong right-handers, who have decreased access to right hemisphere processing, exhibit increased body image distortion and eating disorder symptomatology (Christman, Bentle, & Niebauer, 2007). The current study extended this framework to Body Dysmorphic Disorder, a syndrome in which people are excessively concerned with perceived bodily defects.

Participants and Methods: The Body Dysmorphic Disorder Questionnaire (BDDQ; Phillips, 1996) was administered to 126 college students, with degree of handedness and sex as dependent variables.

Results: The only significant effect was of handedness ($p=.02$), with strong right-handers ($M=13.86$) exhibiting higher scores on the BDDQ than mixed-handers ($M=10.57$). Interestingly, in contrast to previous research, a sex difference was not obtained.

Conclusions: Strong right-handedness is more prevalent in females than in males, raising the possibility that prior findings of increased Body Dysmorphic Disorder in females may have been driven by uncontrolled and unexamined increases in the proportion of strong right-handers in female samples. For example, the effect size of sex differences in eating disorder symptomatology is substantially reduced when strength of handedness is included as a factor in analyses (Christman et al., 2007). Accordingly, future research on sex differences in body image and eating attitudes should include handedness as a variable of interest.

Correspondence: *Stephen Christman, Ph.D., Psychology, University of Toledo, 2801 W. Bancroft, Toledo, OH 43606. E-mail: stephen.christman@utoledo.edu*

E. DE HAAN & M. VAN ZANDVOORT. Dr Strangelove or Anarchic Hand Syndrome in the Right Hand.

Objective: To study the effect of an aneurysm in the communicating anterior artery, followed by a post-embolic infarct after coiling, on the use of both hands.

Participants and Methods: A 47 year old man suffered bilateral medial damage to the frontal lobes. Neuropsychological testing revealed severe aphasia, paraphasia, verbal and nonverbal memory impairment, perseveration, and a partial right sided hemiparesis. There was also loss of decorum and it was noted that he seldomly used his (dominant) right hand.

Results: On several occasions, when asked to perform an action with his right hand, he demonstrated unwilled motor behaviour that required correction by his left hand. Testing showed that (a) there is no weakness in the right hand, (b) that there is no indication of apraxia in the right hand, and (c) that he does realise that his right hand is his own hand.

Conclusions: The prevalent view that the anarchic hand syndrome is caused by a lesion in the corpus callosum leaving a disconnected non-dominant right frontal lobe in charge of the left hand cannot explain these findings. We propose that this case supports the notion put forward by Della Sala (Neuropsychologia, 1991, 29, 1113-27) that the syndrome requires two lesions: one in the corpus callosum (anterior) and one in the mesial frontal lobe (SMA) contralateral to the anarchic hand.

Correspondence: *Edward de Haan, Psychology, University of Amsterdam, Nieuwe Prinsengracht 130, Amsterdam 1018VZ, Netherlands. E-mail: e.h.f.dehaan@uva.nl*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. FALCHOOK, J. WILLIAMSON & K. HEILMAN. Awareness of Dominant and Non-dominant Hands' Abilities to Perform Deft Movements.

Objective: The purpose of this study was to learn if normal participants have reduced awareness of their deftness of movement in the nondominant hand compared with the dominant hand.

Participants and Methods: To test this hypothesis, we enlisted 12 right handed participants (assessed with an Annett handedness questionnaire) between the ages of 50-80 who do not have known neurological disease. They were asked to perform a coin rotation test and to rate, on a vertical Likert scale, how they expected to do before attempting this task with each hand and then to rate how they think they did after the task was complete.

Results: Participants' pre-test estimates did not significantly correlate with performance of the coin rotation test for either hand. Mean coin rotation time was 17.5 seconds with the right hand and 19.4 seconds with the left hand (one tailed p value 0.055). Post-test assessment of right hand performance (mean 4.6 cm as measured on the Likert scale) was viewed as significantly better than left hand performance (mean 7.6 cm) by the participants (one tailed p value <0.01). Post-test assessment of right hand performance significantly correlated with coin rotation time for the right hand, while post-test assessment of left hand performance did not significantly correlate with coin rotation time for the left hand.

Conclusions: Our results suggest that right handed participants have relatively decreased ability to evaluate self performance of fine finger movements with the nondominant hand compared with the dominant hand.

Correspondence: *Adam Falchook, University of Florida, UF HSC, Dept of Neurology, Box 100236, Gainesville, FL 32610-0236. E-mail: Adam.Falchook@neurology.ufl.edu*

E.M. HOLCOMB, V. ZUVERZA-CHAVARRIA, Z. WANG, T. LUCAS, J.L. WOODARD & R. WHITMAN. Lateral Cognitive Processing and Belief Updating within a Sociopolitical Context.

Objective: Compared to liberals, conservatives are more structured and persistent in their beliefs and approaches to decision-making. Similar differences in cognitive styles of belief formation and updating have been linked to asymmetries in information processing by the two cerebral hemispheres. This study sought to examine individual differences in laterality and manifestations of rigidity and flexibility in belief updating within a sociopolitical context.

Participants and Methods: Participants were 130 native English speaking, right-handed undergraduates recruited from on-campus political organizations. Participants reported their political affiliation on a ten-point Likert scale, completed measures of Right-Wing Authoritarianism, Intolerance for Ambiguity, Dogmatism, Need for Closure, a self-report of agreement with current political topics and a lateralized lexical decision task (LLDT). To assess the relative contributions of each hemisphere during the LLDT, laterality and hemispheric communication indexes were calculated based on the accuracy data. Linear regression was used to examine the relationship between hemispheric laterality and each of the self-report measures.

Results: The calculated hemispheric communication index was a significant predictor of Dogmatism (p<.01), Need for Closure (p<.01), Intolerance of Ambiguity (p<.01), and political orientation (p<.05); each of the former measures of cognitive rigidity significantly predicted sociopolitical orientation as well. Specifically, greater communication was associated with lower levels of cognitive rigidity and a more liberal sociopolitical orientation.

Conclusions: Efficient communication between the hemispheres predicted lower levels of characterological rigidity and a more liberal worldview. Efficient communication between the hemispheres may allow for greater malleability in personal ideologies as it relates to political orientation.

Correspondence: *Erin M. Holcomb, MA, Wayne State University, 316 S Maple Ave, Royal Oak, MI 48067. E-mail: du0878@wayne.edu*

A.K. HOLLAND, J. CARMONA, D. COX & D.W. HARRISON. Left Lateralized Cerebral Activation as a Function of Food Absorption and Cognitive Task Demands: Examining Changes in Beta Magnitude Using a Dual Concurrent Task Paradigm.

Objective: Functional cerebral systems that regulate food digestion reside in the left hemisphere. Tasks utilizing functional cerebral systems in the left hemisphere may vary with the requirement for dual concurrent processing demands. Food consumption was used as a left hemisphere stressor. It was predicted that dual task demands of regulating digestive stress concurrent with left frontal cognitive and motor task demands would result in diminished beta activation in the left hemisphere.

Participants and Methods: Thirty undergraduate men and women were recruited for participation and fasted for a minimum of 4 hours prior to participation. Nine of the 30 participants completed the Controlled Oral Word Association task (COWAT) and Finger Tapping Task (FTT) before ingesting a sandwich containing 44-48 grams of carbohydrates. To assess beta activation in the pre-digestion and absorption phases, quantitative electroencephalography (qEEG) recordings were taken at the beginning of the procedure and 5 minutes after the cessation of eating.

Results: A main effect for Task was found ($F(1, 28)=12.41$, $p<.01$), indicating a decrease in beta magnitude across the left hemisphere electrode sites for the participants completing the COWAT and FTT. Further, a Task x Location interaction was found ($F(1, 28)=18.26$, $p<.01$), indicating an increase in beta magnitude a over the left posterior electrode sites for participants not completing the COWAT and FTT.

Conclusions: The Task x Location interaction indicates that the left hemisphere may be differentially influenced by food absorption. The present findings provide initial support for the role of the left hemisphere in the initiation of food digestion under dual concurrent task demands.

Correspondence: *Alissa K. Holland, Ph.D., Psychology, University of South Carolina Lancaster, 476 Hubbard Drive, Lancaster, SC 29721. E-mail: akhollan@mailbox.sc.edu*

R. LESHEM & E. ZAIDEL. The Effects of Attention on Laterality Indices in Dichotic-Listening to Words and Affects.

Objective: We examined Dichotic-listening with constant-vowel syllables in different emotional prosodies. Syllable identification yields a right ear advantage (REA) signaling left hemisphere specialization, and emotion identification yields a left ear advantage (LEA) signaling right hemisphere specialization (Bryden & MacRae, 1988). We compared the effects of attention on several laterality indices in word and emotion detection.

Participants and Methods: 20 UCLA undergraduates received a signal detection version of the test under two focused attention conditions. In the mixed condition, the participants focused attention on either the right or left ear in a pseudo-randomly order indicated by an arrow in one hemifield and a beep in the to-be-attended ear. In the blocked condition, the participants focused attention on either the right or left ear throughout a block, and the arrow and the beep were the same throughout the block. We compared three laterality indices based on (1) proportion hits in each ear, (2) proportion intrusions from the unattended ear, and (3) response bias. The design was a repeated measures ANOVA: Task (Emotion, Word) x Attention condition (Mixed, Blocked) x Ear (Left, Right).

Results: There was generally an REA in word detection and an LEA in emotion detection. Hits were more sensitive to emotions and Intrusions were more sensitive to words. Both Hits and Intrusions were sensitive to attention condition. Response bias was more sensitive to attention condition than to stimulus type (words vs. emotions). Unexpectedly, the Hits index in the Words-Mixed condition yielded an LEA.The Mixed attention condition accentuated the laterality indices compared to the blocked attention condition.

Conclusions: Different laterality indices were differentially sensitive to stimulus type and to attention conditions. Furthermore, the Mixed attention condition was sensitive to top-down processing. We recommend using several indices simultaneously.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Rotem Leshem, Phd, Cognitive psychology, University of California, Fran Hall, Los Angeles, CA 90095-1563. E-mail: rotemlm@yahoo.com*

R.E. PROPPER, T.T. BRUNYÉ & A. JANUSZEWSKIA. Lateral Gaze Enhances Long Term Memory for Geographical Information.

Objective: HERA posits left hemisphere lateralized semantic memory retrieval, regardless of material-type (Habib, Nyberg, & Tulving, 2003). However, material-specific hemispheric asymmetry has been suggested, with language-based versus spatial memories LH versus RH lateralized (e.g.: Wagner et al., 1998). Language versus spatial processing is asymmetric, being LH versus RH, respectively. We examined recall for remotely learned language and spatial information following LH versus RH activation induced by lateral gaze during retrieval (Schiffer, et al., 2004). If HERA is correct, then regardless of material type, LH activation should result in increased semantic memory. If there is material-specificity in hemispheric asymmetry for semantic memory, then LH activity may increase recall for language, and RH for spatial, information.

Participants and Methods: Participants randomly assigned to lateral gaze/hemispheric activation condition: left gaze/RH (LG/RH; n=26), right gaze/LH (RG/LH; n=25), no-lateral gaze, control (NLG, n=24). With gaze restricted, performed within-subjects tasks: a) list as many U.S. states as possible while looking at a blank map; b) locate as many states (listed by experimenter) as possible on a blank map.

Results: Lateral Gaze X Task interaction ($f(2, 72)=3.12$, $p=.05$) revealed a)modestly superior RG/LH locate compared to NLG ($p=.07$; b) decreased locate compared to list in NLG($p<.01$) but similar locate compared to list in both LG/RH and RG/LH conditions.

Conclusions: Results modestly support HERA model: LH activation resulted in superior memory for spatial information. RH activation prevented decreased spatial memory that was found with no gaze restriction. We demonstrate ability of LG to increase geographical semantic memory, offering potential for practical benefits in real-world situations.

Correspondence: *Ruth E. Propper, Ph.D., Psychology, Merrimack College, 315 Turnpike Street, North Andover, MA 01845. E-mail: ruth.propper@merrimack.edu*

R.E. PROPPER, A. JANUSZEWSKIA & T. BRUNYÉ. Inconsistent-Handers are More Affectively Negative and More Susceptible to Mood Induction.

Objective: Inconsistent- relative to consistent-handed (ICH versus CH) individuals are more suggestible, which is attributed to increased right hemisphere accessibility via increased interhemispheric interaction in ICH (Christman et al., 2008). ICH versus CH also demonstrate increased negative affect (e.g.; Propper et al., 2010). We examined handedness and suggestibility via a mood induction paradigm, and right hemisphere activity via tympanic membrane temperature (TMT). We hypothesized i) ICH might be more susceptible to mood induction; ii) increased negative affect in ICH versus CH; iii) Handedness x Mood differences in hemispheric activity.

Participants and Methods: 37 CH (at/above +75 on Edinburgh Handedness Inventory) and 51 ICH (at/between -65 and +70) participants, Pre and Post mood induction condition (MIC), completed Brief Mood Inventory Scale (BMIS) and had left and right TMT measured. After random assignment to MIC (happy, sad, anxious, calm, and neutral), moods were induced via a music + mood congruent memories paradigm.

Results: A mixed (Handedness x Pre versus Post MIC) ANOVA on composite BMIS score revealed increased negative affect in ICH versus CH Pre and Post MIC ($F(1,86)=3.28$, $p=.07$). Paired (Pre versus Post composite BMIS score) t-tests revealed changes in mood for sad and calm MIC for ICH and CH, but not for happy or neutral. For anxious MIC, only ICH changed mood ($t(11)=2.38$, $p<.05$). Overall, Pre to Post MIC decrease in left TMT (increased right hemisphere activity) was associated with increased negative affect Post MIC ($r=.26$, $n=86$, $p<.05$).

Conclusions: Results support increased suggestibility and increased negative affect in ICH, and suggest a negative affect-right hemisphere relationship.

Correspondence: *Ruth E. Propper, Ph.D., Psychology, Merrimack College, 315 Turnpike Street, North Andover, MA 01845. E-mail: ruth.propper@merrimack.edu*

H.K. RAU, Y. SUCHY, S. THORGUSEN & P. WILLIAMS. Switching and Maintaining Mental Set During Verbal and Spatial Task Performance.

Objective: Switching and maintaining mental set have been conceptualized as opponent processors that function to balance task-appropriate behavior (Osmon, 1996). Although various regions within the prefrontal cortex have been implicated with each of these executive abilities, debate persists regarding hemispheric laterality. To examine the hemispheric contributions to these abilities, the present study examined switching and set maintenance performances in the context of verbal and spatial tasks.

Participants and Methods: 298 undergraduates were administered a modified switching task (Suchy & Kosson, 2006), which measures switching and maintaining mental sets under verbal/local and spatial/global conditions.

Results: A two-way repeated-measures ANOVA yielded an interaction between task demand (switch, measured via response latencies; maintain, measured via set-loss errors) and task type [$F(1,297)=15.05$, $p<.001$], indicating that switching performances were better during the verbal task and maintenance performances were better during the spatial task. Results were consistent across analyses utilizing only reaction times [$F(1,297)=15.54$, $p<.001$] or errors [$F(1,297)=6.40$, $p=.01$], arguing against speed-accuracy trade-offs as a potential confound.

Conclusions: Findings indicate that, when processing demands differentially engage one cerebral hemisphere, a discrepancy between switching and set maintenance may occur. Specifically, performing a left-lateralized task may facilitate switching performance and impede maintenance performance, whereas the inverse may be observed during right-lateralized tasks. Results are consistent with findings linking switching to left hemisphere-mediated abilities (e.g., flexibility, refocusing) and maintenance to right hemisphere-mediated abilities (e.g., attention, arousal). Together, this suggests that hemispheric lateralization may contribute to the opponent nature of switching and maintaining mental set.

Correspondence: *Holly K. Rau, M.S. Psychology, Psychology, University of Utah, 380 South 1530 East, Room 520, Salt Lake City, UT 84112-0251. E-mail: hollyrau@gmail.com*

G.A. STEFANATOS, A. DEMARCO, P.M. HEARONS, A. PODGORNY & K. QUINN. Psychometric Properties of Computerized Dichotic Listening Protocols.

Objective: Numerous variations of dichotic listening paradigms have been developed to assess functional brain asymmetries in language processing, but few studies have directly compared them. Two widely used tests differing in stimulus type are the "Fused Dichotic Word Test" (FDWT), which uses rhyming CVC words (e.g. boy/toy) and "Dichotic Listening with CV-Syllables" (CVT). We investigated the reliability and validity of the standard FDWT as well as to a computerized version we developed. Additionally, we compared both these measures to a computerized version of the CVT (CVT-C).

Participants and Methods: Right-handed undergraduate students (N=58) of normal intelligence and hearing participated. The FDWT and FDWT-C were administered the counter-balanced design covering all possible combinations. We then compared the FDWT and FDWT-C tests to the CVT-C.

Results: Paired t-tests revealed no significant difference between test-retest laterality scores on either the FDWT or the FDWT-C. Reliability coefficients were 0.85 and 0.63 for the FDWT or FDWT-C, respectively. Laterality scores derived from the different forms of administration were

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

not significantly different. The average correlation between the FDWT and FDWT-C was 0.68. The FDWT and the FDWT-C yielded a right-ear advantage (REA) in 95.7% and 86.4% respectively in the sample. The CVT-C test had an 86.7% REA, falling in line with normative values (85-90%) for this measure.
Conclusions: Overall, the FDWT-C and CVT-C provide similar levels of reliability and validity to their traditional counterparts. Importantly, these computerized tasks can potentially alleviate the considerable amount of staff time required for administration, mitigate scoring errors and speed compilation of summary statistics.
Correspondence: *Gerry A. Stefanatos, D. Phil., Communication Sciences and Disorders, Temple University, Weiss Hall, 1701 N. 13th St. (Rm 110), Philadelphia, PA 19122. E-mail: stefang@temple.edu*

S.A. VAN DYKE & D. WHITMAN. Measures of Laterality: An Explanation of Inconsistent Literature.
Objective: Conclusions in the literature regarding the relationship between a lateralized bias in the processing of information and individual differences (e.g., biological sex, gender identity, ability, personality) are inconsistent. We compared two different measures of laterality: dichotic listening and lateralized semantic priming and their relation to sex, verbal and visual-spatial ability, gender identity, and personality.
Participants and Methods: Eighty-nine adults (44 women, 45 men) were administered the Wechsler Abbreviated Scale of Intelligence, Bem Sex Role Inventory, and Big Five Inventory in addition to a dichotic listening task and a lateralized semantic priming task that compared ipsilateral and contralateral priming in order to determine the role of interhemispheric transfer. Two stimulus onset asynchronies (SOA; 50 ms and 400 ms) and two levels of association strength (high and neutral) between the prime and the target words were used in the priming task.
Results: Ipsilateral prime-target reaction times were faster than contralateral prime-target presentations, while contralateral presentations resulted in greater semantic priming, suggesting that the time required for interhemispheric transfer allows for greater post-lexical activation. Further, greater association strength increased semantic priming only at the longer SOA and only the shorter SOA correlated with the dichotic listening lateralization index. Individual differences were unrelated to the lateralized indices.
Conclusions: The findings suggest that both dichotic listening and the shorter SOA condition measured automatic or perceptual lateralization whereas the longer SOA condition measured post-lexical lateralization of word meaning. Future research focusing on individual differences in the lateralization of information processing should employ and contrast different lateralization measures.
Correspondence: *Sarah A. Van Dyke, M.A., Clinical Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI 48202. E-mail: svandyke@wayne.edu*

M.L. COHEN, J.C. KWON, J. WILLIAMSON, B.D. BURTIS & K.M. HEILMAN. Biases During Vertical Bimanual Movements in Healthy Adults.
Objective: Right-left spatial processing biases have been demonstrated in healthy participants during movements in the horizontal plane (e.g., pseudo-neglect). The purpose of this study is to learn if there are right-left spatial and magnitude biases when attempting vertical movements (intersection of the midsagittal and coronal planes).
Participants and Methods: Seventeen healthy, right-handed volunteers were positioned in front of 8.5"x11" paper sheets that were positioned in one of three conditions: above-, at-, or below eye-level. With a pen in each hand, blindfolded participants were asked to simultaneously vertically move their forelimbs from two points 10" apart so that their pen marks meet in the middle of the page remaining in the midsagittal plane. Participants completed 12 trials for each combination of independent variables (dominant hand position-x2; spatial location-x3) for a total of 72 bimanual movements. Dependent variables were angular deviation (accuracy) and distance traveled in the midsagittal plane (length).
Results: Regarding main effects, accuracy was greatest in the below-eye-level condition, with downward motion, and with the dominant hand. Lines were longer in the below-eye-level condition and when drawn with the dominant hand. There were significant interactions such that performance was most accurate with downward movements in the above-eye condition and for upward movements in the below-eye condition.
Conclusions: Vertical movement biases are influenced by the hand used, the direction of movement, and the spatial location. These may be related to factors such as attentional-intentional asymmetries, gravitational force, hand dominance, and visual stream (dorsal 'where' versus ventral 'what'). However, the mechanisms accounting for these asymmetries and how brain damage affects these movements must be ascertained by future research.
Correspondence: *Matthew L. Cohen, M.S., Clinical & Health Psychology, University of Florida, PO BOX 100165, Gainesville, FL 32610. E-mail: mlcohen@PHHP.UFL.EDU*

M.L. COHEN, Z.Z. ZLATAR, K.M. MCGREGOR, A.R. BAUER, S. PHAN, K.M. HEILMAN & B. CROSSON. Changes in Finger-Tapping Variability Between Unimanual and Dual-Task Performance as a Function of Age and Aerobic Fitness.
Objective: Activities of daily living and instrumental activities often require two tasks to be performed simultaneously. Consistency improves performance yet dual-task performance has not been explored across the lifespan. The present study aims to learn how the variability of the inter-tap intervals (ITI) during continuous finger tapping is altered with age and aerobic fitness
Participants and Methods: Participants were healthy, right handed, and included 11 young (4 men, mean age=24.8), 15 aerobically active (10 men, mean age=69.6years), and 15 age- and education-matched sedentary older adults (9 men). Participants performed unimanual right and left hand continuous finger tapping alone and simultaneously with a phonemic fluency task.
Results: Young adults demonstrated greater ITI variability with right than left hand tapping and a significant reduction in variability bilaterally during the dual-task condition. The older-active adults did not demonstrate a change in variability in either hand during dual-task performance and older-sedentary subjects demonstrated no change in variability with the left hand during dual-task performance, but showed a significant increase in variability with the right hand
Conclusions: The lower variability in the left versus right hand in younger participants suggests that the right hemisphere is the primary pacemaker (metronome), while the left hemisphere generated words. Young adults benefited most from this processing division and the bihemispheric activity during dual-task conditions improved ITI in both hands. With age and inactivity, the right hemisphere pacemaker was less effective, perhaps due to dysfunction or disconnection, and older groups did not benefit from the right hemisphere pacemaker during dual-task conditions. In fact, the older-sedentary group experienced an increase in variability with the right hand during the dual-task condition, likely due to the particularly heavy burden on the left hemisphere.
Correspondence: *Matthew L. Cohen, M.S., Clinical & Health Psychology, University of Florida, PO BOX 100165, Gainesville, FL 32610. E-mail: mlcohen@PHHP.UFL.EDU*

TBI (Child)

M.L. COHEN, S.C. HEATON, N. GINN & S.M. EYBERG. Parent-Child Interaction Therapy as a Family-Oriented Approach to the Management of Behaviors following Pediatric Traumatic Brain Injury: A Case Report.
Objective: Traumatic brain injury (TBI) occurs at a rate of 70 per 100,000 in children under 18 years old, is a leading cause of death and disability, and accounts for >$1 billion in hospital expenses annually. In addition to cognitive, functional, academic, and social sequelae, pediatric TBI often results in significant dysfunction of the family system.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

This has been shown to include caregiver stress, burden, and depression that often lasts for more than 6 years post-injury, and this difficulty often relates to the child's behavior change (e.g., impulsivity, inattention). Here, we present data from a single family to demonstrate that Parent-Child Interaction Therapy (PCIT) may be a good treatment choice for families coping with a child's behavior problems after TBI.
Participants and Methods: PCIT is a short-term, empirically-supported intervention that involves coached interactions from an unseen therapist (via wireless "bug" in the ear) who aids the parent in building positive interaction styles with the child. The parent's communication is coached to be direct and concrete, which may be particularly beneficial for children with TBI, who often experience deficits in working memory and executive control. The treated family described here experienced significant dysfunction following a severe TBI (GCS=8) sustained by their 12-year-old son from an accidental gunshot to right frontal and parietal brain regions. Following the injury, he demonstrated inattention, dysinhibition, and oppositional and defiant behaviors.
Results: Nine sessions of PCIT helped reduce these behaviors and their impact on the family system.
Conclusions: These results suggest that PCIT may be an appropriate referral for families of children experiencing behavior problems following TBI.
Correspondence: *Matthew L. Cohen, M.S., Clinical & Health Psychology, University of Florida, PO BOX 100165, Gainesville, FL 32610. E-mail: mlcohen@PHHP.UFL.EDU*

M.H. BEAUCHAMP & V. ANDERSON. The Socio-Cognitive Integration of Abilities Model: Theoretical Bases and Empirical Support from the Study of Pediatric TBI.
Objective: Social skills are critical for the development and maintenance of lasting relationships and allow individuals to function appropriately as members of society. Many factors contribute to social functioning, making it vulnerable to disruption throughout development. Here, we consider social skills from a range of complimentary perspectives and present an integrative, developmental model of social function.
Participants and Methods: The socio-cognitive integration of abilities model (SOCIAL, Beauchamp & Anderson, 2010) is based on the premise that the emergence of social skills is dependent on normal maturation of the brain, cognition, and behavior, within a supportive environmental context. The model consists of 1) external and internal influences (e.g., family environment, temperament), 2) neural underpinnings (e.g., brain development and injury), and 3) cognitive factors (e.g., executive, socio-emotional, communication), which determine social competence. Childhood traumatic brain injury (TBI) is used as a clinical example of the model components and the ways in which social development may be disrupted.
Results: Data presented from our research indicates that childhood TBI can result in damage to brain areas responsible for social function and can cause deficits in executive functioning, social information processing, social communication, and moral reasoning. External factors, such as family function and socio-economic status are predictive of TBI recovery, and as such can influence the course of social development.
Conclusions: SOCIAL provides a basis for understanding the biopsychosocial components that may contribute to social problems. The study of childhood TBI provides empirical support for SOCIAL and can be used as an example of the dynamic interaction of the model's components.
Correspondence: *Miriam H. Beauchamp, PhD, Psychology, University of Montreal, C.P. 6128, Succursale Centre-Ville, Montreal, QC H3C 3J7, Canada. E-mail: miriam.beauchamp@umontreal.ca*

A.H. CICCIA. Neural Correlates after Pediatric TBI: A Meta-analysis.
Objective: The purpose of this study was to complete a qualitative and an Activation Likelihood Estimation meta-analysis of fMRI studies with pediatric TBI participants to identify the mechanisms of cognitive and language function in this population.
Participants and Methods: fMRI studies that focused on comparing patterns of brain activation between control participants and those with TBI were found by searching the following databases: PUBMED; PSYCHinfo; Google Scholar; and ASHA using the keywords: pediatric, childhood, brain injury, traumatic brain injury, functional imaging, and fMRI. A total of six studies were identified; however, two studies could not be included in the final analysis because of ALE constraints.
Results: Tabulation of fMRI data revealed 7 cortical foci where control participants demonstrated greater activation compared to TBI participants. Five of the foci were located on the left and two on the right. In contrast, 30 foci were identified where TBI participants demonstrated greater activation compared to controls with foci distributed throughout the brain. 19 foci were found in left-sided areas and 11 foci in right-sided areas. The results of the ALE analysis revealed 3 clusters that were greater in control participants compared to TBI participants, all found in left cortical areas, and 7 clusters that were greater in TBI participants compared to control participants, with 5 foci in left cortical and subcortical areas, and 2 in right cortical areas.
Conclusions: These results demonstrated a diffuse pattern of brain activation following pediatric TBI similar to that in adult TBI. These results were evident in both components of the analysis. These findings could indicate a dysfunction that is specific to TBI overall, regardless of age or task paradigm. These results provide a framework to consider not only issues of recovery of function following TBI in general, but also to consider confounding variables that may differentially impact pediatric TBI.
Correspondence: *Angela H. Ciccia, Ph.D., Communication Sciences, Case Western Reserve University, 11635 Euclid Ave., Cleveland, OH 44121. E-mail: angela.ciccia@case.edu*

L. EWING-COBBS, A. TREBLE, L. KRAMER, P. SWANK & M. PRASAD. Relation Between Social Communication and Regional Callosal Morphometry in Young Children with Traumatic Brain Injury.
Objective: The purpose of the present investigation was to characterize the relations of affect, social cognitive, and communication behaviors with volumes of midsagittal corpus callosum (CC) subregions in children under 6 years of age with traumatic brain injury (TBI).
Participants and Methods: Participants were 47 infants and preschoolers who sustained mild to severe TBI. Social skills were assessed during a semi-structured sequence of social interactions between the child and an examiner. The social interchanges were videotaped and coded for specific social initiation and response behaviors. Anatomic MRI scans were obtained at 1.5T; the mean age at scan was 39 months. A semi-automated program divided the midsagittal CC into the seven sections identified by Witelson. Scores from the social interaction procedure were correlated with the midsagittal surface area of the 7 CC regions. Pearson partial correlation coefficients controlled for both age at scan and for total brain volume.
Results: In response to the examiner's social overture, the child's joint attention was significantly and positively correlated with volume of the genu, rostral body, and anterior midbody. Responding to a social overture using gestures was correlated specifically with volume of the genu. During initiation epochs, the child's use of words and gestures correlated significantly with the posterior midbody volume. Neither positive nor negative emotional displays were related to callosal volumes.
Conclusions: Social response and initiation behaviors were selectively related to regional callosal volumes in young children with TBI. Specific brain-behavior relations indicate early regional specialization of anterior and posterior CC for social communication skills.
NIH RO1 NS29462
Correspondence: *Linda Ewing-Cobbs, PhD, Pediatrics, University of Texas Health Science Center, 7000 Fannin, Suite 2401, Houston, TX 77030. E-mail: linda.ewing-cobbs@uth.tmc.edu*

E.H. GERST, E.L. MCGUIRE, S.R. HUNTER, C.G. VAUGHAN & G.A. GIOIA. Assessing Cognitive and Physical Activities and their Association with Symptom Exacerbation in Children and Adolescents with mTBI.
Objective: Active post-concussion management requires direct understanding of factors that support and impede recovery progress. This study characterizes the classes of cognitive and physical activities and examines their association to symptom exacerbation during recovery from pediatric mTBI.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants included 86 children and adolescents (52.3% male; age mean=14.8 (SD=2.6)) evaluated serially across 3 visits (median days to v1=12, v2=24, v3=44). Types and intensity of activities and associated symptom exacerbation were gathered via structured interview of participants.
Results: At visit 1, activities most commonly reported were academic (81.4%), electronic (TV/computer/video games) (30.0%), and activities of daily living (20.0%), with less frequent engagement in athletics (17.1%) or physical exercise (11.4%). Academic activities remained consistently higher than other activities across visits 2 and 3 (81.7% and 71.2%) although participation in physical activity increased by visit 3 (athletic=26.6%; exercise=25.0%). Across all 3 visits, academic activity was highly associated with increased symptom exacerbation (v1=75.7%, v2=62.3%, v3=32.8%). Electronic, athletic, and exercise were also associated with increased rates of symptom exacerbation. Symptoms most commonly reported to worsen during activities were headache (68.6%), fatigue (31.4%), and trouble concentrating (15.7%).
Conclusions: Certain classes of activities were found to be frequently associated with symptom exacerbation during recovery from mTBI. Specifically, academic activities were high frequency events often associated with worsening of symptoms. Assessment and close monitoring of key child activities are important to ensure appropriate injury management throughout recovery. Standardizing an activity assessment log may assist this directed approach to active concussion treatment.
Correspondence: *Elyssa H. Gerst, Children's National Medical Center, 15245 Shady Grove Road, Suite 350, Rockville, MD 20850. E-mail: egerst@cnmc.org*

G.A. GIOIA, E. GERST, E. MCGUIRE, C. MCGILL, M. PALACIOS & C. VAUGHAN. Standardized Assessment of Cognitive Exertion Effects in Pediatric Mild TBI: Application of Reliable Change Methodology.
Objective: Assessing exertion in response to cognitive demand is important for measuring concussion recovery and for treatment planning. We describe a methodology for a clinically meaningful, standardized assessment of cognitive exertional effects (CEE).
Participants and Methods: To assess symptom exacerbation following cognitive activity, standardized symptom ratings were obtained for headache, fatigue, concentration problems, and irritability immediately before and after baseline cognitive testing in a sample of non-injured children aged 5-18 (n=353; Mean Age = 12.5 (3.5) years). Standardized regression-based (SRB) change score equations were generated for pre-post symptom ratings and composite score then applied to pre-post symptom ratings for a clinical sample of children aged 5-18 (Mean Age= 13.6 (3.1) years) who had sustained mTBI (n=316, median days post-injury = 12).
Results: Repeated measures ANOVA's revealed significant pre-post changes in all symptom ratings in the clinical sample ($p<.01$) with marginal changes in Irritability ($p=.053$). The percentage of mTBI patients with SRB change scores exceeding reliable change level at the 80% CI were: Headache=42.7%, Fatigue=47.7%, Concentration=44.6%, Irritability=18.8%, Symptom Composite=34.2%.
Conclusions: A substantial percentage of children with mTBI exhibited clinically meaningful symptom exacerbation following cognitive activity relative to expectation based on a non-injured sample. Application of reliable change score methodology to standardized pre-post activity symptom ratings revealed significant cognitive exertional effects in the injured sample. Future directions for research include examination of serial change in CEE across recovery, and relationship to general symptom report, cognitive performance, and functional school performance. Clinical application of SRB change scores to measure CEE may provide another quantitative method of tracking injury status.
Correspondence: *Gerard A. Gioia, Ph.D., Pediatric Neuropsychology, Children's National Medical Center, 15245 Shady Grove Road, Suite 350, Rockville, MD 20850. E-mail: ggioia@cnmc.org*

S. GORMAN, M. BARNES, P. SWANK, M. PRASAD, J. FLETCHER & L. EWING-COBBS. Does Processing Speed Partially Mediate the Effect of Pediatric Traumatic Brain Injury on Working Memory?
Objective: The purpose of this study was to compare processing speed (PS) and working memory (WM) performance in children with traumatic brain injury (TBI) and comparison children and to determine whether PS partially mediates the relation between head injury and WM deficits.
Participants and Methods: Coding and a simple reaction time (RT) task were utilized as PS measures. The WM measures consisted of verbal and visual-spatial tasks with parallel processing requirements. The performance of 77 children with TBI was compared with that of 70 comparison children.
Results: Relative to the comparison group, participants in the TBI group performed more poorly on Coding, and on both WM measures, but not on the simple RT task. Thus, simple RT was not included in subsequent analyses. Because the relation between Coding and both the verbal and visual-spatial WM tasks was similar, the final analysis used an average score of the two WM tasks. Bootstrap regression analysis revealed that PS, as measured by Coding, partially mediated the effect of head injury on WM.
Conclusions: Verbal and visual-spatial WM deficits in children with TBI are at least partly related to slow information processing. These findings are discussed in relation to neurocognitive models of WM and with respect to the injury-related mechanisms that may affect both PS and WM. The implications of these findings for assessment and intervention for children with TBI are also presented.
Correspondence: *Stephanie Gorman, University of Houston, 8383 El Mundo #411, Houston, TX 77054. E-mail: sgorman85@gmail.com*

S. GORMAN, M. BARNES, M. PRASAD & L. EWING-COBBS. The Effects of Pediatric Traumatic Brain Injury on the Central Executive and Inhibitory Control in Working Memory.
Objective: Children with traumatic brain injury (TBI) have deficits in working memory (WM) compared to age peers. This study investigated two specific aspects of WM after pediatric TBI- the effects of increasing central executive (CE) demands in verbal and visual-spatial WM, and the effects of TBI on inhibitory control (IC) within verbal WM.
Participants and Methods: Seventy seven children with TBI and 70 comparison children were administered verbal and visual-spatial WM tasks with and without a dual-task component. The dual-task component increased CE demands because it required participants to perform verbal or visual monitoring tasks while processing the materials to be remembered for recall. Verbal intrusion errors were used to measure IC.
Results: A 2 group X 2 material (verbal vs. visual-spatial) X 2 task type (WM or dual-task) repeated measures ANCOVA revealed a significant group difference on overall performance, with the TBI group performing more poorly. A significant main effect of task was also found, with both groups performing more poorly in dual-task conditions; however, this effect was not greater for the group with TBI. Significant group differences in intrusion errors were not found.
Conclusions: While TBI affects both verbal and visual-spatial WM, increasing CE demands did not differentially affect the TBI group and children with TBI did not show more intrusion errors on the verbal WM task. Findings are discussed in relation to hypotheses about the origins of WM deficits in pediatric TBI and the implications of this pattern of WM deficits for broader cognitive functioning and academic performance in children with TBI.
Correspondence: *Stephanie Gorman, University of Houston, 8383 El Mundo #411, Houston, TX 77054. E-mail: sgorman85@gmail.com*

A.A. HEELAN, J. REESMAN, C.G. VAUGHAN, J. VARGHESE & G.A. GIOIA. Relationship between Balance Testing and Symptom Report in Adolescents with Mild Traumatic Brain Injury.
Objective: Previous research has demonstrated disrupted balance following concussion in collegiate athletes. Recent studies (Gagnon, 2002)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

demonstrated that children with mild traumatic brain injury (mTBI) may experience similar balance difficulties. The purpose of the present study was to examine balance and reported symptoms in adolescents post mTBI. It was hypothesized that the report of symptoms by adolescents and their parents would relate to performance on a balance exam.

Participants and Methods: 26 adolescents with mTBI (11 male; Mean age at injury= 16 years, range 13-19 years) recruited from a concussion clinic were tested utilizing a modified version of the Bruininks-Oseretsky Test of Motor Proficiency 2 (BOTMP 2) Balance Subtest. All mTBI participants and one of their parents also completed the Post-Concussion Symptom Inventory (PCSI) to rate the adolescent's symptoms at the time of the appointment.

Results: Adolescent report of increased physical symptoms on the PCSI was significantly correlated with poorer performance on the BOTMP 2 balance subtest conditions 6 and 9 (P<.001). Additionally, parent report of the adolescent's physical symptoms and the adolescent's performance on the BOTMP 2 demonstrated a marginal relationship (P=.07).

Conclusions: Adolescents with mTBI demonstrated a relationship between severity of physical symptoms and the adolescent's performance on the more complex, eyes-closed conditions of the BOTMP 2. The participant's difficulty with these conditions is likely the result of a sensory interaction problem requiring the concussed adolescent to depend more on visual input to maintain postural stability. When considered alongside physical symptoms, balance testing may serve as a good indicator of concussion recovery.

Correspondence: *Alicia A. Heelan, BS, MS and MD in progress, Pediatric Neuropsychology, Children's National Medical Center, 3600 S Glebe Rd, Unit 811, Arlington, VA 22202. E-mail: aheelan@gwmail.gwu.edu*

A.R. JOHNSON, N.C. WALZ, K.O. YEATES, H.G. TAYLOR, T. STANCIN & S.L. WADE. Utilization of Special Education Services During the Initial 18 Months Following Early Childhood Traumatic Brain Injury.

Objective: To examine special education service utilization of young children across the first 18 months following traumatic brain injury (TBI) relative to young children with orthopedic injuries (OI).

Participants and Methods: We examined parent report of educational services for children ages 3 - 7 years, with OI (n=82), moderate TBI (n=48) and severe TBI (n=20). Rates of IEP classification were collected shortly after injury (preinjury), 6, 12, and 18 months postinjury.

Results: Groups did not differ on preinjury special education service utilization based on children who were enrolled in school at the time of injury (TBI: 7/53, 13%; OI: 7/52, 13%). Compared to the OI and moderate TBI groups, children with severe TBI were more likely to be enrolled in special education services over the 18 month follow-up (OI: 3/82, 4%, moderate TBI: 3/48, 6%, severe TBI: 5/20, 25%). Children with OI or moderate TBI were more likely to receive services under speech/language or behavioral classifications, whereas children with severe TBI were more likely to receive services under the TBI classification.

Conclusions: Young children with a history of severe TBI are more likely than children with OI or moderate TBI to qualify for and be enrolled in special education services when they enter school. Children with a history of early TBI should be followed into the school age years to assist with special education planning and appropriate placement.

Correspondence: *Abigail R. Johnson, Ph.D., Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center, MLC 3015, Cincinnati, OH 45229. E-mail: Abigail.Johnson@cchmc.org*

L. JORDAN & S. HEATON. Relationship Between Measures of Executive Function and Academic Achievement in Childhood TBI.

Objective: Executive dysfunction is a common sequela of pediatric traumatic brain injury (TBI). These skills can be measured by parent-report questionnaires (i.e. BRIEF) or performance-based tests (e.g. Trail Making Test, Stroop). However, an early pilot study in our group showed that in a pediatric TBI sample, there is limited correlation between performance scores and parent ratings. Although studies have suggested that executive function affects academic achievement, it is unclear whether this relationship is stronger in performance-based or parent-report measures. Therefore, the goal of the current study was to replicate our previous findings and determine whether performance-based and/or parent-report measures of executive function correlate with academic achievement.

Participants and Methods: Thirty-one participants (7 mild TBI, 15 moderate-severe TBI, and 9 orthopedic control) aged 6-16 were evaluated within 1½ years post-injury. Correlations were calculated between parent-report ratings on the BRIEF (Inhibit, Shift, Emotional Control subscales) and performance-based scores from tests of executive functioning (Stroop, Trails B, WCST, CPT-II, TEA-Ch). Next, correlations were calculated with a subset of the participants (N=20) to investigate the relationship between measures of executive function (BRIEF and performance tests) and academic achievement (WIAT-II).

Results: Consistent with previous findings, results failed to reveal significant correlations between parent-report and performance-based measures. However, parent-reported ratings (BRIEF Inhibition) and performance-based scores (Trails B, TEA-Ch) significantly correlated with academic achievement.

Conclusions: This suggests that although parent-report and performance-based measures did not directly correlate with each other, both measures of executive function are related to academic achievement. Therefore, each measure may uniquely contribute to our understanding of the relationship between executive function and academic achievement.

Correspondence: *Lizabeth Jordan, M.S., Clinical & Health Psychology, University of Florida, UF, HSC, PO Box 100165, Gainesville, FL 32610. E-mail: liz1127@phhp.ufl.edu*

C.L. KARVER, P. CHIU, N. CHERTKOFF WALZ, L. BERNARD, A. CASSEDY, S. TLUSTOS & S. WADE. Iowa Gambling Task performance in adolescent mild to moderate TBI patients.

Objective: Traumatic brain injury (TBI) often results in problems in executive functions, including impaired decision making abilities. Past research has yet to utilize the Iowa Gambling Test (IGT), a measure of decision-making abilities and impulse control, to examine the post-injury effects in adolescents with TBI. We hypothesize that the TBI patients will show different choice patterns than control participants.

Participants and Methods: IGT performance of seventeen adolescents who sustained a mild to moderate TBI (mean age = 15.06, SD = 1.57) was compared to fifteen demographically-matched control participants (mean age = 15.40, SD = 1.39).

Results: Using the previously utilized performance criteria, 10 of the TBI patients exhibited impaired performance (i.e., GT score <= -10) compared to 5 of the control participants, and 4 of the TBI patients showed performance in the "normal" range (>= 10) compared to 7 in the control group. When investigating performance over the final twenty trials, both groups showed a consistent preference for less frequent but smaller punishments when selecting from the risk disadvantageous (RDA) decks (42% vs. 14% for TBI participants and 39% vs. 8% for Control participants). In the risk advantageous (RA) decks, however, the controls showed a significantly greater preference for less frequent but larger punishments than more frequent but smaller punishments (35% vs.18%). Conversely, the TBI patients showed no preference for more between the two RA desks (22% vs. 22%).

Conclusions: These results support past research that indicates that TBI patients have differential decision making abilities relative to control participants.

Correspondence: *Christine L. Karver, B.S., Psychology, The University of Cincinnati, Department of Psychology, 1 Edwards Center, Cincinnati, OH 45221. E-mail: karvercl@mail.uc.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

M.E. KRAMER, S.J. SUSKAUER, E.J. DEMATT & B.S. SLOMINE. Recovery Patterns of Children with Anoxic Brain Injury in an Inpatient Rehabilitation Setting.

Objective: For children who survive an anoxic brain injury (ABI), functional outcome remains poorly understood. We characterized recovery patterns in a sample of children who sustained ABI and required inpatient rehabilitation.

Participants and Methods: The sample included 18 children, ages 2-18, with injuries due to near drowning, strangulation, cardiac arrest due to congenital heart conditions, or cardiac/respiratory arrest from medical complications. Five children sustained ABI while in a hospital. Children were administered the Functional Independence Measure for Children (WeeFIM) at admission and discharge from inpatient rehabilitation. Developmental Functional Quotients (DFQs, age-adjusted WeeFIM scores) are reported.

Results: Two groups emerged based on functional status at admission: Total to Maximum Assistance (TMA) (n=12, WeeFIM DFQ < 30) and Moderate to Minimal Assistance (MMA) (n=6, WeeFIM DFQ = 50 to 80). The groups did not differ in days since injury to rehabilitation admission ($t(16)=0.76$, $p=.46$). For both groups, small improvements in functional recovery were noted in WeeFIM scores at discharge. Two children from the TMA group demonstrated significant functional recovery such that their DFQs were in the range of the MMA group at discharge; both of these children were older than 13 years. Children with better functional status at discharge were significantly older at the time of injury, with an average age of 12.0 years versus 6.7 years ($t(16)=-2.6$, $p=.01$).

Conclusions: Two distinct patterns of functional outcome were observed in this ABI sample, with age at injury playing a significant role in predicting outcome. A larger sample is needed to explore additional predictors of outcome.

Correspondence: *Megan E. Kramer, Ph.D., Neuropsychology, Kennedy Krieger Institute, 1750 East Fairmount Ave, Baltimore, MD 21231. E-mail: kramerm@kennedykrieger.org*

N.K. SANDEL, M.R. LOVELL, A.P. KONTOS, N.E. KEGEL, M.W. COLLINS, J.E. PARDINI, Z. MIKLOS, E.W. JOHNSON & V. FAZIO. The relationship of symptoms and neurocognitive performance to perceptions of recovery from concussion among adolescent athletes.

Objective: The objective of this study was to assess the relationship between athletes' perceptions of recovery and symptoms using the Post-Concussion Symptom Scale (PCSS) and neurocognitive performance on the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) test.

Participants and Methods: A total of 54 athletes (24 boys, 30 girls) aged 12 to 18 years participated in the study. All atheltes were asked to rate their "percent back to normal" at the time of their evaluation. They also completed a brief computer-based neurocognitive assessment and rated their symptom severity utilizing a 7 point likert scale.

Results: The results supported negative correlations ($r= -.34$ to $-.69$) between the total and four symptom factor scores and perception of percent back to normal. There was no relationship between athletes' perception of being back to normal and neurocognitive performance. Separate correlations for gender suggested that males' perceptions of recovery were positively related to visual memory ($r= .44$) and negatively related to reaction time ($r= -.44$), whereas females' perceptions were unrelated to neurocognitive performance. Results of a multiple regression for the four symptom factors yielded a significant model that accounted for 48% of the variance in the perceptions of recovery, with the lower scores on somatic and cognitive symptom factors predicting perceptions of recovery.

Conclusions: Clinicians should be aware that athletes may base their perceptions of recovery from concussion on specific symptom clusters only and that these perceptions may differ based on gender and may not correspond to more objective neuropsychological assessment results. Clinicians should be cautious in returning athletes to return to play based on their self-assessment.

Correspondence: *Mark R. Lovell, Ph.D, Orthopeadics, Univeristy of Pittsburgh, 3200 South Water Street, Pittsburgh, PA 15203. E-mail: lovellmr@upmc.edu*

J. MCALLISTER-DEITRICK, C.T. WELLS, G. GIOIA, C. WEISS-BROD, M. CARTER & J. SCHNEIDER. Mood Disturbance Following Mild Traumatic Brain Injury in Adolescents.

Objective: This study describes changes in adolescents' mood after suffering a mild traumatic brain injury (mTBI). It was hypothesized that gender, injury type (sport or non-sport), posttraumatic amnesia (PTA), and pre-morbid DSM-IV diagnosis (i.e., ADHD, Learning Disability, Anxiety, and/or Depression) would be associated with higher report of depression, anger, and fatigue symptoms.

Participants and Methods: Adolescents (n=98, 58 males, mean age at injury = 15.20) were recruited from a concussion clinic where a comprehensive evaluation was performed, Demographic and injury information, as well as the Brunel Mood Scale (BRUMS; Anger, Depression, and Fatigue scales) were used in the current study. Pre-injury information was collected retrospectively at the first visit.

Results: Analysis of differences in first visit BRUMS scores revealed: 1) Females scored significantly higher than males on Fatigue ($p = .001$); 2) Adolescents with PTA reported higher Anger scores ($p = .007$); and, 3) Adolescents injured in a non-sport activity showed a trend toward higher Anger scores ($p = .052$). Regression models for each BRUMS scale resulted in pre-morbid diagnoses as a significant predictor of Anger scores at the second post-injury visit ($p = .02$).

Conclusions: To our knowledge, this is one of the first studies documenting significant mood changes and their relationship to injury type, PTA, and pre-morbid diagnoses in adolescents, post-mTBI. Results from this study lend support to previous research indicating a need to consider gender in mTBI treatment.

Correspondence: *Jamie McAllister-Deitrick, B.A., American University, 7354 Dartford Drive, Apartment 4, McLean, VA 22102. E-mail: jm4171a@student.american.edu*

J.L. MICKLEWRIGHT, T.Z. KING & K. OTOOLE. The Association Between Caregiver Emotional Distress and Adaptive Living Skills Following Pediatric Traumatic Brain Injury.

Objective: The potentially mediating role of hostile, punitive, and directive parenting practices in the relationship between caregiver emotional distress and child adaptive living skills was examined in the 12-36 months following traumatic brain (TBI) or orthopedic injury (OI). We hypothesized that there would be a significant relationship between caregiver emotional distress and child adaptive living skills following TBI but not OI, and that this relationship would be mediated by greater caregiver reliance on hostile, punitive, and directive parenting practices.

Participants and Methods: Forty-four children between the ages of 9-17 with moderate/severe TBIs or OIs were recruited from an inpatient rehabilitation unit at a children's hospital. Injury groups were stratified on age at injury (M=13.8, SD=2.51), race (% Caucasian), and socio-economic strata. Participants' caregivers completed the Hollingshead, Brief Symptom Index, Parenting Practices Questionnaire, and Vineland-II.

Results: Hierarchical multiple regression revealed that after controlling for family insurance status, higher caregiver emotional distress was associated with reduced adaptive outcomes in the TBI group ($\geq=-.74$, $p<.001$). The indirect effect was significant (B=.17, 95% CI =-.388,-.008) across groups. The remaining direct effect ($\geq=-.64$, $p< .01$) indicated that hostile, punitive, and directive parenting practices partially account for the association between caregiver emotional distress and child adaptive living skills following TBI.

Conclusions: Caregiver emotional distress was associated with a greater reliance on hostile, punitive, and directive parenting practices, which were associated with child adaptive outcomes following TBI but not OI. The utility of these findings to inform rehabilitation practices and the development of caregiver and family-based interventions will be discussed.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Jackie L. Micklewright, Ph.D., Department of Psychiatry & Psychology, Mayo Clinic, 200 First Street SW, Rochester, MN 55901. E-mail: micklewright.jackie@mayo.edu*

J.B. NEWMAN, C. BRUN, T. GENAU, G. GIOIA & E. GERST. Parent and Adolescent Post-Concussion Symptom Ratings: Variation in Symptom Ratings by Domain of Symptoms Assessed and Sex Differences Identified.

Objective: The current study examines the relationship between parent and adolescent report of post-concussion symptoms along three dimensions: physical/sleep, cognitive, and emotional symptoms, and sex differences.

Participants and Methods: 177 adolescents (60% male) and their parents completed the Post-Concussion Symptom Inventory (PCSI) as part of a standard clinical assessment. Participants age 13-18 years (M =15.9 ± 1.4) who were first treated within 21 days of injury (M =11.5 ± 4.9; 76% sports related) were included.

Results: Parent and adolescent ratings of overall symptoms were highly consistent (r = .68, p Λ.001), as were retrospective ratings of pre-morbid baseline symptoms (r =.36, p. p Λ.001). Upon evaluation of different domains of symptoms, it was found that parents rated higher levels of emotional symptoms (p = .002), while adolescents rated higher levels of cognitive symptoms (p = .02). Additionally, female adolescents and their parents reported more overall symptoms than males and their parents (Parent ratings p = .05, Female M = 32.1 ± 26.2, Male M = 24.77 ± 22.8; Adolescent ratings p Λ.001; Female M = 36.5 ± 23.0, Male M = 23.0 ± 23.9), despite similar initial injury characteristics (e.g. LOC, PTA, etc.) between males and females.

Conclusions: Parents and adolescents exhibit overall similarities in post-concussion symptom reports, while at the same time showing differences in specific symptom types. Both parent and adolescent symptom reports should be obtained for a comprehensive perspective of post-concussion recovery. Additional research is needed to examine the nature of the significant sex-discrepancy identified in this analysis.

Correspondence: *Julie B. Newman, PhD, Children's National Medical Center, 15245 Shady Grove Rd, Rockville, MD 20850. E-mail: jnewman@cnmc.org*

J.B. NEWMAN, J. REESMAN, G. GIOIA, E. GERST & C. VAUGHAN. Lines of Evidence for Validity of Pediatric ImPACT Processing Speed Variables in Children with mTBI.

Objective: The current study examines the relationship of test performance on a novel computerized post-concussive assessment measure, Pediatric ImPACT, with traditional paper and pencil measures of neuropsychological functioning in a clinical sample of children with mTBI.

Participants and Methods: 111 children (64% male) between the ages of 5 and 12 (mean = 10.8 ± 1.5), treated clinically for mTBI, were administered Pediatric ImPACT (7 subtests comprising 3 factor composites: Response Time, Learning and Memory, and Response Variability) with a series of traditional paper and pencil measures, including the WJ-III Reading Fluency (RF) and Math Fluency (MF), SDMT, and CVLT-C.

Results: Paper and pencil measures of processing speed correlate significantly with Response Time on Pediatric ImPACT (WJ-III MF r = .44, p Λ.001; WJ-III RF r = .40, p Λ.001; SDMT r =.43, p Λ.001), showing strong convergent validity for this composite as a measure of post-concussive processing speed. In contrast, the Response Time factor is not associated with learning and memory performance on CVLT-C (Learning r = .18, p > .05; SD FR r = .01, p > .05; LD FR r = .20, p > .05), thereby demonstrating discriminant validity between processing speed on Pediatric ImPACT and traditional paper and pencil learning/memory.

Conclusions: Pediatric ImPACT is a novel computerized instrument for the post-concussive assessment of children ages 5 to 12. The current study demonstrates strong convergent and discriminant validity in an injured clinic sample (mTBI) when compared to traditional paper and pencil measures of processing speed and learning/memory.

Correspondence: *Julie B. Newman, PhD, Children's National Medical Center, 15245 Shady Grove Rd, Rockville, MD 20850. E-mail: jnewman@cnmc.org*

L. PARKS, S. PROVENCAL & T.J. GUILMETTE. Concussion Understanding and Management Among New England High School Soccer Coaches.

Objective: Compared to other high school athletes, soccer players sustain a relatively high number of concussions (approximately 25,000 per year). The purpose of this study was to investigate concussion knowledge and management in high school soccer coaches.

Participants and Methods: Anonymous surveys were mailed to high school soccer coaches in New England. Of the 110 returned surveys, 58% were completed by girls' coaches and 42% by boys' coaches.

Results: Results of the survey suggested that soccer coaches were significantly more knowledgeable about concussion than a sample of the general public, which was available from a prior study. Although coaches reported that their most common source of information about concussion was magazines/newspaper/TV, these sources were rated as the least helpful. In contrast, the Heads Up Tool Kit from the Centers for Disease Control was the least common source of information yet rated as the most helpful. Ninety percent of coaches reported that they would consult with a healthcare professional before allowing an athlete to return to play if symptoms of concussion were suspected; however, most coaches indicated that players rarely reported symptoms of concussion. Approximately 76% of coaches would support legislation requiring athletes with symptoms of concussion to obtain medical clearance before returning to play.

Conclusions: Overall, results suggest that most high school soccer coaches are knowledgeable about concussion and would support legislation regarding concussion management; however, results highlight the need for coaches to have access to more formal sources of information on concussion, particularly given the low frequency with which athletes disclose symptoms of concussion.

Correspondence: *Lauren Parks, PhD, Dept of Psychiatry & Human Behavior, Warren Alpert Medical School of Brown University, Box G-BH, Brown University, Pawtucket, RI 02912. E-mail: lauren_parks@brown.edu*

H. PENNINGTON, S.J. SUSKAUER, A. AMARI, S.J. MCCANN & B.S. SLOMINE. Use of Methylphenidate Improved Responding in a Minimally Conscious Child 14 Months After Traumatic Brain Injury.

Objective: The minimally conscious state (MCS) is a condition of severely altered consciousness in which minimal but definite behavioral evidence of self or environmental awareness is demonstrated. There are few treatment options for individuals with traumatic brain injury (TBI) in a prolonged MCS. Limited literature suggests methylphenidate may increase arousal in minimally conscious adults post-TBI; however, no studies describe its use to improve arousal following TBI in children.

Participants and Methods: Single subject medication trials in an inpatient rehabilitation setting to improve responsiveness in a 9-year-old boy in a MCS 14 months post-TBI. Acutely post-injury neurostimulant medications were not beneficial. Arousal and responsiveness were measured at baseline and during medication trials using the Rappaport Coma/Near Coma Scale (CNCS), which ranges from 0-4 with higher scores denoting less responsiveness.

Results: At admission, responses to stimulation were inconsistent. Data revealed no improvements with zolpidem administration; levodopa/carbidopa administration resulted in improvement in arousal but increased abnormal motor movements. Improvements in CNCS scores were observed with methylphenidate (mean = 2.42 at baseline, mean = 1.63 during treatment).

Conclusions: This case demonstrates that methylphenidate may be useful in improving arousal and responding in children in a prolonged MCS post-TBI and that neurostimulant trials may be useful in the chronic phase of TBI, even if no benefit is observed earlier in the post-injury course.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Hannah Pennington, Ph.D. Clinical Psychology, Pediatric Neuropsychology Associates, 3330 NW 56th St., Suite 305, Oklahoma City, OK 73112. E-mail: hannah.e.pennington@gmail.com*

J. ALBERTY, J. PIVONKA-JONES, A. ARRATOONIAN, K. FREIER RANDALL & S. ASHWAL. Cognitive Correlates of Visual/Verbal Memory in Moderate to Severe Traumatic Brain Injury.

Objective: Previous studies examining memory in children with traumatic brain injury (TBI) demonstrate variability often related to time since injury. Children with TBI reportedly have poorer immediate recall of verbal/nonverbal information and poorer delayed recall of verbal information. This study examined verbal and visual memory and cognitive correlates in children with TBI at two time points.

Participants and Methods: 22 children (M age=11 years (SD=3.9), 27% female) were assessed in a longitudinal study with moderate/severe pediatric TBI at 3 months (T1) & 12 months (T2) post-injury. The Children's Memory Scale assessed memory and The Wechsler Abbreviated Scale of Intelligence assessed cognitive functioning.

Results: Data analysis for subjects with significant VIQ/PIQ discrepancies utilized a multiple linear regression model. The mean discrepancy between Verbal Intelligence Quotient (VIQ) and Performance IQ (PIQ) was M=19.4 (SD=8.1) at T1 and M=12.1 (SD=14.7) at T2. Expected relationships were found among VIQ/PIQ scores and visual and verbal memory scores. Unexpected results at T2 suggest a significant positive correlation between PIQ and significant VIQ/PIQ splits, r=.81, p=.014.

Conclusions: Commensurate with the literature, deficits in VIQ were related to verbal memory deficits however, PIQ deficits were only related to immediate visual memory. Variability at T2 may be due to lower N or time since recovery. Cognitive correlates should be further explored as the possibility of IQ screener/subscale split may be useful in indicating specific memory concerns. Results further elucidate cognitive/memory sequelae with pediatric TBI up to 12 months post injury. Early identification/intervention of deficits is critical in recovery.

Correspondence: *Jamie Pivonka-Jones, Ph.D., Loma Linda University, 25845 Barton Road, Loma Linda, CA 92354. E-mail: jpivonka@llu.edu*

J. ALBERTY, J. PIVONKA-JONES, A. ARRATOONIAN, K. FREIER RANDALL, H. BARBARA & S. ASHWAL. Psychosocial Risk Factors as potential impact on Recovery Trajectory in Adolescents with Traumatic Brain Injury (TBI): A Case Study.

Objective: Outcomes of two adolescents (participants in larger IRB approved TBI Study) with severe TBI are contrasted/compared at study established evaluation 3 and 12 months post-injury.

Participants and Methods: Two bilingual female patients with severe TBI are compare/ contrasted.

Results: Patient 1: 15-year-old, Bilingual female. Per parental report, premorbid functioning was average (C average academics). Family is low socioeconomic status (SES). Patient did not have adequate rehabilitation services during 12-month recovery. Patient's impaired functioning precluded neuropsychological battery at 3 months. Adaptive functioning reflected "low" functioning (age-equivalents 3 months to 6 years). 12 month evaluation demonstrated impaired verbal/nonverbal reasoning, attention and immediate visual memory skills. MRI revealed marked volume loss in bilateral cerebral and cerebellar hemispheres, with moderately severe ventriculomegaly. Bifrontal/bitemporal encephalomalacia and gliosis.

Patient 2: 16-year-old Bilingual female. Premorbid functioning was high average per parental report (A average academics), family is high SES. Patient had access to rehabilitative services. Her 3 month representative IQ and attention were average. Memory was borderline. 12 month results demonstrated average IQ and attention. Memory significantly increased (superior range). MRI revealed hemorrhages in left paramedian frontal lobe and splenium of the corpus callosum. Persistent numerous micro hemorrhages in the cerebral hemisphere.

Conclusions: TBI Recovery trajectory in children can be influenced by SES including education, household income, and number of siblings. These SES variables may contribute to other recovery risk factors; parental stress, family adjustment, and access to protective factors (resources, social support, health/rehabilitation services). This example illustrates how risk factors may impact long-term recovery in adolescents with severe TBI and highlights the importance of rehabilitation services.

Correspondence: *Jamie Pivonka-Jones, Ph.D., Loma Linda University, 25845 Barton Road, Loma Linda, CA 92354. E-mail: jpivonka@llu.edu*

A.T. SCHMIDT, K.T. ZHANG, X. LI, G.R. HANTEN & H.S. LEVIN. Adverse Impact Of Low Birth Weight On The Trajectory Of Recovery Following Childhood Traumatic Brain Injury.

Objective: Children born with a birth weight below 2500 grams are at higher risk for long-term cognitive, academic, and behavioral difficulties, and may be more vulnerable to neurologic and environmental insults. This study reports a prospective case-series of children born with birth weights below 2500 grams who sustained a moderate or severe traumatic brain injury (TBI) in later childhood.

Participants and Methods: Participants were matched by age, estimated socioeconomic status (SES), and severity of TBI to normal birth weight (NBW) controls; yielding a group of six LBW children matched to 10 NBW children.

Results: At baseline, both groups exhibited similar scores on WJ-R Letter Word Identification and Calculations, Tower of London number solved, and CVLT-C total correct. Baseline group differences were observed on the CELF-III Formulated Sentences (NBW>LBW) and on the VABS Adaptive Behavior Composite (LBW>NBW). Over the two-year follow-up period, relative to the NBW group, the LBW group evidenced declines on both WJ-R subtests, CVLT-C total correct, and VABS Adaptive Behavior Composite. Differences on CELF-III Formulated Sentences continued to be present, and no significant differences on the Tower of London emerged.

Conclusions: These findings suggest that a history of LBW may influence the trajectory of recovery following a TBI occurring later in childhood. Verbal memory, academic functioning, and adaptive functioning appeared particularly affected. The extent to which these results reflect the additive impact of LBW and TBI verses a synergistic effect of these two conditions is unknown. Likewise, the extent to which results reflect impaired recovery verses attenuated development of these abilities cannot be specified by the current data.

Correspondence: *Adam T. Schmidt, Ph.D., Physical Medicine and Rehabilitation, Baylor College of Medicine, 1709 Dryden Road, Suite 1200, Houston, TX 77030. E-mail: ats1978@gmail.com*

N. SHAY, K. YEATES, N. WALZ, T. STANCIN, G. TAYLOR, D. BEEBE, C. WELLS, L. KRIVITZKY & S. WADE. Sleep Problems and their Relationship to Neurobehavioral Functioning in Young Children with Traumatic Brain Injury.

Objective: Severe traumatic brain injury (TBI) in school-aged children is associated with a marked increase in sleep problems. Little research has been conducted regarding sleep problems and their relationship with neurobehavioral deficits in young children with TBI. We examined the impact of TBI on sleep problems and their relationship to neuropsychological and behavioral functioning in a group of young children with TBI.

Participants and Methods: A total of 108 participants were drawn from a longitudinal study of injured young children. They were divided into three groups: orthopedic injury (n = 63), complicated mild/moderate TBI (n = 34), and severe TBI (n = 11). Caregivers completed a validated sleep questionnaire, as well as ratings of behavioral functioning (CBCL, BRIEF, ABAS) on four occasions: 1, 6, 12, and 18 months post-injury. Ratings of pre-injury sleep and behavioral functioning were obtained at the initial assessment. Children completed neuropsychological testing at the same occasions.

Results: Group comparisons revealed that children with TBI showed significantly more sleep problems than children with OI at 6 and 12

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

months post-injury, but not at 18 months. Sleep problems were a significant predictor of parent-rated behavioral functioning in children, irrespective of group, at all time points. More sleep problems were associated with poorer emotional and behavioral adjustment, worse executive functioning, and lesser adaptive functioning. In contrast, sleep problems did not predict neuropsychological outcomes at any occasion.
Conclusions: The results suggest that young children with TBI demonstrate more sleep problems than children with injuries not involving the head. The presence of sleep problems, in turn, significantly increases the risk of poor behavioral outcomes across time, but is not associated with worse neuropsychological functioning.
Correspondence: *Nicole Shay, PhD, Nationwide Children's Hospital, 700 Children's Drive, Columbus, OH 43206. E-mail: nickilasa@hotmail.com*

K. SINOPOLI & M. DENNIS. Awareness of Deficits Following Childhood Traumatic Brain Injury and its Relationship to Inhibitory Control on the Stop Signal Task.
Objective: Poor awareness of deficits is a consequence of traumatic brain injury (TBI) in adulthood, and has been linked to poor adaptive outcomes, occupational and relational difficulties, and greater family distress. Awareness of deficit after childhood TBI is poorly understood: the discrepancy between parent and self-reports of deficits, which provides insight into the "awareness of deficit", has not been examined, and the relationship between awareness of deficit and neurocognitive function is unclear. We examined the link between awareness of deficits and inhibitory control on the stop signal task.
Participants and Methods: Participants included children with TBI (n=51), healthy controls (n=44), and those with developmental or primary ADHD (P-ADHD; n=18). Parents, teachers, and the children themselves rated "real world" inhibitory control behaviors on the Conners 3rd Edition scales. All participants completed the stop signal task (cancellation and restraint versions).
Results: Poor concordance was found between others' and self-report ratings in the P-ADHD group and in a subset of children with TBI who had developed ADHD secondary to the TBI (i.e., S-ADHD). Impairments on the stop signal task were evident only in the P-ADHD and S-ADHD groups, with performance in the P-ADHD group related to both parent and teacher ratings of inattention and hyperactivity/impulsivity. Neurocognitive inhibition performance did not predict self-report classification of participants into any ADHD subtype.
Conclusions: Participants with poor awareness of deficits also exhibited poor inhibition performance. These data suggest that poor awareness of deficits following TBI is present only in those children who develop S-ADHD.
Correspondence: *Katia Sinopoli, Psychology, Hospital for Sick Children, 555 University Ave., Toronto, ON M5G 1X8, Canada. E-mail: katia.sinopoli@utoronto.ca*

S.J. TLUSTOS, P. CHIU, N.C. WALZ, L. BERNARD & S.L. WADE. Neural Correlates of Inhibitory and Socio-emotional Processing in Adolescents with Traumatic Brain Injury: An fMRI Study.
Objective: Severe traumatic brain injuries (TBI) are known to affect executive functions (EF) such as attention and cognitive control; however, the evidence for such deficits in adolescents with milder forms of TBI is more equivocal. The current study sought to investigate EF in adolescents with complicated-mild and moderate TBI in a paradigm that demands more complex stimulus processing by integrating socio-emotional information within a behavioral inhibition paradigm.
Participants and Methods: Ten adolescents between the ages of 13 and 17 (6 males, 4 females; M age=15.79 yrs) with TBI at least 12-months post-injury and nine typically-developing (TD) adolescents (5 males, 4 females; M age=15.83 yrs), matched on age, gender, and maternal education, participated in this study. We developed an Emotional Go/No-Go block-design fMRI experiment whereby participants saw faces with varying emotional expressions and were instructed to "go" on pictures displaying happy, sad, or fearful, and "no-go" on angry.
Results: Preliminary between-group analyses using the General Linear Model (GLM) revealed greater inhibition-related activation (No-Go > Go) for participants in the TD group than the TBI group in several broad regions, including inferior and medial frontal, temporal, inferior parietal, precuneus, and subcortical regions including the thalamus, basal ganglia, and amygdala.
Conclusions: These results suggest that TD adolescents show higher activation levels than adolescents who have suffered a TBI within networks associated with socio-emotional processing and cognitive control during an emotionally-mediated inhibition task. Further research is needed to determine how these differences in activation level are related to cognitive and socio-emotional outcomes after TBI in adolescence.
Correspondence: *Sarah J. Tlustos, MA, Psychology, University of Cincinnati, University of Cincinnati, ML0376, Cincinnati, OH 45221. E-mail: tlustossj@gmail.com*

S.J. TLUSTOS, P. CHIU, N.C. WALZ, S.K. HOLLAND, L. BERNARD & S.L. WADE. Neural Correlates of Interference Control in Adolescents with Traumatic Brain Injury: fMRI study of the Counting Stroop Task.
Objective: Difficulty in inhibition or cognitive control is a common and significant sequelae of pediatric traumatic brain injury (TBI). Such deficits may help explain the discrepancy between seemingly normal performance on many standard neurocognitive measures despite observed impairments in everyday social and academic functioning.
Participants and Methods: The present study used functional MRI to examine one specific inhibitory function, interference control, in 11 adolescents, aged 12 – 16, (mean age = 15.7) with complicated mild to severe TBI who were at least 1 year postinjury and 11 age-matched typically developing control participants (TC; mean age = 14.2). Participants completed a Counting Stroop task with 2 main conditions: 1) a neutral condition requiring the counting of animal words (e.g., the word "dog" was shown on the screen twice) and 2) an interference condition in which mismatched number words were counted (e.g., the word "four" was shown on a screen three times).
Results: Both TBI and TC adolescents activated similar networks of brain regions relevant to interference control, but the TBI group showed higher levels of activation relative to the TC group in multiple brain areas within this network, including predominantly right middle frontal gyrus, anterior cingulate, and right inferior parietal regions.
Conclusions: Findings of greater activation of the relevant neural network in the TBI group are consistent with recent fMRI findings using other interference control paradigms with individuals with a history of TBI. Further research is needed to understand how these altered patterns of neural functioning relate to functional outcomes.
Correspondence: *Sarah J. Tlustos, MA, Psychology, University of Cincinnati, University of Cincinnati, ML0376, Cincinnati, OH 45221. E-mail: tlustossj@gmail.com*

C.G. VAUGHAN, E. GERST, E. MCGUIRE, J.B. NEWMAN, J. REESMAN & G.A. GIOIA. Reliability of Different Methods of Symptom Assessment in Pediatric Concussion.
Objective: Symptom assessment is a critical component in the identification of concussion in children and adolescents. Tools for symptom assessment include interview or structured rating scales from parent and child.
Participants and Methods: 120 children ages 5 to 12 (73% boys; mean age = 10.3 +/- 2.0) were seen for initial evaluation within 60 days of injury. Symptom assessment included a clinician conducted interview of both parent and child and subsequent structured symptom rating scales completed separately by parent and child. Coefficient Kappa was used to measure the strength of the symptom agreement across rating methods.
Results: There was significant discordance between symptoms reported during interview and endorsed on rating scales. Agreement between parent report and interview was generally very low across 20 symptoms

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

(average Kappa =.280). Symptoms including headaches (.50) and fatigue (.42) were moderately associated. Agreement between interview and child rating scale symptom endorsement were similarly low (average Kappa = .293), with headaches (.66), difficulty concentrating (.48), trouble falling asleep (.42), photophobia (.42), and phonophobia (.40) most concordant between interview and child rating scale. For the vast majority of symptoms, informants were more likely to endorse their presence on the rating scale method than in the interview.
Conclusions: Significant disagreement occurs when symptoms are assessed through clinical interview as compared with rating scales, with under-reporting often seen in interview. Both methods may still provide clinical utility, although the importance of utilizing structured rating scales in the assessment of concussion is highlighted by these findings.
Correspondence: *Chris G. Vaughan, Children's National, 15245 Shady Grove Rd., Suite 350, Rockville, MD 20850. E-mail: cvaughan@cnmc.org*

C.T. WELLS, B. GOREN, J. HACKLEY, E. GERST & G.A. GIOIA. Premorbid Diagnoses, Behavioral Problems, and Post-Concussion Symptoms Following Mild Traumatic Brain Injury in Children and Adolescents.
Objective: This study examined the relationship between post-concussion symptoms (PCS; i.e., headache, fatigue, irritability, etc.), problem behaviors (BEH; i.e., working memory, inhibition, emotional control, etc.), and pre-injury diagnosis of ADHD, mood disorder (Depression or Anxiety), or no diagnosis following mild traumatic brain injuries (mTBI) in children and adolescents. Parents of patients with no pre-injury diagnoses were expected to report greater post-injury increases in BEH and PCS.
Participants and Methods: Patients from a concussion clinic completing a neuropsychological evaluation and meeting inclusion criteria (mild injury and evaluation within 60 days post-injury) were included. Out of 355 patients, 19 were diagnosed with only Mood Disorder (MDX; 8 male, Mean Injury Age = 14.9 years). A no diagnosis group (NoDX) was matched on age and gender. An only ADHD group (ADHD) was matched on age, but included more males (n=15). No additional group differences on injury or demographic variables existed. PCS and BEH parent-report at initial visit was compared to retrospective pre-injury report to determine the unique affect of mTBI.
Results: Regression with injury age, gender, injury type (sport/non-sport), PTA, PCS, and BEH as predictors of diagnostic group resulted in a non-significant main effects model with a significant age X PCS interaction model. The final overall model was non-significant. Follow-up analysis of individual predictors revealed significant contribution of only post-injury BEH, with NoDX resulting in higher post-injury BEH.
Conclusions: PCS inventories may represent a sensitive measure of mTBI symptoms, regardless of pre-injury diagnostic status, and may play an important role in documenting recovery.
Correspondence: *Carolyn T. Wells, PhD, Pediatric Neuropsychology, Children's National Medical Center, 15245 Shady Grove Road, Suite 350, Rockville, MD 20850. E-mail: carolynwells@mac.com*

S.R. MCCAULEY, C. PEDROZA, S. CHAPMAN, L. COOK, A.C. VASQUEZ & H.S. LEVIN. Monetary Incentive Effects on Event-Based Prospective Memory One Year after Traumatic Brain Injury in Children.
Objective: Previous investigations of incentive effects on event-based prospective memory (EB-PM) in pediatric traumatic brain injury (TBI) have found that children with moderate, but not severe, TBI significantly improved performance by 3 months postinjury. It remains to be determined at what point during recovery incentive effects may significantly improve EB-PM in children with severe TBI.
Participants and Methods: Addressing this issue, two levels of monetary incentives (dollars and pennies for points in a 1:1 ratio) were used to improve EB-PM in children ages 7 to 16 years with orthopedic injuries (OI, n = 38), or moderate (n = 17), and severe (n = 30) TBI at approximately 12 months postinjury. The EB-PM task consisted of the child giving a specific verbal response to a verbal cue from the examiner while performing a battery of neuropsychological measures. Data were analyzed as a cross-over design using a mixed model. Sequence (motivation condition order) and Period (time factor for repeated measures) effects were included; sequence was nested within subject and the subject variable was treated as a random effect to account for correlation between multiple measures within the same participant. Other main effects of interest included Age-at-Test, Gender, SES, Group, Race/Ethnicity, Motivation Condition, and 2-way interactions between Group and Sequence, Period, and Motivation Condition.
Results: Interactions were not significant and the model was re-estimated without them. Significant effects were found for Age-at-Test ($p < .02$), Motivation Condition ($p < .008$), and Group ($p = .002$). Post hoc within-group analyses indicated OI and moderate TBI groups performed nearly at ceiling under both conditions, but the severe TBI group performed significantly better under the high- versus low-incentive condition ($p = .0007$).
Conclusions: These results indicate that EB-PM can be significantly improved at 12 months postinjury in children with severe TBI.
Correspondence: *Stephen R. McCauley, PhD, Physical Medicine and Rehabilitation, Baylor College of Medicine, Cognitive Neuroscience Laboratory, 1709 Dryden Rd., Ste. 1200, Houston, TX 77030. E-mail: mccauley@bcm.edu*

TBI (Adult)

S.R. MCCAULEY, M. SHERER, T. HART & M. ROBERGE. Neuropsychological Correlates of Early Impaired Self-Awareness Following Traumatic Brain Injury.
Objective: Impaired self-awareness (ISA) is a common sequela following traumatic brain injury which negatively impacts participation in rehabilitation and limits post-acute functional outcomes including employment. Previous studies have reported conflicting relations between ISA and several areas of cognitive functioning. To clarify this issue, we used a prospective design to assess persons with moderate-to-severe traumatic brain injury during inpatient rehabilitation.
Participants and Methods: Participants were persons with moderate or severe TBI admitted to one of two inpatient brain injury rehabilitation programs during the study period. Most participants were also enrolled in the TBI Model Systems national database study. We assessed 165 persons with a brief neuropsychological test battery including: Logical Memory, Rey Auditory Verbal Learning Test, Wisconsin Card Sorting Test, the Modified Six Elements Test, Dual Task Procedure, Trail Making Test, and the Controlled Oral Word Association Test.
Results: The battery was subjected to a principal components analysis which yielded four factors: 1) memory, 2) strategic multitasking, 3) alternating attention, and 4) concept formation. Spearman correlations between the Awareness Questionnaire (AQ) total score and the neuropsychological factor scores revealed significant associations for the factor scores of memory ($p < .0001$) and strategic multitasking ($p < .0001$). Multivariate linear regression analysis indicated that only the memory ($p < .005$) and strategic multitasking ($p < .04$) factor scores were significant predictors of early ISA after accounting for variables of injury severity, demographics, and functional independence.
Conclusions: Episodic memory and executive functions are important factors contributing to early ISA.
Correspondence: *Stephen R. McCauley, PhD, Physical Medicine and Rehabilitation, Baylor College of Medicine, Cognitive Neuroscience Laboratory, 1709 Dryden Rd., Ste. 1200, Houston, TX 77030. E-mail: mccauley@bcm.edu*

A. ADNAN, M. MOSCOVITCH, D. MIKULIS, A. CRAWLEY, B. COLELLA & R.E. GREEN. Progressive Loss of White Matter Integrity in the Fornix from 5 to 30 Months After Moderate-Severe TBI and Deleterious Impact on Memory Recovery.
Objective: Objectives: (1) To examine, using diffusion tensor imaging (DTI), whether fornix damage after moderate to severe traumatic brain injury (TBI) continues to progress sub-acutely; and, (2) To measure the relationship between structural changes in the fornix and recovery of memory function.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Predictions: (1) That FA would be reduced in the left and right crux and the column of the fornix; and, (2) That verbal memory change would be correlated with change in the column and left fornix, and visual-spatial memory change with the column and right crux.
Participants and Methods: Participants: 19 patients with moderate to severe TBI assessed at five months and 2.5 years post injury. Outcome measures: Fractional anisotropy (FA) values for the column/body, right crux and left crux of the fornix; delayed recall on the Wechsler Memory Scale – Logical Memory test (WMS-LM). Total learning scores of the Rey Auditory Verbal Learning Test (RAVLT) and Rey Visual Design Learning Test (RVDLT). Control variable (for injury severity, speed of processing and complex attention): The symbol digit modalities test – oral (SDMT-O).
Results: Paired t-tests showed significant FA reductions from 5 months to 2.5 years for the column/body of the fornix ($t= 2.887$, $P<0.05$, Cohen's $d= 0.67$), right crux of fornix ($t=2.587$, $P<0.05$, Cohen's $d= 0.5776$) and left crux of fornix ($t=2.085$, $P<0.05$, Cohen's $d= 0.4765$). After controlling for multiple comparisons, change in logical memory was found to be significantly correlated with change in FA of the column/body of the fornix (Pearson $r= 0.0.445$, $P<0.05$).
Conclusions: There is a loss in fornix integrity within the sub-acute stages of TBI, and greater FA reductions in the column and left crux are associated with poorer verbal memory recovery. Such changes within white matter tracts may explain the poor cognitive recovery observed in TBI patients.
Correspondence: *Areeba Adnan, Hon. BSc., Toronto Rehab, 550 University Avenue, Toronto, ON M5G 2A2, Canada. E-mail: areeba.adnan@gmail.com*

Z. BAYER, B. SCOTT & J. PERAZA. The Role of Executive Functioning and Coping in the Traumatic Brain Injury Community.
Objective: The focus of traumatic brain injury (TBI) rehabilitation is typically to improve overall cognitive and physical functioning and to increase autonomy and satisfaction with life. The current study examined whether levels of executive functioning and coping strategies were sufficient to predict levels of community integration and life satisfaction in individuals living with TBI.
Participants and Methods: Participants (N=31) completed a series of executive functioning tests, the Ways of Coping Questionnaire-Revised, Satisfaction with Life Scale, the Community Integration Questionnaire, and the Patient Competency Rating Scale (PCRS). A caregiver, family member, or significant other of each participant also completed the PCRS with respect to the individual with a history of TBI.
Results: A series of linear regressions were run assessing the predictability of community integration and life satisfaction from executive functioning and coping strategies. The results suggest that higher levels of executive functioning and problem-solving coping significantly predicted higher levels of community integration. Also, higher levels of executive functioning and satisfaction with life significantly predicted higher levels of community integration. No variables significantly predicted satisfaction with life.
Conclusions: These results suggest that a complex relationship exists among these variables, which are commonly used to determine overall quality of life for individuals living with a TBI. Specifically, improvements in executive functioning will only predict levels of community integration when paired with concurrent improvements in problem-solving coping or life satisfaction. These results emphasize the importance of not only retraining executive functioning skills in the rehabilitation setting but also teaching effective coping strategies and striving to increase satisfaction with life.
Correspondence: *Zachary Bayer, Pacific University, 2027 NE Davis St, Portland, OR 97232. E-mail: baye3513@pacificu.edu*

A. CAPPS, E. GEARY, E. SCHULZE, P. ABERGEL, N. PLISKIN & D. LITTLE. Regional Areas of Susceptibility to Traumatic Brain Injury in the Corpus Callosum.
Objective: It has long been believed that the corpus callosum is a common location for diffuse axonal injury in closed-head traumatic brain injury. However, there is a significant discrepancy in the literature as to whether the corpus callosum is in fact affected across all severities. We hypothesized this discrepancy is due to region of interest (ROI) placement. Specifically, we hypothesized that thinner white matter fibers and those with lower degrees of myelination will be differentially affected by DAI.
Participants and Methods: Forty patients with a history of TBI (n=20 mild, n=20 moderate) and 35 healthy controls underwent high resolution DTI and neuropsychological testing. Multiple regions of interest (ROIs) were place along the genu and splenium of the corpus callosum to calculate fractional anisotropy (FA) from areas either medial to the bundle or closer to the edge of the callosum bundles.
Results: Although the moderate TBI have decreased FA relative to controls and milds in virtually all ROIs, the mild group showed a selective decrease in FA only in the edge ROIs.
Conclusions: These findings indicate a more focused area of disrupted white matter integrity in the splenium of the corpus callosum in patients with mild TBI than has typically been described in the literature. This may correlate with ex vivo studies which show these locations also contain thinner and less myelinated fibers. Further, significant correlations were found between the extent of DAI in this area and measures of cognitive functioning.
Correspondence: *Angela Capps, Ph.D., Department of Psychiatry, University of Illinois Chicago, 912 S. Wood, Chicago, IL 60612. E-mail: cappsan@hotmail.com*

K.S. CHIOU, J. SLOCOMB & F.G. HILLARY. Qualitative Features of Metacognition Following Moderate and Severe Traumatic Brain Injury.
Objective: Metacognition refers to the thoughts and beliefs held about one's own cognitive performance. Deficits in the ability to make accurate metacognition judgments have been documented following traumatic brain injury (TBI) and have significant implications for treatment. However, little is known about the quality of such judgments (i.e., under or overconfidence); furthermore, almost universally the literature has focused on studies of metamemory. The absolute value (AV) as a metric affords the ability to obtain more detailed measurement of judgment magnitude and direction. This study uses AVs to examine the qualitative features of metacognitive judgments following moderate and severe TBI in the domains of metamemory (metaMEM) and meta-abstract reasoning (metaAR).
Participants and Methods: 21 participants with moderate to severe TBI and 21 matched healthy adults completed neuropsychological tests. Retrospective confidence judgments were collected following each response and AVs were calculated. Independent samples t-test, ANOVA, and correlation analyses were performed.
Results: No difference in magnitude of confidence was found between groups in either metacognitive domain. All participants reported underconfident metaMEM judgments and overconfident metaAR judgments; a significant main effect of metacognitive domain was found ($F(1, 40)=19.9$, $p=0.000$). Significant correlations were found between performance accuracy and confidence for both groups for metaMEM (TBI: $r=0.69$, $p=0.001$; HC: $r=0.44$, $p=0.05$). However, only participants with TBI demonstrated this relationship in the metaAR domain ($r=0.47$, $p=0.03$).
Conclusions: These results suggest that the magnitude and direction of confidence in individuals with TBI do not differ significantly from healthy adults. However, the metacognitive domain influences direction of confidence, suggesting two separate processes.
Correspondence: *Kathy S. Chiou, M.S., Psychology, The Pennsylvania State University, 610 Moore Building, University Park, PA 16802. E-mail: ksc167@psu.edu*

M. CHOI, K. GROHMAN, M. ALT, S. PIWOWARCZYK & K.T. DONNELLY. TBI and Alcohol Effects on Cognitive and Psychosocial Profiles of OEF/OIF Veterans.
Objective: This study examines demographic, psychosocial, and cognitive profiles of 172 OEF/OIF veterans based on their history of mild traumatic brain injury (mTBI) and current alcohol use.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants were drawn from a larger study of post-deployment adjustment and healthcare utilization. TBI status was determined by a board certified neuropsychologist using a structured clinical interview. Identification of alcohol abuse within the past six months was made using the Alcohol Use Disorders Identification Test (clinical cutoff: ≥ 5 for men, ≥ 4 for women). Groups included 41 participants with no TBI and no alcohol abuse (TBI-/ALC-), 42 with only alcohol abuse (ALC+), 44 with only TBI (TBI+), and 45 with both TBI and alcohol abuse (TBI+/ALC+).
Results: Participants in the TBI+/ALC+ groups were significantly less educated and younger than participants in the ALC+, TBI+, and TBI-/ALC- groups. Participants in TBI+/ALC+ also endorsed significantly higher levels of depression (BDI2), generalized anxiety (BAI), and PTSD (PCLM) than participants in the three other groups. Post-hoc univariate analyses of psychosocial responses between the ALC+ and TBI+ groups were not significantly different; however both groups reported significantly higher levels of depression, anxiety, and PTSD than the TBI-/ALC- group. Multivariate analyses of between group differences were not significant for any cognitive measures examining fluency, processing speed, attention, learning, retention, executive function, and symptom validity.
Conclusions: These findings are consistent with previous studies in non-veteran populations suggesting that there is more variability in cognitive profiles within groups of TBI and/or alcohol abuse than between them.
Correspondence: *Melissa Choi, M.A., VA WNY Healthcare System, 44 1/2 St James Place, Buffalo, NY 14222. E-mail: melissa.s.choi@gmail.com*

J.A. CLARK, S.M. KURTZ & A. CERNICH. Subjective Complaints and Neurocognitive Test Performance in Veterans from Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF).
Objective: Mild traumatic brain injury (mTBI) and PTSD are leading problems for many veterans from the OEF/OIF conflicts. Although many veterans report postconcussive complaints, the presence of objective cognitive deficits is controversial. Twenty-eight veterans with diagnosed mTBI who underwent clinical neuropsychological testing were examined. Objective performance on neuropsychological testing and subjective complaints on the Neurobehavioral Symptom Inventory (NSI) were compared for two sets of contrasts.
Participants and Methods: The first contrast compared those with diagnosed PTSD (n=22) to those with no diagnosis of PTSD (n=6). The second contrast compared those who reported a loss of consciousness (LOC; n=17) to those who reported an alteration of consciousness (n=11).
Results: Neuropsychological testing suggests that the PTSD vs. No PTSD contrast showed statistically significant group differences on measures of recall, recognition and processing speed. The LOC vs. No LOC contrast suggested statistically significant group differences on recall and recognition measures only. Furthermore, the PTSD vs. No PTSD contrast showed that PTSD patients reported a greater number of symptoms on the NSI on 14 of 22 factors, including cognitive, affective, and somatic complaints. However, the LOC vs. No LOC contrast indicated the LOC group reported greater complaints for only photosensitivity and fatigue.
Conclusions: While both contrasts resulted in group differences in neurocognitive testing, the PTSD contrast suggested a difference in processing speed that was not present in the LOC contrast. Results also suggest that those with PTSD report more postconcussive complaints. It is possible that these symptoms may deleteriously affect the PTSD group and may contribute to cognitive problems.
Correspondence: *Jessica A. Clark, Ph.D., Clinical Psychology, National Rehabilitation Hospital, 11806 Macon Street, Beltsville, MD 20705. E-mail: JessicaClarkPhD@gmail.com*

A. HULL, C. LOCKWOOD & J. POOLE. Convergent validity of the S-NAB Executive Index in VA patients screening positive for TBI.
Objective: The Screening Module of the Neuropsychological Assessment Battery (S-NAB) has five abbreviated neurocognitive indices. However, it is unclear whether subtests selected for the S-NAB Executive Index tap into executive skills. This study analyzed the convergent validity of the S-NAB Executive Index in VA patients with positive screens for traumatic brain injury (TBI).
Participants and Methods: Subjects: 60 outpatient veterans and service members, ages 20-58, who screened positive for possible mild to moderate TBI on a standard VA screen. Tests: The S-NAB Executive Index (Mazes and Word Generation subtests), Wisconsin Card Sorting Test (WCST), DKEFS Verbal Fluency and Color-Word Inhibition, Trail Making, and Shipley Abstraction were administered as part of a standard neuropsychological battery. Correlations between the S-NAB Executive Index and standard executive measures were analyzed.
Results: The S-NAB Executive Index correlated significantly with Trails B, Verbal Fluency Switching, Color-Word Inhibition, and Abstraction. In terms of the S-NAB subtests, S-NAB Word Generation correlated specifically with Verbal Fluency Switching, Abstraction, and Trails B; while S-NAB Mazes correlated specifically with Color-Word Inhibition and Trails B. In this patient sample, the WCST was generally performed within normal limits and did not correlate significantly with the S-NAB Executive Index.
Conclusions: The S-NAB Executive Index correlated significantly with four of the five executive measures. In terms of S-NAB subtests, Word Generation was associated with executive measures that emphasize verbal mediation, whereas the Mazes subtest was associated with executive measures that emphasize visual mediation. Overall, the present analyses support the convergent validity of the S-NAB Executive Function Index and subtests.
Correspondence: *Amanda Hull, Palo Alto VA, 1354 Monroe St NW, B, Washington, DC 20010. E-mail: ahull@paloaltou.edu*

M. O'NEIL, L. HUTSON, S. TUN, G. MONCRIEF & D. STORZBACH. Psychometric Properties and Factor Structure of the British Columbia Postconcussion Symptom Inventory (BC-PSI) in Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) Veterans.
Objective: Examine the factor structure and reliability of the BC-PSI in a sample of OEF/OIF veterans.
Participants and Methods: Subjects are 87 OEF/OIF veterans who participated in an ongoing study of the neuropsychological effects of blast exposure. All participants were administered a comprehensive neuropsychological battery which included the BC-PSI. Exploratory factor analysis was conducted using Principle Axis Factoring and oblique rotation to account for factor correlations. Factors were retained based on their theoretical relevance, examination of the scree plot, and having eigenvalues greater than 1. Reliability was measured using Cronbach's Alpha.
Results: Results supported a 3 factor structure corresponding to cognitive, affective, and somatic constructs. Items with pattern loadings greater than .35 were retained in each factor, and only two items, symptoms of headaches and irritability, obtained cross-loadings of greater than .35 on more than one factor. Two items, symptoms of poor sleep and differential effects of alcohol, did not obtain factor loadings of above .35 on any of the three retained factors. The factors were significantly correlated, and therefore oblique rotation was maintained. All subscales demonstrated adequate reliability; the total scale reliability was .91, cognitive subscale was .84, somatic subscale was .74, and affective subscale was .85.
Conclusions: The results support a 3 factor structure of the BC-PSI. Two individual items, sleep and alcohol symptoms, were not included in the factors, and it is possible that these items measure unique constructs that are less related to the other item clusters.
Correspondence: *Lee Hutson, PhD, Portland VAMC, 3710 SW US Veterans Hospital Rd, Portland, OR 97239. E-mail: lee.hutson2@va.gov*

L. HUTSON, M. O'NEIL, S. TUN, G. MONCRIEF & D. STORZBACH. Postconcussive Symptoms Reported by Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) Veterans: Effects of Blast Exposure and PTSD Diagnosis.
Objective: Using the British Columbia Postconcussion Symptom Inventory (BC-PSI), examine the differences among reported postconcussive symptoms in OEF/OIF veterans.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Subjects are 80 OEF/OIF veterans who participated in an ongoing study of the neuropsychological effects of blast exposure. All participants were administered a comprehensive neuropsychological battery which included the BC-PSI. PTSD was diagnosed using a structured clinical interview (Mini-International Neuropsychiatric Interview). Participants were divided into three groups based on cognitive complaints (no history of blast exposure, history of blast exposure without cognitive complaints, and history of blast exposure with cognitive complaints) and two groups based on current PTSD diagnosis. Factor analysis of the BC-PSI guided choice of dependent variables as follows: three factor-based subscales were created (affective, cognitive, and somatic). Additionally, individual items corresponding to sleep and alcohol effects were included as dependent variables since they did not load on any of the three factors but contained unique symptom information. A MANOVA was used to examine the differences in reported postconcussive symptoms among the groups.
Results: Results indicated that there were no statistically significant interaction effects among cognitive complaints and PTSD diagnosis in terms of BC-PSI subscale scores. Similarly, there were no statistically significant differences in BC-PSI scores between the three groups of veterans based on cognitive complaints. There were, however, statistically significant differences in BC-PSI scores based on PTSD diagnosis (eta-squared = .28) for the affective, cognitive, and somatic subscales of the BC-PSI. Veterans who had a current PTSD diagnosis scored significantly higher on all three subscales.
Conclusions: Veterans with a diagnosis of PTSD are more likely to endorse postconcussive symptoms regardless of blast exposure or cognitive complaints.
Correspondence: *Lee Hutson, PhD, Portland VAMC, 3710 SW US Veterans Hospital Rd, Portland, OR 97239. E-mail: lee.hutson2@va.gov*

G.L. IVERSON, M. WÄLJAS, R.T. LANGE, P. DASTIDAR, K. HARTIKAINEN, M. JEHKONEN, S. SOIMAKALLIO & J. ÖHMAN. A Prospective Inception Cohort Study of the Post-Concussion Syndrome.
Objective: The purpose of this study was to examine the nature and course of the post-concussion syndrome (PCS) at four weeks and 12 months following mild traumatic brain injury (MTBI).
Participants and Methods: In this inception cohort design, participants were 126 patients from the Emergency Department who had sustained an MTBI. They underwent day-of-injury computed tomography (CT) and 3 Tesla MRI after approximately four weeks. At four weeks (N=126) and 12 months post injury (N=103), they were interviewed and they completed several questionnaires. Classification of DSM-IV symptom criteria for the post-concussion syndrome was based on the Rivermead Post-Concussion Symptoms Questionnaire.
Results: Based on "mild" or greater symptom reporting, the incidence of PCS was 30.2% at four weeks and 16.5% at 12 months. Based on "moderate" or greater symptom reporting, the incidence was 7.1% at four weeks and 4.9% at 12 months. Delayed-onset PCS was present in 3.9%. Those with structural abnormalities on day-of-injury CT or four-week MRI were not more likely to develop the syndrome. Women were more likely to have moderate-severe PCS at four weeks but not at 12 months. Those with a pre-injury history of mental health problems were more likely to have PCS at four weeks and 12 months. Post-injury alcohol abuse and depression was associated with the PCS.
Conclusions: Rates of PCS vary depending on symptom thresholds for diagnosis. Pre-injury mental health problems, and post-injury alcohol abuse and depression, were associated with the PCS. The development of the PCS was unrelated to injury severity.
Correspondence: *Grant L. Iverson, Ph.D., Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada. E-mail: giverson@interchange.ubc.ca*

L.S. KAKOS, T. STRATTON, A.J. SZABO & J. GUNSTAD. Hours of Sleep Prior to ImPACT Testing, Symptom Report, and Cognitive Function.
Objective: Inadequate sleep has adverse effects on cognitive function, particularly attention, working memory, and recall. The Immediate Post-concussion Assessment and Cognitive Testing (ImPACT) is used to assess these abilities in athletes. The effects of reduced sleep on baseline test performance are unknown.
Participants and Methods: Division I football players (n=229, mean age= 20.4±1.4, mean concussions=0.52±1.0) were administered baseline ImPACT testing. As part of standardized testing, the student athletes reported the number of hours of sleep obtained prior to testing and subjective symptoms. Cognitive testing generated composite indices of verbal and visual memory, visual motor speed, reaction time, impulse control, delayed memory, and working memory.
Results: A mean of 7.3 (±1.3) hours of sleep prior to testing was reported. In general, symptom report varied and ranged from vomiting and balance problems (0.4% each) to fatigue (20.1%). Partial correlations controlling for number of concussions demonstrated that hours of sleep prior to testing was negatively correlated with reported headache (r=-0.21, r=0.00), fatigue (r=-0.15, r=0.02), trouble falling asleep (r=-0.16, r=0.02), sleeping less than usual (r=-0.17, p=0.01), and irritability (r=-0.20, p=0.00). Hours of sleep was not significantly correlated with measures of cognitive function in the sample or those individuals with history of concussion.
Conclusions: While hours of sleep was not associated with cognitive test performance in university football players, it was associated with reports of physical symptoms. Clinicians may benefit from assessing sleep in differential diagnosis of concussion, as common symptoms of reduced sleep and concussions may be over-reported due to inadequate sleep before testing.
Correspondence: *Lynn S. Kakos, M.A., Kent State University, 3398 East Normandy Park Dr, N2, Medina, OH 44256. E-mail: lreese3@kent.edu*

E. KELLEY, M. LONG, R. WELLS & J.H. POOLE. Does Handedness Influence Neuropsychological Performance After Traumatic Brain Injury?
Objective: Many theories relate handedness to differences in functional localization or interregional brain connectivity. Handedness is known to influence neuropsychological performance in many populations. To this date, no empirical investigation has been conducted on the relation of handedness to neuropsychological performance following a moderate to severe traumatic brain injury (msTBI) adults. We aim to investigate whether handedness may relate to performance following TBI.
Participants and Methods: Subjects: 36 veterans [18 left handed (LH), 18 right handed (RH)] with moderate to severe TBI and no hemiplegia. Procedure: received acute inpatient rehabilitation at the VA Palo Alto. Administration of measures was done upon admission to unit. Measures: Wisconsin Card Sort, Verbal Fluency, Boston Naming, Trails, Design Fluency, Digit Span, California Verbal Learning, Grip Strength, 9-Hole Peg (N=22), Hamilton Depression and Anxiety Scales. Analysis: MANCOVA controlling for injury severity (Posttraumatic Amnesia), education, and age.
Results: Measures of hand functioning were significant, with the LH group having stronger grips [$p < .01$ for both hands, moderate effect sizes]. The LH group performed significantly faster on the Nine Hole Peg Test ($p<.05$, moderate effect size). No group differences were found on neuropsychological or psychological measures.
Conclusions: Our analyses suggest differences between RH and LH groups exist immediately following msTBI on tests of motor functioning; while handedness grouping does not impact neuropsychological performance at baseline. This implies that there is no significant difference in brain symmetry or protective factors on these domains, although the LH group may have increased motor recovery and functioning following msTBI. Further theories will be discussed.
Correspondence: *Elizabeth Kelley, Defense and Veterans Brain Injury Center, 1791 Arastradero Road, Palo Alto, CA 94304. E-mail: eliz.kelley@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

K. BAUMGARTEN & M.R. KENNEDY. Auditory Working Memory after Brain Injury: A Preliminary Study Comparing Performance Across Three Tasks.

Objective: The purpose of this study was to compare the working memory (WM) of mildly impaired adults with brain injury (BI) to controls on listening span, n-back, and digit span tasks. We hypothesized that the WM of adults with BI would be lower than the performance of those without BI on all tasks.

Participants and Methods: Thirteen adults with brain injury were matched to 10 controls on age, education and verbal IQ. The listening span task required that participants listen to sets of sentences that increase in number, while true/false judgments and attempts to recall the final word from each sentence are made. For the n-back task (0-back, 1-back, 2-back) participants manually responded to previously specified types of matches located within an auditory strings of letters. The digit span task involved recalling increasingly longer strings of numbers forwards or backwards.

Results: Between- and within-group comparisons were made. The hypothesis that the WM of adults with BI would be lower than controls' was partially supported; adults with BI made more errors on the listening span task than controls, but the groups performed similarly on the n-back and digit span tasks. N-back and digit span backward scores of the BI group were strongly correlated, as were verbal IQ scores, verbal fluency scores, and errors on the listening span task. As expected, lower WM occurred in both groups, as tasks increased in length or difficulty.

Conclusions: These preliminary results suggest that the listening span task may be a more sensitive measure that differentiates adults with BI with mild impairments from well-matched controls. Relationships between performances on the listening span task, verbal IQ and verbal fluency suggest that the listening span task is a language-based working memory measure that includes executive functions. Further investigation is certainly warranted with larger sample sizes. Until then, clinicians may want to consider including a listening span task in their assessment toolbox.

Correspondence: *Mary R. Kennedy, Ph.D., University of Minnesota, 115 Shevlin Hall, 164 Pillsbury Dr. S.E., Minneapolis, MN 55455. E-mail: kenne047@umn.edu*

M.J. LARSON & T.J. FARRER. Cognitive Control in Mild Traumatic Brain Injury: Conflict Detection and Resolution.

Objective: Recent studies indicate that individuals with mild traumatic brain injury (mTBI) show deficits in the cognitive control function of performance monitoring. No studies have examined the neural underpinnings of the cognitive control functions of conflict detection and resolution, which can be examined using the N450 and conflict slow potential (conflict SP) components of the event-related potential (ERP). We tested the hypothesis that individuals with mTBI would show attenuated ERP reflections of conflict detection and resolution.

Participants and Methods: We acquired high-density ERPs while 20 individuals who sustained a mTBI within the previous 12 months and 20 demographically-matched control participants completed a single-trial Stroop task with 50% congruent and 50% incongruent trials. Separate 2-Group x 2-Congruency ANOVAs were used to examine the behavioral (response times [RT] and error rates) and ERP (N450 and conflict SP amplitudes) manifestations of cognitive control.

Results: Behaviorally, both groups showed slower RTs and increased errors to incongruent trials relative to congruent trials; however, groups did not differ in RTs or error rates overall or as function of congruency. Both groups showed more negative N450 amplitude and more positive Conflict SP amplitude to incongruent trials relative to congruent trials. Groups did not differ in ERP amplitudes overall or as a function of congruency. Notably, ERP amplitudes significantly correlated with severity of post-concussion symptoms, but not time since injury.

Conclusions: Findings suggest that individuals with mTBI show intact behavioral and neural reflections of conflict detection and resolution, although increased severity of post-concussion symptoms may be associated with decreased ERP amplitudes.

Correspondence: *Michael J. Larson, Ph.D., Department of Psychology, Brigham Young University, 244 TLRB, Provo, UT 84602. E-mail: michael_larson@byu.edu*

K. LE, J. MOZEIKO, C. COELHO & J. GRAFMAN. Cognitive-Linguistic Explanations for Narrative Discourse Performance following TBI.

Objective: Discourse impairments are emblematic communication disorders of traumatic brain injury (TBI). A recently developed narrative discourse measure, story goodness, discriminated TBI and comparison groups and identified performance profiles based on story organization and content within the TBI group. This study examined cognitive and linguistic variables thought to account for differences in the storytelling subgroups.

Participants and Methods: 162 adults with TBI participated. Discourse production was assessed using story grammar (organization) and story completeness (content). Performance was plotted into one of four quadrants of discourse ability (Q1: organized, incomplete; Q2: organized, complete; Q3: disorganized, incomplete; Q4: disorganized, complete). Cognitive measures included two executive function tasks (D-KEFS card sort and tower test) and the WMS-III working memory index (WM). The Boston Naming Test (BNT), Discourse Comprehension Test (DCT), and Token Test comprised the linguistic measures. A MANOVA was performed using quadrant as the fixed factor and the six cognitive and linguistic indices as dependent variables.

Results: Significant group differences were noted across measures. Post-hoc tests revealed that each variable significantly differed between, at least, one pair of storyteller groups. All variables distinguished between Q2-Q3. Both D-KEFS tasks, WM, BNT, and DCT were different for Q1-Q2 as were WM, BNT, and DCT for Q3-Q4. DCT differentiated Q1-Q4 as did BNT for Q1-Q3. Effect sizes (Cohen's d), ranged from medium to very large.

Conclusions: Results suggest that production of story narratives is dependent on both cognitive and linguistic processes. The relative contribution of these processes to story goodness components of organization and content does not appear to be comparable.

Correspondence: *Karen Le, MA, Department of Communication Sciences, University of Connecticut, 850 Bolton Road, U-1085, Storrs, CT 06269-1085. E-mail: karen.le@uconn.edu*

T.L. MERKLEY, M.J. LARSON, E.D. BIGLER & W.M. PERLSTEIN. Structural and Functional Changes of the Caudal Anterior Cingulate Following Traumatic Brain Injury.

Objective: Impairments of attention and executive functions are common sequelae of traumatic brain injury (TBI). Despite the heterogeneity of injury severity and location across individual patients, the anterior cingulate is likely to sustain injury as a result of head trauma, due to its frontal location and proximity to the rough surface of the falx cerebri. The current study investigated the relationship between caudal anterior cingulate (CAC) volume and performance on tasks of selective attention and cognitive flexibility (single-trial Stroop task) and working memory (Auditory Consonant Trigrams).

Participants and Methods: Participants consisted of 12 adults who had sustained a severe TBI and 18 demographically-matched controls. T1-weighted volumetric MRI data were used for the automated cortical reconstruction, parcellation and volume measurement of the CAC, as performed using Freesurfer software.

Results: Volume of the CAC reflected reductions in the TBI group as compared to controls for both right ($p<.05$) and left ($p<.01$) hemispheres, after accounting for total intracranial volume. Decreased right hemispheric CAC volume was associated with poorer performance on the Auditory Consonant Trigrams task (pΛ05 for 3-second and 9-second trials, trend for 18-second trials), and increased error rates on a single-trial version of the Stroop task ($p<.05$). Similar relationships were not observed for the left CAC.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Current findings indicate that the CAC is susceptible to atrophy following TBI, which likely contributes to reduced performance on executive function tasks. An understanding of the functional role of TBI-vulnerable brain regions may provide insight into the common functional impairments that are observed subsequent to TBI.
Correspondence: *Tricia L. Merkley, Psychology, Brigham Young University, 1001 Kimball Tower, Brigham Young University, Provo, UT 84602. E-mail: merkleytl@gmail.com*

T.W. OLIVIER, D.G. NEMETH, L.T. WHITTINGTON, J.R. HAMILTON, A.P. STEGER & A. GREMILLION. Can the DRS-2 Distinguish TBI from Aging Effects In Seniors?
Objective: To determine the efficacy of using the Dementia Rating Scale-2 (DRS-2) to distinguish between traumatic brain injury (TBI) and aging effects in senior citizens. According to Lezak (2004, p.703), the Mattis Dementia Rating Scale "examines five areas that are particularly sensitive to the behavioral changes that characterize senile dementia of the Alzheimer's type:" Attention, Initiation and Perseveration, Construction, Conceptualization, and Memory. The DRS-2 evaluates these same areas. The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) was initially "designed to screen elderly patients with possible dementia;" however, "it also serves as a general use screening battery (Lezak, 2004, p. 696)." "It contains 10 subtests that contribute to 5 index scores (Immediate Memory, Visuospatial/Constructional, Language, Attention, and Delayed Memory) and a summary measure (Lezak, 2004, p.696)."
Participants and Methods: The DRS-2 performances of five senior citizens who experienced a TBI were compared to five non-TBI seniors referred for a dementia evaluation. These scores were compared to their performances on the RBANS.
Results: Individuals in the TBI category had Average Total Scores on the DRS-2; whereas, individuals referred for dementia evaluations did not. Results of the RBANS were consistent with these findings. Specifically, the TBI seniors had impaired scores on the RBANS, but not on the DRS-2; whereas, dementia patients had impaired scores on both.
Conclusions: Although not specifically designed to differentiate dementia from TBI effects in seniors, the DRS-2 can be a useful tool to include in an assessment of TBI seniors who are suspected of having pretrauma dementia.
Correspondence: *Darlyne G. Nemeth, Ph.D., M.P., A.B.M.P., The Neuropsychology Center of Louisiana, LLC, 4611 Bluebonnet Blvd, Ste. B, Baton Rouge, LA 70809. E-mail: dgnemeth@gmail.com*

D. PARTOVI. Impact Of Parental Traumatic Brain Injury On Adolescents.
Objective: This study looked at the phenomenological experience of adolescents who have a parent with TBI. The needs of this population are often overlooked by medical/mental health professionals responsible for treating adults with TBI, and research in this area is scarce. When a parent has a brain injury and associated sequelae during this important stage of physical, cognitive and psychosocial development, it can pose specific challenges to an adolescent.
Participants and Methods: Using qualitative methodology, 8 adolescents (ages 12-19), were interviewed in person, or by phone, about their experience of having a parent with a physical, cognitive, and /or psychosocial disability related to TBI. Questions included: resources provided to the adolescent; impact of parental injury on adolescent's social, academic, and emotional functioning; changes in the injured parent; adolescent's perception of parental injury (including personality changes, level of functioning, physical changes, etc.); and adolescent's perception of benefits to the family/adolescent as a result of the parental injury. Demographic information was also collected.
Results: The following themes emerged: lack of formal resources aimed at facilitation of understanding or discussing emotions related to the parental injury, or subsequent changes in the injured parent; feelings of guilt about the parental injury; concern about leaving the injured parent (e.g., for college); difficulty with parent's decreased ability for emotional regulation.
Conclusions: It is clear that this population is in need of resources designed to address the specific emotional and psychological issues related to parental TBI. This information can be helpful in informing medical and mental health providers who treat parents with TBI.
Correspondence: *Diana Partovi, M.A., PsyD Candidate, NCHCS, Martinez, CA, 3368 N Lucille Lane, Lafayette, CA 94549. E-mail: dpartovi@comcast.net*

P.J. KELLEY, A.R. RABINOWITZ & P.A. ARNETT. Baseline Characteristics Predict Post-Concussion Recovery in College Athletes.
Objective: Research on the neurocognitive consequences of sports-related concussion has demonstrated that most athletes return to baseline within 10 days of sustaining a mild traumatic brain injury (mTBI). However, for reasons that remain poorly understood, some athletes recover at a slower rate. The present study examines factors associated with protracted mTBI recovery.
Participants and Methods: Five-hundred and seventy-four non-injured college athletes were administered the ImPACT as part of a baseline assessment. Ninety athletes subsequently sustained mTBI during their college tenure, and were re-tested approximately 48 hours post-injury. Athletes received follow-up testing as needed, until a final return-to-play decision was made. For the present analyses, athletes were divided into three groups based on recovery course: 1. athletes with one post-injury evaluation (N=61), 2. those with two evaluations (N=22), and 3. those with three or more evaluations (N=7).
Results: One-way ANOVA revealed that performance on the ImPACT at baseline, but not post-concussion, distinguished the groups. The effect of recovery group was significant for the Verbal Memory Composite ($F=5.20$, $p<.01$), Visual Memory Composite ($F=3.90$, $p<.05$), and Total Symptom Score ($F=4.54$, $p<.05$). Athletes who returned to play after their initial post-concussion evaluation exhibited better verbal and visual memory, and reported fewer symptoms, at baseline than those who were re-referred for further post-concussion testing on a second and third occasion.
Conclusions: Results suggest that pre-injury factors—symptom reporting and poorer performance on memory tasks—predict a longer recovery time after mTBI. This finding is consistent with theories of cognitive reserve. Theoretical and clinical implications will be discussed.
Correspondence: *Amanda R. Rabinowitz, M.S., Psychology, Pennsylvania State University, 1651 Highlandon Court, State College, PA 16801. E-mail: arr200@psu.edu*

H. GODDARD, S. RUSSO, D. RITCHIE, S. QUINTANA-MARIKLE, B. BERGMAN & C. DELUCIA. Concussion History and Knowledge Base in Competitive Equestrian Athletes.
Objective: The present study was aimed at assessing the knowledge base of equestrian athletes concerning sport related concussion. Additionally, the survey looked at patterns of treatment, recovery, and attitudes about concussion in equestrian athletics.
Participants and Methods: Participants were 94 (males=27, females=67; mean age=37.81, SD=14.15) equestrian riders who were recruited at a premiere equestrian facility in the Southeastern United States. Riders were asked to complete a survey including demographics, concussion history, and concussion knowledge items. 31% identified themselves as professional riders and 68% identified themselves as amateur riders. The riders reported a mean of 25 years experience (SD=11.32).
Results: Of all the riders surveyed, 42 (45%) reported at least one prior concussion while riding, 66% classified themselves as amateur riders and 33% were professional. Utilizing chi square analyses, 78% (n=32) of the concussed sample reported never being educated about concussion; while 46% (n=24) of the non-concussed sample endorsed receiving concussion education. 30% of the riders altered their riding behavior after a concussion for increased safety. Riders rated seeking medical care following concussion as very important or important 72% of the time, while only 17% of equestrian riders sought medical management following their own concussion.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Sport related concussion is a major concern in contact sports in the United States, garnering much publicity in popular media. Current results demonstrate a significant risk of brain injury for equestrian athletes and also show large discrepancies between the attitudes and behaviors held by riders. Additionally, the current results demonstrated a lack of knowledge of equestrian athletes concerning proper management and potential consequences of sport-related concussion.
Correspondence: *David Ritchie, M.A., Center for Psychological Studies, Nova Southeastern University, 3301 College Avenue, c/o Stephen Russo, Fort Lauderdale, FL 33014. E-mail: dritchie@nova.edu*

P. ROSKOS, J.D. GFELLER, J. MURPHY, D. WHITSON, J. BOLZENIUS, B.A. IBATA & R.D. BUCHOLZ. Construct Validity of the Neurobehavioral Symptom Inventory in a Sample of Healthy Controls and Individuals with TBI.
Objective: The Neurobehavioral Symptom Inventory (NSI; Cicerone & Kalmar, 1995) is a self-report measure of cognitive, affective, and somatic problems which can occur following traumatic brain injury (TBI). Recently the NSI has been used to assess symptoms in military veterans suspected of having combat related TBI. Despite its increased use, very little is known about its psychometric properties. The goal of this study was to examine the relationships between the NSI and other self-report symptom measures (BDI-II, BAI, PCL-C, PHQ-9, and PHQ-15) in a sample of individuals with TBI and healthy controls. We expected that the NSI would correlate significantly with other self-report measures and that the TBI group would score significantly higher on the NSI, relative to healthy controls.
Participants and Methods: Participants completed the NSI and other self-report measures as part of a larger ongoing prospective study. In additional to descriptive statistics, Pearson correlation and ANOVA analyses were conducted.
Results: Results showed that the NSI had significant correlations with other self-report measures in the TBI group, but the correlations were attenuated or non-significant in the healthy control group. NSI scores were significantly higher in the TBI group, but so were scores on measures of depression, anxiety, somatization, and PTSD.
Conclusions: These findings suggest that the NSI has strong relationships with measures of distress, which are not specific to TBI. Our results also imply that presence of psychiatric distress in individuals with TBI may elevate scores on the NSI.
Correspondence: *P. Tyler Roskos, PhD, Surgery/Neurosurgery, Saint Louis University, 1320 South Grand Blvd., St. Louis, MO 63104. E-mail: roskospt@slu.edu*

J.D. GFELLER, P. ROSKOS, J. MURPHY, D. WHITSON, J. BOLZENIUS, B.A. IBATA & R. BUCHOLZ. The Clinical Utility of the Neurobehavioral Symptom Inventory in Persons with Traumatic Brain Injury.
Objective: The Neurobehavioral Symptom Inventory (NSI; Cicerone & Kalmar, 1995) has seen increased use for evaluating self-reported symptoms in persons with traumatic brain injury (TBI). This study sought to further investigate the clinical utility of the NSI in persons with a history of TBI as well as healthy control participants.
Participants and Methods: As part of a larger ongoing prospective study, TBI participants and healthy controls completed the NSI and a test battery that included traditional neuropsychological tests (e.g. CVLT-II, RBANS, Stroop Color Word Test).
Results: Analyses indicated that the mean NSI score for the TBI sample was demonstrably higher, relative to the mean NSI score for healthy controls. Additionally, total NSI scores were used to classify participants as either TBI or healthy controls. An NSI total score of 10 or greater resulted in high overall classification accuracy, with high specificity and moderately high sensitivity. Associations between NSI scores and performance on neuropsychological tests were investigated with correlation analyses. The results indicated there were many positive and significant correlations between the NSI and neuropsychological tests (e.g. CVLT-II, RBANS, Stroop Color Word Test).
Conclusions: Collectively, these findings provide additional support for the clinical utility of the NSI when evaluating persons with TBI.
Correspondence: *P. Tyler Roskos, PhD, Surgery/Neurosurgery, Saint Louis University, 1320 South Grand Blvd., St. Louis, MO 63104. E-mail: roskospt@slu.edu*

T.L. VICTOR, R.J. MELROSE, M.L. ETTENHOFER, J. GHIAM, S.C. CASTELLON & A. OKONEK. The Association Between Headache and Neuropsychological Functioning in OEF/OIF Veterans with History of Traumatic Brain Injury.
Objective: Traumatic brain injury (TBI) is prevalent among OEF/OIF veterans, and posttraumatic headache (PTH) is the primary pain complaint. Previous literature suggests that veterans with a history of TBI and PTH would show poorer neuropsychological functioning compared to veterans without PTH.
Participants and Methods: Medical chart review of OEF/OIF veterans who were referred for neuropsychological evaluation after screening positive for TBI. One-tailed independent samples t-tests were used to compare mean performances of veterans with (TBI+PTH) and without PTH (TBI-PTH).
Results: Data were analyzed from 55 patients reporting TBI (mild n = 43, 78%; moderate n = 7, 13%; severe n = 5, 9%). Thirty-one (56%) reported headache pain. There were no differences in TBI severity between patients with and without PTH ($p > .05$). Within the entire sample, 48 (89%) were diagnosed with Post-traumatic stress disorder (PTSD), and there were no differences between groups with respect to this diagnosis ($\alpha 2(df)=.338$, $p>.5$). Of those reporting headaches, 30 (97%) reported cognitive complaints such as memory problems (90%), inattention/distractibility (77%), cognitive slowing (13%), and word-finding difficulties (10%). TBI+PTH had poorer performance on composite measures of executive functioning ($t(48)=1.7$, $p=.05$) and nonverbal memory ($t(53)=1.8$, $p=.04$) compared to TBI-PTH. In addition, headache pain severity was inversely associated with Global Assessment of Functioning (GAF) ($r=-.38$, $p<.01$).
Conclusions: In OEF/OIF veterans with a history of TBI and PTSD, headache pain is related to poorer executive abilities and nonverbal memory, and poorer global function, highlighting the importance of multidisciplinary effort in the treatment of this population.
Correspondence: *Tara L. Victor, PhD, Physical Medicine and Rehabilitation, Greater Los Angeles Veterans Healthcare System, 11301 Wilshire Blvd, MC 117, Los Angeles, CA CA. E-mail: tvictor@csudh.edu*

R. MELROSE, T.L. VICTOR, M.L. ETTENHOFER, C. CARTER, J. GHIAM, S. CASTELLON & A. OKONEK. The Performance of OEF/OIF Veterans on Standard Tests of Cognitive Effort: A Descriptive Study.
Objective: Neuropsychological evaluation of discharged military personnel involves inherent challenges in assessing symptom validity. Secondary benefits include higher service connection (SC), leading to greater medical benefits/monthly disability payments, while high rates of brain injury/psychiatric diagnoses suggest that legitimate cognitive difficulties are prevalent.
Participants and Methods: Medical chart review of 61 OEF/OIF veterans referred for neuropsychological evaluation from a Polytrauma Network Clinic. Patients screened positive for TBI and were under diagnosis/treatment for one or more military-related traumas (including mental health). Patients completed a subset of the following: Test of Memory Malingering (TOMM), Rey-15 Item Test, Digit Span Age-Corrected Scaled Score (DSpACSS), Reliable Digit Span (RDS), and the California Verbal Learning Test-II Forced Choice (CVLT-FC). Pass rates were calculated using standard cut-offs.
Results: Pass rates were 92% for the TOMM (34 of 37 patients), 100% for the Rey-15 Item Test (51 of 51), 89% for DSpACSS (54 of 61), 91% for RDS (41 of 45) and 88% for the CVLT-FC Test (30 of 34). Forty-five patients (70%) were SC for at least one medical/psychiatric condition at the time of testing, including PTSD (39%) and brain injury (9%).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: OEF/OIF veterans with incentives to feign/exaggerate symptoms are passing the cognitive effort tests used in this study at high rates. The pass rates obtained here are higher than other reports in OEF/OIF samples (~60-80%). The reasons for this are unclear. These may not be the most sensitive measures. Sample-specific factors may also be relevant, suggesting more research is needed across a wide variety of settings.
Correspondence: *Tara L. Victor, PhD, Physical Medicine and Rehabilitation, Greater Los Angeles Veterans Healthcare System, 11301 Wilshire Blvd, MC 117, Los Angeles, CA CA. E-mail: tvictor@csudh.edu*

G. VOELBEL, H. GENOVA, C. ZAKRZEWSKI, G. WYLIE, N. CHIARAVALLOTI, J. DELUCA & J. LENGENFELDER. White Matter Integrity and Novel Nonverbal Problem Solving Ability of Adults with Moderate to Severe TBI: A Diffusion Tensor Imaging Study.
Objective: Tower tasks are commonly used to assess nonverbal problem solving skills. Survivors of severe traumatic brain injury (TBI) often demonstrate nonverbal problem solving deficits. Functional neuroimaging studies suggest the lateral prefrontal cortex subserves these executive functions (EF). However, the role of the subcortical white matter pathways on these EF has not been investigated. The current study examines the relationship between specific performance measures of the Tower Test of the DKEFS and the fractional anisotropy (FA), a measure of white matter integrity.
Participants and Methods: Eighteen adults with moderate to severe TBI were included in the study. All participants were administered the Tower Test and underwent Diffusion Tensor Imaging (DTI). The Achievement score, time and number of moves to complete the 9 tower trials were regressed on the FA value to examine the relationship between nonverbal problem solving and white matter integrity.
Results: Significant positive relationships were found between the FA values of the splenium of the corpus callosum (CC) and the right superior longitudinal fasciculus. Less time to complete the towers was significantly associated with the higher FA values of the CC and bilateral superior longitudinal fasciculus. The number of moves to complete the tasks was significantly associated with the FA values of multiple thalamic radiations and the CC.
Conclusions: The results of this study suggest that reduced integrity of subcortical white matter associated with the executive function network affects multiple performance measures of nonverbal problem solving. The association of white matter integrity of the executive function network and the behavioral performance of time and accuracy of novel problem solving tasks will be discussed.
Correspondence: *Gerald Voelbel, Ph.D., New York University, 35 West 4th Street, 11th Floor, New York, NY 10012-1172. E-mail: gv23@nyu.edu*

J. LENGENFELDER, A. ARJUNAN, A. SMITH, N.D. CHIARAVALLOTI & J. DELUCA. Examination of Verbal Learning Strategies in TBI using the CVLT-II.
Objective: The CVLT-II is commonly used in neuropsychological assessment as a measure of verbal learning and memory. Here, it provides information on how individuals with TBI learn a list of words using strategies that rely on the organization of the categories (Semantic Clustering) or the position of the words (Serial Clustering).
Participants and Methods: Participants were 42 individuals with moderate-severe TBI and 19 matched healthy controls (HC). The CVLT-II was administered in standard format.
Results: Individuals with TBI did not significantly differ from HC on Semantic Clustering during Trial 1 but did differ by Trial 5. Additionally, HC demonstrated a significantly greater use of Semantic Clustering than TBIs on both the Short and Long Delay Free Recall . There was no significant difference between groups on Serial Clustering. For HC, both Serial Clustering and Semantic Clustering were significantly correlated with learning (Trials 1-5 correct) and memory (SDFR and LDFR), while for TBIs, only Semantic Clustering was significantly correlated with learning and memory scores.
Conclusions: While both groups begin the CVLT-II task using similar semantic clustering strategies, by the end of the learning trials the HC are utilizing semantic strategies more than the TBIs. For individuals with TBI, using semantic strategies, but not serial positioning, is related to better overall learning and memory. These findings have implications in designing rehabilitation interventions. Efforts focusing on teaching organizational strategies in a population known to have both executive dysfunction and memory deficits may subsequently improve learning and memory abilities.
Correspondence: *Jeannie Lengenfelder, Kessler Foundation Research Center, 300 Executive Drive, Suite 010, West Orange, NJ 07052. E-mail: jlengenfelder@kesslerfoundation.org*

Cancer

K. LANGER & J.P. FRAIMAN. Case Perspectives on Assessment of Social Cognition in the Neuropsychological Evaluation of the Oncology Patient.
Objective: Neuropsychological assessment of cognitive-behavioral functioning may be useful in oncology settings for patients with primary or metastatic brain lesions, or without radiographic findings of metastatic disease. The ability to identify facial expression of affect is a component of social perception; disruption of ability to use prosody and interpret affect is a symptom in right-hemisphere brain dysfunction.
Participants and Methods: Two male patients with non-CNS cancer, both in active treatment with chemotherapy, underwent neuropsychological evaluation to investigate concerns about cognitive functioning. The neuropsychological profiles differed in terms of cognitive findings. One patient showed signs of incipient and more generalized cognitive dysfunction, and the other, a more focal dysfunction of linguistic fluency.
Results: In both cases, on the social perception section of ACS social cognition, there was a selective decrement in affect identification of fear relative to other affects. Specificity was demonstrated, with a percentage of error of 80% (4/5) for the misidentification of the affect of fear as another affect, often more neutral. There were no instances of misidentification by endorsement of fear in place of another correct affect.
The difficulty was not reflective of general social perception dysfunction; these patients had percentile scores for affect naming of 50th %ile and 63rd %ile, respectively.
Conclusions: The misidentification of fear in the context of adequate social perception may represent a selective unawareness of affect. It is suggested that avoidance or minimization of affect may possibly account for findings. The hypothesis of affect minimization may have clinical relevance for certain patients with advanced disease in the oncology setting.
Correspondence: *Karen Langer, PhD, psychosical services, NYU Langone Medical Center, NYU Clinical Cancer Center, 160 East 34th Street, New York, NY 10016. E-mail: karen.langer@nyumc.org*

Medical/Neurological Disorders/Other (Adult)

J.A. GRIFFEN, L.J. RAPPORT, R. BRYER, C.A. SCOTT, L.A. BIELIAUSKAS, D. WHITMAN & B.N. AXELROD. Awareness of Deficits and On-road Driving Performance.
Objective: This study examined the relationship of neuropsychological and on-road driving evaluations among adults with acquired brain injury (ABI), and the extent to which that relationship is moderated by awareness of deficit. Awareness of deficit may partly explain mixed findings regarding the relationship between cognitive function and driving outcomes, inasmuch as persons aware of their deficits attempt to compensate for them accordingly, thereby minimizing deficit-related risk.
Participants and Methods: Sixty-two pairs of adults with ABI and significant-other informants recruited from a driving evaluation center and 40 healthy controls participated. Adults with ABI and controls completed neuropsychological and on-road evaluations.
Results: Multiple regression indicated that neuropsychological performance, awareness of deficit, and their interaction each explained significant variance in driving performance. The moderation effect was illustrated by different relationships between neuropsychological and on-road performances among the awareness groups: Among adults with impaired awareness (n = 21), neuropsychological functioning was sub-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

stantially related to driving outcomes; in contrast, driving outcome showed weak relation to neuropsychological functioning among those with intact (n = 24) or hypervigilance (n = 17) toward their deficits. An exception was that processing speed showed modest relation to on-road outcome for all groups, including healthy controls.
Conclusions: Awareness of deficit has a considerable influence on driving outcomes both directly and as a moderator between the relationship of neuropsychological functioning and driving performance. When adults with ABI lack appreciation for their impairments, their neuropsychological status is especially important in predicting driving outcomes. Even minor deficits, if not recognized and compensated for appropriately, can increase driving risk substantially.
Correspondence: *Julie A. Griffen, MA, Psychology, Wayne State University, 5057 Woodward, 7th Floor, Detroit, MI 48202. E-mail: jgriffen@wayne.edu*

Cognitive Intervention/Rehabilitation

A.C. WILSON & R. LANGDON. Cognitive Rehabilitation Utilising Action Video Games following Traumatic Brain Injury.
Objective: In the current health care climate it is imperative that new cognitive rehabilitation methods are cost effective, accessible, place low demands on staff, and result in functional improvements for patients. This research examines the use of a commercially available video game in conjunction with an 8-week cognitive rehabilitation guide in improving attention and executive functioning following Traumatic Brain Injury.
Participants and Methods: 31 participants were alternately assigned to a treatment or waitlist control group. Treatment participants attended an 8 week program where they played "Medal of Honor: Rising Sun" (MoHRS; Electronic Arts, 2003) on a Sony Playstation 2 for approximately ¾ of each two hour session. The remainder of the time was dedicated to the psycho education program addressing some of the common consequences of brain injury and introducing useful compensatory strategies. Patients were assessed before and after treatment on an attentional blink task, The Test of Everyday Attention (TEA), The Behavior Rating Inventory of Executive Functioning- Adult version Self Report (BRIEF-A) and The Comprehensive Quality of Life Scale Fifth Edition – for Intellectual/Cognitive Disability (ComQol-I5).
Results: Treatment effects were examined using Wilcoxon Signed Ranks Tests, Paired T-Tests, and One-Way Anovas. Results indicated significant treatment effects on game performance, attentional blink, some TEA subtests, and Quality of Life (productivity, material well being and intimacy). There was no effect of training on self-reported executive functioning (BRIEF-A).
Conclusions: We found that a cognitive rehabilitation program utilizing readily available video games is effective in improving some specific areas of attention functioning and specific areas of quality of life. However, effects did not generalize to executive functioning.
Correspondence: *Alexandra C. Wilson, PhD Candidate, Macquarie Centre for Cognitive Science, Macquarie University, 1/22-28 Bertram Street, Chatswood, Sydney, NSW 2067, Australia. E-mail: alexandra.wilson@mq.edu.au*

J.J. RANDOLPH. 10-year Publication Trends in JINS: Moving Toward a Positive Neuropsychology?
Objective: Despite considerable growth in the neuropsychology literature over the past 10 years, few studies address positive neuropsychology (PNP)—the study, promotion, and enhancement of cognitive health. The present study served to examine 10-year publication trends in the Journal of the International Neuropsychological Society to determine whether there has been a meaningful shift in publication of PNP-oriented manuscripts.
Participants and Methods: Titles and abstracts from all empirical papers published in JINS in 1999, 2004, and 2009 (N = 241) were reviewed and classified into categories based on primary study aims. Primary manuscript categories included deficit characterization, new/existing measure validation, general methodological research, examination of normal cognitive functioning, neuroimaging, medical intervention effects on cognition, and cognitive rehabilitation.
Results: Review of JINS papers across the sampled years indicated a predominant focus on characterizing deficits in neurological conditions (58%), with the majority of other manuscripts addressing neuroimaging (11%), statistical/methodological issues (7%), and neuropsychological measure validation (5%). While 10% of studies examined normal cognitive functioning, only 3% of studies examined other PNP topics such as cognitive rehabilitation and preserved functioning in neurological illness. There was a trend toward increased publication of studies examining normal cognitive functioning across the journal years sampled here, but no other meaningful increases in PNP-related research were observed.
Conclusions: There is little evidence that the field is moving toward the study and promotion of cognitive health based on JINS publication trends over the past 10 years. Future directions will be discussed that could lead to a more consistent empirical focus on PNP-related topics.
Correspondence: *John J. Randolph, Ph.D., Randolph Neuropsychology Associates, PLLC, 20 W. Park Street, Suite 215, Lebanon, NH 03766. E-mail: john.randolph@randolphnp.com*

Invited Address: Constructive Memory: Remembering the Past to Imagine the Future

Speaker: Daniel Schacter

3:30–4:30 p.m.

D. SCHACTER. Constructive Memory: Remembering the Past to Imagine the Future.
Memory is typically viewed as a process that is concerned with the past. One function of memory that has been largely overlooked until recently is its role in allowing individuals to imagine, envisage, or simulate possible future events. However, a rapidly growing number of recent studies have shown that imagining possible future events depends on much of the same cognitive and neural machinery as does remembering past events. We have argued that this linkage between remembering the past and imagining the future is relevant to understanding the constructive nature of memory. Specifically, we have advanced the constructive episodic simulation hypothesis, which holds that imagining future events requires a system that allows the flexible recombination of details from past events into novel scenarios. Human memory possesses these characteristics, which makes the system adaptive for simulating alternative future scenarios based on past experiences, but also may make the system prone to certain kinds of errors and distortions. This presentation will consider recent neuroimaging and neuropsychological studies that examine the processes underlying remembering the past and imagining the future, and delineate their implications for the constructive episodic simulation hypothesis.
Correspondence: ,, . *E-mail:*

Birch Lecture: The Neurodevelopment of Memory and Decision Making: A Fuzzy-Trace Theory Approach

Speaker: Valerie Reyna

5:00–6:00 p.m.

V.F. REYNA. The Neurodevelopment of Memory and Decision Making: A Fuzzy-Trace Theory Approach.
Memory and decision making have been active areas of investigation in behavioral neuroscience. However, these research programs have progressed in parallel with little integration. In this talk, using fuzzy-trace

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

theory, I present an integrated approach to memory and decision making, with worked examples ranging from adolescence to aging. Fuzzy-trace theory distinguishes dual gist-memory and verbatim-memory representations of information, but differs from other dual-process models in emphasizing that gist-based intuition is an advanced form of reasoning. In adolescence, most individuals can draw on a healthy but immature brain, which places them at the pinnacle of verbatim memory performance, but lacking in gist-based intuition. This profile predicts impairments in judgment and decision making. In normal aging, most individuals exhibit the mirror image of the strengths and weaknesses of adolescence: impaired verbatim memory accompanied by advanced gist-based intuition (e.g., in emotional regulation). Neuroimaging and behavioral data are presented implicating brain mechanisms underlying these dual processes along with those underlying inhibition (self-control). Implications for health and well-being across the life span are also discussed.

Correspondence: *Valerie F. Reyna, PhD, Cornell University, 3 Whispering Pines Drive, Ithaca, NY 14850. E-mail: vr53@cornell.edu*

FRIDAY MORNING, FEBRUARY 4, 2011

Invited Address: The Brain's Default Network: Anatomy, Function, and Relevance to Disease

Speaker: Randy Buckner

9:00–10:00 a.m.

R.L. BUCKNER. The Brain's Default Network: Anatomy, Function, and Relevance to Disease.

A shared human experience is our active internal mental life. Left without an immediate task that demands full attention, our minds wander jumping from
one passing thought to the next. Accumulating evidence suggests that we possess an interacting set of brains areas – known as the default network – that participates in internal modes of cognition. Anatomically, the default network comprises heteromodal association areas that are integration zones <
hubs < of information processing. Comparative anatomy suggests that brain areas comprising the default network have markedly expanded in hominid evolution. Providing insight into function, the default network is preferentially active when individuals are not focused on the external environment and tracks spontaneous thoughts. The default network is also
active when individuals are engaged in internally focused tasks including autobiographical memory retrieval, envisioning the future, and conceiving the perspectives of others. The implications of these anatomical and functional observations will be presented in relation to possible adaptive roles of the default network for using past experiences to plan for the future and maximize the utility of moments when we are not otherwise engaged
by the external world. The lecture will conclude by discussing the relevance of the default network for understanding Alzheimer's disease.

Correspondence: *Randy L. Buckner, PhD, HHMI at Harvard University, 52 Oxford Street, Cambridge, MA 02138. E-mail: Randy_Buckner@harvard.edu*

Symposium 6: Positive Neuropsychology: New Applications of an Old Construct

Chair: Peter Arnett

9:00–10:30 a.m.

P. ARNETT, P. ARNETT, J. RANDOLPH, A. RABINOWITZ, D. RAMANATHAN, G. VARGAS & D. UKUEBERUWA. Positive Neuropsychology: New Applications of an Old Construct.

Symposium Description: Positive Psychology focuses on promoting mental health. Although this construct has been explored in psychology more generally, it has rarely been applied to the field of neuropsychology. The overwhelming focus in neuropsychology has been on studying impairments in neurological patient groups. This has been a necessary emphasis, as important goals in the field of neuropsychology have been the accurate characterization of limitations so that remediation can proceed realistically; it has also allowed researchers to gain a more precise understanding of the nature of brain functioning. However, such emphasis has led to the neglect of the study of positive factors and strengths that may predict positive outcomes in neurological patient groups. In this symposium, we present data on multiple sclerosis (MS) and traumatic brain injury (TBI) patients that explore such positive predictors and outcomes, an approach we term Positive Neuropsychology (PNP). John Randolph will first discuss publication trends in neuropsychology journals over the past 10 years, revealing an emphasis on the study of pathological brain-behavior relationships. Next, Amanda Rabinowitz will present a longitudinal study on MS patients showing that general contentment may serve as a protective factor against neurological decline. Deepa Ramanathan will then review a study showing that dispositional optimism in TBI patients predicts better psychological functioning and improved cognitive functioning. Then Gray Vargas will show how positive affect in MS patients is independent of depression, and is predictive of good social support and the use of adaptive coping strategies. Finally, Dede Ukueberuwa will show that cognitive reserve appears to provide a buffer against decline in job status in a longitudinal study of MS patients. A discussion moderated by Peter Arnett will then ensue.

Correspondence: *Peter Arnett, Ph.D., Psychology, Penn State University, 522 Moore Building, University Park, PA 16802-3105. E-mail: paa6@psu.edu*

J. RANDOLPH. 10-year Publication Trends in the Neuropsychological Literature: Moving Toward a Positive Neuropsychology?

Objective: While positive psychology has experienced considerable growth as a field, positive neuropsychology (PNP)—the study, promotion, and enhancement of cognitive health—has received little attention. To further examine this possibility, a review of multiple neuropsychological journals across a 10-year period was conducted to examine whether there has been a noticeable increase in PNP-oriented manuscripts.

Participants and Methods: Titles and abstracts from all empirical papers published in the Journal of the International Neuropsychological Society (N = 241) and Archives of Clinical Neuropsychology (N = 145) in 1999, 2004, and 2009 were reviewed and classified into categories based on primary study aims.

Results: The majority of JINS studies focused on characterizing deficits in neurological conditions (58%), with other manuscripts primarily addressing neuroimaging (11%), normal cognitive functioning (10%), statistical/methodological issues (7%), and neuropsychological measure validation (5%). Review of ACN studies indicated a predominant focus on characterizing deficits in neurological conditions (31%), validating new neuropsychological measures (31%), validating symptom validity measures and procedures (13%), and statistical/methodological issues (9%). While there was a trend toward increased publication of normal cognitive functioning studies in JINS and ACN, there was no other meaningful increase in PNP-related publications in either journal across the 10-year period sampled here.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Examination of 10-year publication trends across neuropsychological journals reveals a continued focus on examining pathological brain-behavior relationships rather than those that exemplify PNP. Future directions to promote a shift toward a PNP focus will be discussed.
Correspondence: *John Randolph, 2 Montview Dr., Hanover, NH 03755. E-mail: John.randolph@randolphnp.com*

A. RABINOWITZ & P. ARNETT. General Contentment as a Protective Factor in MS Patients.
Objective: Multiple sclerosis (MS) is a heterogeneous disorder characterized by marked variation in outcomes. Previous research has demonstrated that stress is associated with exacerbations of the disease. Positive factors may also contribute to subsequent disability; however, factors protective against MS disability are poorly understood. The present study sought to evaluate general contentment as a protective factor in MS patients.
Participants and Methods: Fifty-nine MS patients were administered the Functional Assessment of MS Quality of Life (FAMS), the EDSS, and the Chicago Multiscale Depression Inventory (CMDI) at two time-points 3 years apart. Patients were also administered the MS Functional Composite (MSFC) battery at time 2. Regression models were created using FAMS General Contentment score from time 1 to predict disability variables at time 2, controlling for depression at both time points.
Results: Separate regression analyses revealed that time 1 General Contentment predicted time 2 disability as operationalized by the MSFC (R-squared change =.17, p<.005) and the EDSS (R-squared change =.24, p<.001). A third regression analysis revealed a significant effect of time 1 General Contentment on change in EDSS between time points (R-squared change =.10, p<.05).
Conclusions: These results indicate that a positive factor, general contentment, is associated with subsequently milder progression of disability over a three-year period. This finding suggests that contentment may protect against later neurological disability, independent of possible risk conferred by prior or concurrent depression. The theoretical and clinical implications of this finding will be discussed.
Correspondence: *Amanda Rabinowitz, 420 Moore Building, University Park, PA 16802. E-mail: rabinowitz.a@gmail.com*

D. RAMANATHAN, B. WARDECKER, J. SLOCOMB & F. HILLARY. Dispositional Optimism and Outcome Following Traumatic Brain Injury.
Objective: Despite a vast literature examining the predictors of patient outcome following traumatic brain injury (TBI), little work has examined how positive personality traits influence outcome. Dispositional optimism (DO) has been associated with improved functioning in a number of clinical disorders. In an attempt to understand the potential of positive characteristics as a buffer for detrimental consequences following brain injury, this study examined the associations between DO and outcomes following moderate to severe TBI.
Participants and Methods: 45 individuals who sustained moderate to severe TBI were recruited through mailings and completed the Symptom Checklist Questionnaire-90 Revised (SCL-90-R), the Telephone Interview for Cognitive Status (TICS), the Craig Handicap Assessment Reporting Technique (CHART), and the Life Orientation Test-Revised (LOT-R). Partial correlations and regression analyses were conducted to test the relationship between DO and patient outcome after TBI.
Results: DO was significantly correlated with decreased psychological distress and cognitive deficits, but not functional outcome. Regression analyses showed that DO predicted psychological distress (R-squared = .540, R-squared change = .250, $F(3, 33) = 16.300$, $p < .001$) and that psychological distress mediated the relationship between DO and cognitive deficits.
Conclusions: These findings illustrate that higher levels of DO in individuals sustaining moderate to severe TBI are related to better psychological functioning and improved cognitive functioning. DO appears to be an important factor in understanding recovery and outcome from the consequences of TBI and may aid in resiliency during the recovery process. The future directions and clinical implications of these findings will be discussed in a positive neuropsychology framework.
Correspondence: *Deepa Ramanathan, 622 Moore Building, University Park, PA 16802. E-mail: mdeepar@gmail.com*

G. VARGAS, P. ARNETT & A. RABINOWITZ. Correlates of Positive Affect in Multiple Sclerosis.
Objective: Although commonly used to measure symptom clusters of depression, the Chicago Multiscale Depression Inventory (CMDI) has a positive affect (PA) scale that has had limited study. PA has received little attention in Multiple Sclerosis (MS) as most studies focus on depression and negative outcomes. This study attempted to identify individual and interactive factors associated with higher PA in an MS sample.
Participants and Methods: Ninety-six MS patients and 27 controls were included in the study. They were administered the CMDI, Expanded Disability Status Scale (EDSS), Functional Assessment of Multiple Sclerosis (FAMS), Social Support Questionnaire (SSQ), and the COPE.
Results: Patients had lower levels of PA than controls, even after controlling for depression. In patients, after controlling for disability, PA predicted increased social support, emotional wellbeing, general contentment, family and social wellbeing, and adaptive coping (comprised of positive reinterpretation and growth, planning, and social support for emotional reasons). After also controlling for depression, PA still predicted social support, general contentment, family and social well-being, and positive reinterpretation and growth. PA did not correlate with marital or occupational status. Disability interacted with positive reinterpretation and growth to predict PA.
Conclusions: MS patients have lower PA than controls, which is not fully explained by their higher levels of depression. PA appears to be particularly related to high levels of social support and adaptive coping styles. Furthermore, using positive reinterpretation and growth coping is more associated with PA at lower levels of disability. Implications of these findings for positive neuropsychology will be discussed.
Correspondence: *Gray Vargas, 420 Moore Building, University Park, PA 16802. E-mail: grayvargas@gmail.com*

D. UKUEBERUWA & P. ARNETT. Predicting positive functional outcomes: Job stability in multiple sclerosis.
Objective: Research predicting positive outcomes for people with multiple sclerosis (MS) could be valuable in guiding interventions. The influence of cognitive reserve on functional outcomes for individuals with MS is often overlooked. The present study investigated cognitive reserve, operationalized as premorbid IQ, as a predictor of job change due to MS symptoms.
Participants and Methods: 51 participants (43 female) with MS completed a standard measure of premorbid IQ, the Wechsler Test of Adult Reading (WTAR), and self-reported any changes in job status. An additional measure of premorbid IQ was obtained from the WTAR based on demographic characteristics. Job change could include a new position with less responsibility or fewer hours, or retirement.
Results: Both measures of premorbid IQ were negatively correlated with job change due to MS (WTAR IQ r = -0.33, p<0.05; Demographic Formula IQ r = -0.29, p<0.05). Logistic regression also showed a significant relationship between IQ and job change due to MS (WTAR IQ R-squared change = 0.11, p<0.05; Demographic Formula IQ R-squared change = 0.09, p<0.05). Premorbid IQ scores did not significantly correlate with current disability or performance on tests sensitive to cognitive changes in MS. Participants' current cognitive functioning was not significantly correlated with job change due to MS.
Conclusions: These results indicate that MS symptoms may be less likely to lead to unfavorable job changes for people with greater cognitive reserve. This positive outcome might be explained by increased job flexibility in those with greater cognitive reserve. Results are discussed in terms of advantages of building cognitive reserve in MS.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Dede Ukueberuwa, 420 Moore Building, University Park, PA 16802. E-mail: OZU100@PSU.EDU*

Symposium 7: Neuropsychological Functioning in Rare Diseases; Research Challenges and Potential Solutions

Chair: Lauren Krivitzky

Discussant: Elsa Shapiro

9:00–10:30 a.m.

L. KRIVITZKY & E. SHAPIRO. Neuropsychological Functioning in Rare Diseases; Research Challenges and Potential Solutions.
Symposium Description: The definition of a rare (orphan) disease set forth by the Office of Rare Diseases Research at NIH includes diseases that "have a prevalence of fewer than 200,000 affected individuals in the United States", although many of these diseases have even lower incidence. Rare disorders pose significant challenges for researchers given their low incidence rates and variable outcomes. In addition, several of these conditions are neurodegenerative and sometimes have limited correlation of the genotype-phenotype. In the past several years, there has been an increase in the study of rare diseases, leading to a number of consortiums to study these conditions (The Rare Diseases Clinical Research Network-RDCRN). This has helped to improve rare disease information, treatment, clinical studies, and general awareness for both patients and the medical community. For this symposium, we plan to assemble a panel of experts in the neuropsychological outcomes of various rare genetic diseases including several inborn errors of metabolism (PKU, Urea Cycle Disorders, MMA, MPS Types 1-IV) and other rare genetic conditions (Battens Disease, Adrenal Leukodystrophy). Each talk will present data on the neuropsychological outcomes in these disorders, with the goal of using the discussion period to examine potential similarities and differences that may be explained by overlapping disease pathology. Our second goal is to discuss the common challenges we face in working with these disorders and potential solutions for studying small samples. Solutions may include multi-center collaboration, a uniform test battery for genetic/metabolic disorders, and designing appropriate studies using small sample sizes.
Correspondence: *Lauren Krivitzky, PhD, Neuropsychology Program, Children's National Medical Center, 2548 Ayr Court, Crofton, MD 21114. E-mail: lkrivitz@cnmc.org*

H. ADAMS. Neuropsychological assessment and challenges in evaluation of juvenile-onset Batten Disease.
Objective: Juvenile Neuronal Ceroid Lipofuscinosis (CLN3 disease; JNCL or juvenile-onset Batten Disease) is a fatal, autosomal-recessive inherited neurodegenerative disease with pediatric onset. Its core clinical features are vision loss, seizures, motor and mental decline, and premature death. At present there are no established treatments available to stop, slow, or reverse disease progression. Serial neuropsychological evaluation of JNCL-affected children has contributed to our understanding of clinical phenotype, has expanded our knowledge of disease progression, and has helped validate components of the Unified Batten Disease Rating Scale (UBDRS), a disease-specific clinical rating scale. For example, performance on tests of verbal abilities, memory, and attention are significantly correlated with an independent clinician (neurologist) global impression (CGI) of subjects' cognitive function based on a physical exam (CGI x WISC-IV Vocabulary: Pearson r = -0.41; CGI x WRAML Recall: r = -0.59; CGI x Digit Span: r = -0.45; all at least p <.05). However, neuropsychological evaluation of these children also presents challenges related to disease features including blindness, and progressive motor speech impairments and dementia. The proposed talk will present neuropsychological data from children with JNCL, illustrating impairments in verbal cognitive ability, attention, memory, and language. The data will also be used to highlight assessment challenges and solicit input from attendees on further approaches to evaluation of these children.
Correspondence: *Heather Adams, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, NY 14642. E-mail: Heather_Adams@urmc.rochester.edu*

S. WAISBREN. Neuropsychological Profiles in PKU and other Metabolic Disorders.
Objective: Inborn errors of metabolism represent one of nature's best designed experiments, in that these single gene defects confer specific neuropsychological deficits in humans. With newborn screening for these disorders and prompt treatment, the more severe consequences of the metabolic perturbations (including intellectual disability and neonatal death) are prevented, revealing a distinct impact on cognitive and behavioral functioning. For example, individuals with phenylketonuria (PKU) experience executive functioning deficits, reduced processing speed and depression while individuals with galactosemia almost universally suffer speech/language delay and long-term dysarthria. Recent findings in these disorders as well as disorders of fatty acid metabolism, biotinidase deficiency, and homocystinuria will be presented along with hypotheses regarding the genetic, epigenetic and environmental causes of neuropsychological outcomes. A method for neuropsychological screening of children and adults with these disorders has been recommended by the Genetics and Metabolism Psychology Network (www.GMPsych.org). The Uniform Assessment Method includes the BRIEF, BASC (for children), ABAS and the Beck Depression and Anxiety Inventories (for adults). Preliminary results on the validity and reliability of this method will also be shown. This symposium provides a rare opportunity to develop consensus regarding clinical and research evaluations of children and adults with rare metabolic and other genetic disorders so that collaborative studies and meta-analyses can be performed.
Correspondence: *Susan Waisbren, Boston Children's Hospital, 300 Longwood Avenue, Boston, MA 02115. E-mail: Susan.Waisbren@childrens.harvard.edu*

L. KRIVITZKY & N. AHMEW. Neuropsychological Functioning in Neontatal Onset Proximal Urea Cycle Disorders.
Objective: Urea Cycle Disorders (UCD) are a group or rare inborn errors of metabolism, in which the urea cycle fails to rid the body of excess ammonia causing toxic effects on the central nervous system. Hyperammonia is most problematic in the defects that are "proximal" in the urea cycle, CPS-I and OTC deficiency. The current study investigates individuals with the most severe form of these disorders (neonatal onset) in order to describe the natural history.
Participants and Methods: 24 subjects with neonatal onset CPS-I or OTC were collected through the UCDC Research consortium. The UCDC consists of 16 Sites across the US, Canada and Europe. Data regarding neuropsychological functioning is collected at baseline and set age points throughout the evaluation. Only 6 subjects had repeat testing available, so their most recent evaluation data was used in the study.
Results: Although a large portion of the study population (~50%) were found to have a significant developmental (< age 4) or intellectual disabilities (4 to adulthood), there was also a small group of children with IQ and basic academic scores close to or within the normal range. Closer inspection of this small group revealed neuropsychological weaknesses in motor skills, complex perceptual and visual-motor functioning, attention, executive functioning, and behavioral/emotional functioning.
Conclusions: Results indicate that children with neonatal onset CPS1 and OTC deficiency have varying degrees of impairment, from pro-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

found/severe disability to mild learning/behavioral problems. Although this is the largest cohort of children with these disorders that has been studied, it was too difficult to evaluate the relationships between medical variables and outcome due to the small number of subjects, broad age range, and wide variability in outcome.
Correspondence: *Lauren Krivitzky, 102 Irving Street, NW, NRH-Psychology Dept, Washington, DC 21114. E-mail: lkrivitz@cnmc.org*

J.B. EISENGART, A. AHMED, I. NESTRASIL, K. RUDSER, K. DELANEY, P. ORCHARD, J. TOLAR, R. ZIEGLER & E. SHAPIRO. How subtypes of the mucopolysaccharidoses differentially affect the brain: Neurobehavioral and structural distinctions.
Objective: The mucopolysaccharidoses (MPS disorders) are a group of lysosomal storage diseases that cause buildup of cell waste and decline in functions of nearly all organ systems, including the CNS. There are eight types of MPS disorders, but specific profiles of neurobehavioral functioning and brain structure among them are not well understood, due to their rarity, phenotypic variability and measurement challenges. We seek to identify and describe differences in brain functioning and structures among MPS Types I and II. We hypothesize each Type may be distinguished by functional and structural brain abnormalities.
Participants and Methods: Data were gathered from the first year of a prospective longitudinal study of MPS. We conducted neuropsychological testing and quantitative MRI studies of children with MPS Type I, severe and attenuated forms (MPSIH and MPSIA respectively), and attenuated MPS Type II (MPSII).
Results: Preliminary findings indicate overall IQs of MPSII were higher than both MPSI subtypes, and MPSIH was lower than MPSIA. MPSIH obtained lower scores than MPSII on measures of attention and executive functioning. Volumetric analysis indicated white matter volumes were smaller in MPSIH than MPSIA and MPSII. Corpus callosum volumes were smaller in MPSIH than MPSIA, which was smaller than MPSII. Correlations between neuropsychological testing and MRI volumes will be explored.
Conclusions: Preliminary findings suggest unique neurobehavioral and quantitative MRI profiles for each Type. While some findings may be confounded by treatment effects (e.g., preparatory regimen for bone marrow transplant), it is important to understand the neurobehavioral presentations of Types to guide evaluation and intervention.
Correspondence: *Julie B. Eisengart, University of Minnesota Medical Center, 420 Delaware St. SE, Minneapolis, MN 55455. E-mail: eisen139@umn.edu*

Z. RICHARD, K. LEISER, J.B. EISENGART, S. ROTHMAN, P. ORCHARD & E. SHAPIRO. Neuropsychological Functioning in Boys with Cerebral Adrenoleukodystrophy (CALD) Treated with Stem Cell Transplant.
Objective: Cerebral adrenoleukodystrophy (CALD) is an X-linked peroxisomal disorder characterized by elevated very long chain fatty acids and demyelination resulting in progressive neurologic/neuropsychologic impairment. Phenotypic variability can be observed based on the location of demyelination with a posterior presentation (80%) exhibiting diminished visual processing with progression to visual agnosia and eventual cortical blindness. The anterior frontal presentation (15-20%) presents with behavioral dysregulation and executive dysfunction, similar to that observed in ADHD and other externalizing behavior disorders. The standard of care treatment for CALD is hematopoietic stem cell (bone marrow or umbilical cord blood) transplantation (HCT). Analysis of 48 transplanted boys from 2000 to 2010 yielded findings consistent with previous research. Children transplanted at a younger age (<10 years) with better baseline neuropsychological performance and less demyelination fared better at follow-up. Likewise, children presenting as more advanced in their disease course with poorer baseline neuropsychological evaluations and greater demyelination often demonstrated very impaired neurologic/neuropsychologic functioning even in the context of successful transplant (full engraftment). Use of N-acetyl-l-Cysteine, a hypothesized neuroprotective agent did not enhance neurocognitive outcomes. There are challenges in conducting clinical research with CALD. These include assessment challenges, such as the need to make visual and behavioral accommodations (posterior vs. frontal involvement). In very impaired children, neuropsychological functioning is not quantifiable in the traditional sense. The precipitous nature of neuropsychological and neurological decline can be highly traumatic to the child and family and can affect testing. Further, data collection may be impeded such that severe impairments may preclude the child's being tested, resulting in missing data.
Correspondence: *Ziegler Richard, Division of Pediatric Clinical Neuroscience MMC 486, 420 Delaware St. SE, Minneapolis, MN 55455. E-mail: ziegl002@umn.edu*

J. SNOW, C.J. O'SHEA, E.A. WIGGS, M. PAO, J. SLOAN & C.P. VENDITTI. Neurocognitive assessment of patients with isolated methylmalonic acidemia (MMA) and cobalamin C (cblC).
Objective: Isolated methylmalonic acidemia (MMA) and cobalamin C (cblC) form a group of rare disorders (incidence 1/50,000 – 1/100,000) characterized by defective methylmalonyl-CoA metabolism and/or impaired cobalamin synthesis. Neurological manifestations, such as mental retardation, visual impairment, hearing loss, and movement disorders are frequently observed in these patients.
Participants and Methods: Neurocognitive evaluations were conducted on 37 patients (ages 2 to 35 years) with isolated MMA (22 mut0, 5 mut-, 6 cblA, and 4 cblB) and 15 with cblC. Patients were assessed with a Wechsler intelligence test, and/or the Vineland-II, as well as other measures.
Results: In our sample, 37% of the patients had a sensory deficit (visual or hearing impairment), 17% had a movement disorder (choreoathetosis or dystonia), and 13% had severe autistic behaviors. Seven cblC and 3 mut0 patients could not be assessed using a Wechsler test because of severe cognitive, sensory, and/or motor deficits. These individuals had a mean Vineland-II ABC of 46±16. Of the testable isolated MMA patients (n=34), we found an average IQ of 85±21, but there were substantial subgroup differences. The mut-, cblA, and cblB subgroups manifested mean IQs in the normal range (IQ=102±11), whereas mut0 (n=19) patients were in the borderline range (IQ=71±18). Testable cblC (n=8) patients had a mean IQ of 79±26 (range 42-130).
Conclusions: Our data indicate that there is substantial neurocognitive heterogeneity both within and between patient subgroups. mut0 and cblC patients generally have the worst cognitive outcomes. Severe cognitive, sensory, motor, and behavioral deficits pose a substantial assessment challenge to the clinician and researcher.
Correspondence: *Joseph Snow, NIMH Intramural Research Program, 10 Center Drive, Room 3n222, Bethesda, MD 20892. E-mail: JosephSnow@mail.nih.gov*

Poster Symposium: Neuropsychological traits as targets in genetic studies of ADHD

9:00–10:30 a.m.

A.E. DOYLE. Multivariate association of ADHD and neuropsychological phenotypes in the 3q13.21 and 22q12.3 regions.
Objective: A growing literature indicates that a wide range of higher-order neurocognitive traits index the underlying familial/genetic risk for attention-deficit/hyperactivity disorder (ADHD). Nonetheless, recent data underscore the partial rather than complete etiological overlap of ADHD and these associated neuropsychological traits. Thus, molecular genetic studies of ADHD that include these candidate endophenotypes as targets must determine whether identified risk variants influence the disorder, the neuropsychological traits or both.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: We recently conducted a multivariate genomewide linkage study of ADHD symptoms and measures of executive functions, verbal learning, speed of information processing and intellectual and academic functions. Based on a relatively novel method that determines the contribution of each phenotype to the overall result, analyses revealed two regions of interest. All neurocognitive traits and ADHD inattention symptoms showed suggestive linkage to a quantitative trait locus (QTL) on chromosomes 3q13.21 and only the Wisconsin Card Sorting Test showed suggestive linkage to a QTL on 22q12.3. We now further explore potential risk variants in these regions. First, we genotyped 264 SNP markers across five genes - DRD3, KALRN, LSAMP and CD47 on 31q3 and MAPK1 on 22q12. Second, we examined densely spaced markers from an available genomewide association data set.
Results: Although the results do not survive correction for multiple testing, markers in CD47, LSAMP and KALRN showed association with ADHD and neurocognitive phenotypes and are worthy of further investigation. Preliminary evidence from the 3q13.21 region suggests an additional gene of interest.
Conclusions: Such work shows the potential of endophenotypes for novel gene discovery for ADHD.
Correspondence: *Alysa E. Doyle, 185 Cambridge Street, CHGR-MGH, Boston, MA 02114. E-mail: aedoyle@partners.org*

R. SCHACHAR. Response inhibition as a candidate endophenotype for ADHD.
Objective: Attention deficit hyperactivity disorder (ADHD) is a highly heritable condition of childhood. Despite identification of several risk alleles and promising findings from genome-wide association studies, genetic findings are tentative and few genetic findings have been replicated. In a quest to increase the power and precision of genetic investigations in complex disorders like ADHD, researchers are seeking to identify disease endophenotypes — non-clinical markers of genetic risk. The most common endophenotypes under consideration in ADHD are neuropsychological measures of executive control. One of the most promising ADHD endophenotypes is response inhibition, the ability to stop a motor response when intentions or circumstances change.
Participants and Methods: This paper will describe the criteria for a valid endophenotype and the theoretical rationale for their use, the ways in which response inhibition is measured, evidence indicating that deficits in response inhibition characterize ADHD, and are heritable. The presentation will review the progress that has been made in understanding the genetics of ADHD using response inhibition as an endophenotype. The results of a nearly completed study of the genetics of response inhibition will be presented. In this study, 17,000 participants, ages 7-17 from the general community performed a measure of response inhibition (stop task) and provided a DNA sample via sputum.
Results: An extreme-trait genome-wide association study should be complete by the time of the presentation.
Conclusions: If carefully chosen, endophenotypes have the potential to increase the power of genetic research to identify susceptibility genes. If not carefully selected, endophenotypes may generate false negative and false positive results.
Correspondence: *Russell Schachar, 555 University Ave, Toronto, ON M5G 1X8, Canada. E-mail: russell.schachar@sickkids.ca*

J. KUNTSI, R. PINTO, N. ILOTT, A. WOOD & P. ASHERSON. Candidate gene associations with quantitative trait measures of ADHD and intermediate phenotypes.
Objective: Quantitative genetic studies find that ADHD is highly heritable (70-80%); and genetic influences on ADHD influence levels of ADHD symptoms throughout the population. As such, quantitative trait (QT) approaches to gene mapping, which correlate genetic variation with continuous measures of ADHD symptoms, provide complementary strategies to identify risk alleles. Additionally, intermediate phenotypes that share genetic influences with ADHD may represent etiologically less complex phenotypes. Our research using family and twin studies has identified objectively measured activity level (AL) and performance on specific cognitive tasks (reaction time variability (RTV) and commission errors (CE) on go-no-go and 4-choice reaction time (RT) task) as potential intermediate phenotypes, with moderate to high genetic overlap between ADHD and the various measures.
Participants and Methods: We genotyped 657 twin pairs aged 7-10 for previously identified ADHD risk alleles from: HTR1B, MAOA, SLC6A3, SNAP-25, TPH2, HTR2A, SLC6A2, AK124961; CDH13; HTR2A. Six phenotypes were derived from our quantitative genetic studies using ADHD symptoms, actigraph, go-no-go and 4-choice RT task data: Actigraph composite; ADHD (mean of parent and teacher), ADHD_AL composite (ADHD parent and teacher, actigraph), RTV, CE (composite slow and fast conditions); composite RT factor score (ADHD, RTV, mean RT).
Results: Preliminary analyses identify nominal association between noradrenergic transporter and measures related to ADHD, ADHD/AL composite and commission errors; and TPH2 and ADHD and ADHD/AL composite.
Conclusions: Our findings suggest that QT approaches including neuropsychological phenotypes provide alternative strategies for investigating ADHD risk alleles and determining aspects of their functionality, with specific findings implicating noradrenergic and serotonin signaling.
Correspondence: *Jonna Kuntsi, Institute of Psychiatry, Kings College De Crespigny Park, London SE5 8AF, United Kingdom. E-mail: jonna.kuntsi@kcl.ac.uk*

S. LOO. The additive effects of genes involved in brain efficiency and integrity on human intelligence.
Objective: Despite high heritability estimates, attempts to identify common genetic variants in genome-wide association studies (GWAS) that play a role in human intelligence or general cognitive ability have been largely unsuccessful.
Participants and Methods: We performed a genome-wide quantitative trait association analysis with a dense set of single-nucleotide polymorphisms (1M SNPs) and intelligence scores within a sample of 966 individuals that participated in family studies on the genetics of Attention-Deficit/Hyperactivity Disorder (ADHD). A two-step analysis strategy was implemented. The first was a traditional GWAS using single markers applied separately in the child (N=440) and parent (N=526) samples.
Results: In the child sample, significant SNPs were identified in the 22q12.3 region (p=7.00E-08) that were ~6kb from the gene, Ret Finger Protein-Like3 (RFPL3). Next, haplotype trend regression analysis with sliding 6-SNP windows was used with the whole sample. Several genes involved in synaptic signaling (GNAI2, GNA14, RASGRP3, SLC2A1; p-value range 3.57E-10 - 1.42E-08), neurodevelopment (SERPINE2, ASTN2; p-value range 2.50E-08-3.56E-08), and intellectual disability (DYM, C20orf23; p-value range 5.53E-08 – 9.59E-08) that reached genome-wide significance were identified. Analyses of individual SNPs within the significant haplotype blocks indicate that 16 genes are strongly associated with intelligence, three of which reach genome-wide significance: SLC2A1 (1.01E-08), GNAI2 (8.16E-08) and SERPINE2 (9.94E-08). The effects of the 16 genes are additive and negatively correlated with IQ (p=.002).
Conclusions: The GWAS results suggest that there is a strong and additive effect of genes that influence brain development, integrity and efficiency on intelligence.
Correspondence: *Sandra Loo, Semel Institute for Neuroscience and Human Behavior and David Geffen School of Medicine, UCLA, Los Angeles, CA 90095. E-mail: sloo@mednet.ucla.edu*

ADHD/Attentional Functions

A. DOYLE, R. SCHACHAR, J. KUNTSI, E. WILLCUTT & S. LOO. Neuropsychological traits as targets in genetic studies of ADHD.
Symposium Description: Neuropsychological phenotypes will undoubtedly feature prominently in the next generation of molecular ge-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

netic studies of psychiatric disorders, including attention-deficit/hyperactivity disorder (ADHD), schizophrenia and bipolar disorder. Interest in neuropsychological traits thus far has predominantly been driven by their potential to aid in revealing the elusive genetic bases of these complex conditions. The presence of higher-order neuropsychological impairments in affected individuals and their unaffected relatives underscores their etiological overlap with these disorders. Thus, relevant neuropsychological traits, (which are themselves heritable) have potential to serve as "endophenotypes" that may increase power by parsing heterogeneous constructs and more closely indexing underlying neurobiology. Yet, neuropsychological traits are also important targets of genetic investigation in their own right given limited options for treatment and the fact that impaired higher-order cognition yields poor functional outcome, over and above diagnosis, for a range of disorders. The current symposium highlights work from groups across the US, Canada and United Kingdom that are studying the relationship between genes, neuropsychological traits and ADHD. Presentations include behavioral and molecular studies investigations of ADHD and response inhibition, errors of commission, reaction-time variability, reading and IQ. These projects are laying the groundwork for large-scale collaborative investigations by these and other investigators that will capitalize on genomewide association data and novel statistical and molecular methods. Such work should reveal previously unknown neurobiological risk mechanisms underlying ADHD and its co-occurring neuropsychological impairments that may translate into new treatment targets and revised conceptual models.

Correspondence: *Alysa Doyle, PhD, Psychiatry/ Center for Human Genetics Research, Massachusetts General Hospital, 185 Cambridge Street, Simches CPZN 6238, Boston, MA 02446. E-mail: aedoyle@partners.org*

E.G. WILLCUTT, R.S. BETJEMANN, L.M. MCGRATH, R.K. OLSON, J.C. DEFRIES & B.F. PENNINGTON. Using twins to understand the etiology and neuropsychology of comorbidity between ADHD and learning disorders.

Objective: Attention-deficit/hyperactivity disorder (ADHD) is frequently comorbid with reading disability (RD) and math disability (MD), but the etiological and neuropsychological underpinnings of these associations are not well understood.

Participants and Methods: Univariate twin analyses were used to examine the etiology of individual differences in seven neuropsychological processes, and multivariate analyses were conducted to identify the shared and unique neuropsychological predictors of ADHD, RD, and MD. Twins with DSM-IV ADHD (N = 308), RD (N = 420), MD (N = 225) and a control sample without any of these disorders (N = 900) completed an extensive battery of neuropsychological measures as part of their participation in the Colorado Learning Disabilities Research Center twin study.

Results: Exploratory and confirmatory factor analyses indicated that the neuropsychological battery assessed seven dimensions of functioning: phonological awareness, response inhibition, response variability, verbal working memory, spatial working memory, processing speed, and naming speed. RD was uniquely predicted by naming speed, MD was independently predicted by spatial working memory, and ADHD was predicted by response inhibition. Shared genetic influences on verbal working memory and phonological processing contributed to comorbidity between RD and MD, and weaknesses in processing speed and response variability were a genetically-mediated shared risk factor that accounted for comorbidity between all three disorders.

Conclusions: Taken together, these results indicate that the etiologies and neuropsychologies of RD, MD, and ADHD are complex and multifactorial, and illustrate how etiologically-informative methods can help to dissect the shared and unique neuropsychological risk factors for correlated disorders.

Correspondence: *Erik G. Willcutt, Muenzinger Hall D313C, University of Colorado, Boulder, Boulder, CO 80309. E-mail: Erik.Willcutt@Colorado.EDU*

Poster Session 6: Behavioral Neurology, Rehabilitation, Language and Speech Disorders, Stroke

9:00–10:30 a.m.

Behavioral Neurology

R.C. CHAN, T. XU, H. LEE, Q. ZHAO, H. LUI, Y. WANG, C. YAN, X. CAO & Y. WANG. A structural equation modeling analysis on neurological soft signs and neurocognition in healthy elder people.

Objective: Neurological abnormalities have been reported in normal aging population. However, very little is known about the relationship between neurological soft signs and neurocognitive function in healthy elder people. The current study aimed to examine the underlying relationships between neurological soft signs and neurocognition in a group of healthy elderly.

Participants and Methods: One hundred and eighty healthy elderly participated in the current study. Neurological soft signs were evaluated with the subscales of Cambridge Neurological Inventory. A set of neurocognitive tests was also administered to all the participants. Structural equation modeling was adopted to examine the underlying relationship between neurological soft signs and neurocognition

Results: No gender effect was found in neurocognitive function performances and neurological soft signs. The model fitted well in the elderly and indicated the moderate associations between neurological soft signs and neurocognition, specifically verbal memory, visual memory and working memory.

Conclusions: The neurological soft signs are more or less equivalent to capture the same information done by conventional neurocognitive function tests in the elderly. The implication of these findings may serve as a potential neurological marker for the early detection of pathological aging diseases or related mental status such as mild cognitive impairment and Alzheimer's disease.

Correspondence: *Raymond C. Chan, Ph.D., Institute of Psychology, Chinese Academy of Sciences, 4A Datun Road, Beijing 100101, China. E-mail: rckchan@psych.ac.cn*

V. DRAGO, P. FOSTER, K. HEILMAN, D. ARICO', J. WILLIAMSON & R. FERRI. The Influence of Sleep on Creativity.

Objective: Sleep has been shown to enhance creativity, but the reason for this enhancement is not entirely known. There are several different physiological states associated with sleep. In addition to rapid (REM) and non-rapid eye movement (Non-REM) sleep, the Non REM sleep can be broken down into Stages (1-4), that are characterized by the degree of EEG slow wave activity. In addition, during Non-REM sleep there are transient but cyclic alternating patterns (CAP) of EEG activity and these CAPs can also be divided into three subtypes (A1-A3) according to speed of the EEG waves. The purpose of this study was to learn the relationship between sleep, CAP activity and creativity.

Participants and Methods: The participants were 8 healthy young adults (4 women), who underwent 3 consecutive nights of polysomnographic recording and took the Abbreviated Torrance Test for Adults (ATTA) on the 2 and 3rd mornings after the recordings.

Results: There were positive correlations between Stage 1 and 4 of Non-REM sleep and some measures of creativity as well as a negative correlation between REM sleep and originality. During Non-REM sleep the CAP rate, which in young people is primarily A1, also correlated with originality.

Conclusions: Non-REM sleep is associated with low levels of cortical arousal and low arousal allows access to the remote associations that are critical for creative innovations. In addition, A1 CAP activity reflects frontal activity and the frontal lobes are important for divergent thinking, also a critical aspect of creativity.

Correspondence: *Valeria Drago, IRCCS Fatebenefratelli, via Pilastroni 4, Brescia 25123, Italy. E-mail: vdrago@fatebenefratelli.it*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. FALCHOOK, J. WILLIAMSON & K. HEILMAN. Awareness of Limb Kinetic Apraxia in Parkinson Disease.

Objective: Limb kinetic apraxia refers to a loss of deftness of fine finger movements and is a characteristic of PD that is independent of bradykinesia and rigidity. We were interested to learn if limb kinetic apraxia is associated with a loss of motor awareness in PD.

Participants and Methods: To test this hypothesis, we enlisted 12 normal right handed participants between the ages of 50-80 and 12 right handed participants with PD of similar ages. They were asked to perform a coin rotation test and also asked to rate, on a vertical Likert scale, how they expected to do before attempting this task with each hand and to rate how they think they did after the task was complete.

Results: Results in the PD group were similar to results seen with normal controls, after exclusion of one outlier in the PD group. Pre-test estimates did not significantly correlate with performance of the coin rotation test for either hand. Post test assessments in both groups showed significant correlations with coin rotation times for the right hand ($p<0.05$) but not the left hand.

Conclusions: We refer to a loss of ability to self-evaluate impaired motor performance as anterograde anosognosia and our study did not show the participants with PD to have an anterograde anosognosia for limb kinetic apraxia, although performance of the outlier in the PD group suggests that different results may be seen in patients with PD with more advanced disease.

Correspondence: *Adam Falchook, University of Florida, UF HSC, Dept of Neurology, Box 100236, Gainesville, FL 32610-0236. E-mail: Adam.Falchook@neurology.ufl.edu*

M. MISHRA, J. WILLIAMSON & G. FINNEY. Recognition Test for Optional Cued Recall on the Montreal Cognitive Assessment.

Objective: Develop normative data for a recognition task to replace the current optional cued recall section of the Montreal Cognitive Assessment (MoCA). Forced choice paradigms are less sensitive to neurological change than yes/no recognition and may offer better clinical data in contexts that the MOCA is often employed.

Participants and Methods: We have replaced the category cue/multiple choice cue with a Yes/No recognition task, allowing generation of a discrimination index (DI). We tested 100 healthy elderly participants aged more than 40 years and without history of neurological or psychiatric disease. Participants were screened with the Mini-Mental State Examination (MMSE). They also were administered items from the MoCA. After performing the free delayed recall task from the MoCA, the participants were asked to perform a yes/no recognition task consisting of 10 words, 5 targets and 5 foils semantically related to the targets selected from the current optional multiple choice section of the MoCA.

Results: Of the 100 participants, 85 had MMSE 26 and a mean DI of 4.6 ± 0.6, and 15 had MMSE < 26 with a DI of 4.2 ± 0.8, a statistically significant difference ($p=0.012$). The 26 cut-off was used to resemble the normal group in the original MoCA study.

Conclusions: This is the first normative data provided for a cuing task for the MoCA. Our substitute cuing task provides a simple recognition task that may be more sensitive than the forced choice paradigm currently used. Future research will see if this recognition task distinguishes Alzheimer's and vascular pathologies.

Correspondence: *Monika Mishra, MBBS, Neurology, University of Florida, L3-100 Mcknight Brain Institute, Newell Drive, Gainesville, FL 32610. E-mail: monika.mishra@neurology.ufl.edu*

M. MISHRA, J. WILLIAMSON & G. FINNEY. Utilization of the Montreal Cognitive Assessment PLUS Semantic Fluency Task in the Clinical Setting.

Objective: The Montreal Cognitive Assessment (MoCA) is a recently developed tool to screen for cognitive dysfunction. It includes phonemic fluency (LFT), but no semantic fluency task (SFT). Sensitivity to cognitive dysfunction may be enhanced with inclusion of a semantic fluency task. We performed a semantic fluency task (SFT) with the MoCA and created a language score (ratio of SFT to LFT), to develop a preliminary cutoff for additional clinical research on changes in sensitivity to different classes of neurodegenerative disease using these simple rapid screens.

Participants and Methods: We performed the MoCA and SFT on 100 participants ages >40 without previous medical or neurologic diagnosis. Participants were normal healthy individuals who accompanied patients in the neurology clinic at the University of Florida. We calculated a ratio score of the SFT and the LFT.

Results: The mean ratio of SFT for naming animals in 60 seconds and LFT for the letter "F" was 1.57 +/-0.66. The average SFT score was 20.58 +/- 5.62, and the average LFT score was 14.34 +/- 4.42.

Conclusions: Category fluency is preferentially impacted by several neurodegenerative diseases (and normal aging) in comparison to letter fluency. Including a category fluency measure as part of the MoCA may enhance referral sensitivity. As expected, normals performed better on the semantic fluency task than on the letter fluency task (ratio = 1.57). We intend to follow-up with referral/disease sensitivity research on this MoCA administration, using a ratio-cutoff of 0.58 (1.5 SD below the mean) as a "red flag" score for additional assessment.

Correspondence: *Monika Mishra, MBBS, Neurology, University of Florida, L3-100 Mcknight Brain Institute, Newell Drive, Gainesville, FL 32610. E-mail: monika.mishra@neurology.ufl.edu*

L. NAHUM, A. WAHLEN, R. PTAK & A. SCHNIDER. Disorientation is Associated with Impaired Reality Filtering in Amnesia.

Objective: Reality filtering is the capacity to distinguish between memories that relate to ongoing reality and memories that do not. The mechanism underlying this capacity appears to be extinction, the ability to learn that a previously relevant anticipation no longer applies. Two previous studies demonstrated that failure of extinction (Nahum et al., Biol Psychiat 2009; 65: 966-72) and suppression of the interference of currently irrelevant memories (Schnider et al., Brain 1996; 119: 1627-32) are strongly associated with disorientation in amnesic patients. The aim of the present study was to extend these results.

Participants and Methods: The same two experimental tasks (memory selection task and extinction task) and a questionnaire of orientation were administered to 23 amnesic patients. The patients further performed control tasks of executive functions (e.g., Go/No-Go task) and a variant of the extinction task, in which the necessity to abandon the previously valid anticipation was signaled by the absence of the object instead of the appearance of another object.

Results: Results confirmed that failure of extinction and memory selection strongly correlated with disorientation, whereas failures of association learning, item learning, or executive functioning (incl. Go/No-Go) had no predictive value for disorientation. Both versions of the extinction task provided similar results.

Conclusions: The findings support the Reality filter hypothesis which states that the human sense of present reality is strongly and specifically associated with the ability to suppress the interference of currently irrelevant memories and extinction capacity.

Correspondence: *Louis Nahum, Geneva University Hospitals, 26 Avenue de Beau-Séjour, Geneva 1211, Switzerland. E-mail: louis.nahum@hcuge.ch*

M. WOODS, K.D. WHITE, J. WILLIAMSON, C.G. MAITLAND & K.M. HEILMAN. Case Study: Shifts in Hemispatial Attention Over Time with Repeated-Trials Line Bisection.

Objective: After weeks or months, some patients convert from contralesional to ipsilesional neglect. That is, the allocation of sensory attention and/or action-intention changes over time. The purpose of this study is to learn how the spatial allocation of attention/intention changes as a function of repeated trials in each of 3 body-centered spatial locations.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: A 48 year old, right handed woman, 4 months after a large right hemisphere stroke, was administered sequential line bisection tests in left, right and center body-centered space. Tests were conducted in 3 blocks of 30 trials for each location, the 9 blocks total presented in quasi-random order for location.
Results: Across repeated trials, left-spatial neglect was most consistent in right body space compared with center and left spaces. Linear regressions across trials at each location showed: in the left and center spatial conditions there were significant shifts from ipsilesional deviation to contralesional deviation ($p<.05$); however, on the right there was no significant change with repeated trials.
Conclusions: These results suggest that the spatial allocation of attention/intention changes with repetition and with location in body-centered space. Initially, ipsilesional neglect was found in the left and center while contralesional neglect was found in the right space. However, with repeated trials there was a shift to contralesional neglect in the left and center spaces, but stability on the right. Elucidating the mechanism (e.g., fatigue or habituation) that accounts for this asymmetrical change with repeated trials will require additional research.
Ths study was supported by a scholarship from the AAN.
Correspondence: *Mary Woods, Florida State University College of Medicine, 302 Stadium Dr., Apt. 103, Tallahassee, FL 32304. E-mail: mew09h@med.fsu.edu*

ÅSA. HAMMAR, G. ÅRDAL & K. HUGDAHL. Normalized Cognitive Impairment in Effortful Processing in Major Depressive Disorder Results From a Ten Year Follow Up Study.
Objective: The relation between depression and cognitive impairment in the acute phase is well known. However, few studies have followed the same patient group over time to examine how this impairment evolves in relation to symptom reduction and remission. The aim of this study was to investigate cognitive functioning, within a neurocognitive experimental setting, in a short and long -term follow up, in patients with unipolar recurrent major depressive disorder (MDD). Automatic and effortful information processing was investigated with a experimental visual search paradigm.
Participants and Methods: Thirty individuals; 15 patients diagnosed with recurrent MDD and 15 individually matched controls were tested at three occasions; in acute phase, after six months, and after ten years. Mean symptom score as measured by the Hamilton Depression Rating Scale (HDRS) were 22 in the acute phase of illness, 8.6 in the six months follow up and 5.5 in the 10 year follow up, indicating that the patient group were in symptom reduction in the short term follow up and in remission in the long-term follow up.
Results: The results showed that the depressed patients performed equal to the control group on trials requiring automatic information processing at all three test occasions. However, the patients were impaired compared to the control group on trials requiring effortful information processing in the acute phase, and the impairment remained also after six months, despite significant improvement in their depression scores. Further, the results showed no differences between groups in effortful information processing at the 10 –year follow up.
Conclusions: The findings in the present study indicate a normalization of cognitive functioning in a long term perspective.
Correspondence: *Åsa Hammar, Dr, IBMP, University of Bergen, Jonas Lies vei 91, Bergen 5097, Norway. E-mail: aasa.hammar@uib.no*

Cognitive Intervention/Rehabilitation

J. ABRISQUETA-GOMEZ, A. TURCHETI PINTO DE MOURA, E. DE OLIVEIRA P. GUIMARÃES, E.B. PIOVEZAN & O.A. BUENO. Practice Effects: Implications for Neuropsychological Interventions in Alzheimers disease.
Objective: Improvements in cognitive performance in healthy elderly, resulting from serial assessments in clinical trials may be due to Effects of Practice (EP), generated by previous exposure to the same stimulus and procedure. The purpose of our study was to determine whether neuropsychological interventions (NI) amplify the magnitude of EP in patients with Alzheimer's disease (AD)
Participants and Methods: Participated in this study 27 subjects, 15 healthy elderly subjects (HS), 12 patients with AD early stage in use of drug therapy. All subjects were submitted to a Neuropsychological evaluation that included Mini-Mental State Examination (MMSE) and the Neuropsychological Battery NEUROPSI (which examines several cognitive functions). After evaluation AD patients were randomly divided into two groups of six members each; AD1 and AD2. The group AD1 participated in a NI, where they were trained (12 months twice a week) with Cognitive Stimulation Techniques. All groups were reassessed after 12 months with the same neuropsychological battery.
Results: The groups did not differ in variables age, schooling. Variance analyses of MMSE and NEUROPSI scores showed difference inter and intragroup in all groups after 12 months. The differences were more significant in NEUROPSI where AD1 group showed significant improvement score (9 points) followed by the HS (3 points), with significant loss of score in the AD2 (12 points).
Conclusions: Our results are preliminary and serve to understand that patients with AD also show EP when stimulated with neuropsychological techniques. Other studies are needed to understand the variables that affect the magnitude of EP in patients with AD.
Correspondence: *Jacqueline Abrisqueta-Gomez, PhD, Brain Checkup - Consulting and Research in Cognitive Neurosciences., Rua Rubem Berta 1499, Sao Paulo 04074-010, Brazil. E-mail: jacky_ag@hotmail.com*

M.T. WAGNER, L.A. BRENNER & A.J. WALKER. Application of Technological Innovations for Neurorehabilitation: Case Examples.
Objective: Recent advances in portable technology have the potential to dramatically improve quality of life for patients with circumscribed neurocognitive deficits. The creative application of widely-available technologies (e.g., iPads, iPhones, Smartpens, personal navigation systems), is a highly efficacious alternative to traditional cognitive retraining neuropsychological methodology.
Participants and Methods: Case #1: A 40-year-old female being followed with a nonenhancing 1.3 cm infiltrative left medial temporal oligodendroglioma and intractable seizures. Case #2: A 32-year-old male presenting with chronic symptoms s/p head injury with encephalomalacia with adjacent subcortical gliosis within the left inferior temporal gyrus and medial left occipital lobe. Neurocognitive exam was performed and intervention prescribed with patient follow-up.
Results: Case #1: The prominent neurobehavioral syndrome was lateralized episodic memory dysfunction resulting in poor attention during meetings and putting her job in jeopardy. Livescribe smartpen technology was prescribed with beneficial effect noted in follow-up. Smartpens capture and link written notes to a digital audio recording, enabling the user to review notes with the entire audio recording on a PC. Case #2: A profound neurobehavioral syndrome of alexia without agraphia was found. Computer-based text-to-speech for reading and social networking was prescribed. Noncompliance was noted in follow-up.
Conclusions: These case reports illustrate the potential impact and challenges of simple, cost-effective technological solutions to problems of daily living associated with focal neurobehavioral syndromes. Improved integration of technology with neuropsychological practice for both diagnostics and intervention is discussed.
Correspondence: *Laurie A. Brenner, M.A., Neurology, Medical University of South Carolina, MUSC Rutledge Tower, Charleston, SC 29403. E-mail: brenner@musc.edu*

B. BUTLER, G. ESKES, R. LYONS & P. EBERT. 'Making the Most of Your Memory': A Pilot Study of a Cognitive Strategy Training Group for Community-dwelling Stroke Survivors.
Objective: Problems with attention, memory and executive functions have been shown to significantly interfere with physical recovery, independence, community re-integration, and quality of life after stroke. Rehabilitation through individualized training of

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

compensatory strategies and/or cognitive skills-based training can be effective, but is time-intensive, and access to health care professionals with the necessary specialized training is often limited. Thus, we have undertaken a randomized, controlled, cross-over trial of a group-based cognitive rehabilitation program for community-dwelling stroke survivors.
Participants and Methods: Participants (n=8) who were enrolled and randomized to either the Early Intervention or Late Intervention group were at least six months post-stroke, were living in the community, and had subjective cognitive complaints. Individual functional goals were set with each participant to provide a focus for their participation in the 8-week group-based cognitive rehabilitation program. Outcome measures including subjective measures of cognitive functioning, mood, and quality of life, as well as objective tests of cognitive performance were collected at baseline and at three month intervals for nine months.
Results: Group rehabilitation improved mood and satisfaction with daily functioning, cognition and quality of life. Some gains were maintained over three months; however, satisfaction with cognitive functioning declined at follow-up. Goal performance and goal satisfaction improved at final assessment.
Conclusions: Group-based cognitive rehabilitation had a positive influence on the mood and life satisfaction of chronic stroke survivors.
Supported by the Dalhousie Psychiatry Research Fund, the Atlantic Health Promotion Research Centre, and the IWK Health Centre.
Correspondence: *Beverly Butler, Ph.D., Department of Psychiatry, Dalhousie University, 8th floor, Abbie J Lane Bldg, 5909 Veteran's Memorial Lane, Halifax, NS B3L 1S3, Canada. E-mail: DrBevButler@gmail.com*

T. CONWAY, D. SZELES, F. BOWDEN, S. UHAZIE, J. GILBERT, C. HAMM, P. PRILUTSKY, B. CROSSON & L. GONZALEZ-ROTHI. Multi-modal intensive Treatment (MMiT) of Phonological Alexia: Unique Behavioral and fMRI Outcomes.
Objective: INTRODUCTION: Phonological alexia commonly endures post-stroke in adults with aphasia and is characterized by impaired reading of pseudowords versus orthographically irregular words. We previously reported a multi-modal intensive treatment program (MMiT) altered the degree of alexia in some participants with chronic aphasia by improving phoneme production, sublexical phonological processing, and/or pseudoword reading, with some generalization to improved reading of orthographically irregular words. Currently, we explored a new revision of MMiT's impact on sublexical phonological processing, pseudoword reading and reading of orthographically regular words. From fMRI of overt pseudoword reading we aimed to determine if a common pattern of neural activity was present in treatment responders.
Participants and Methods: PARTICIPANTS & METHODS: Through a mixed-effects, single-subject research design with replication across participants, nine adults with aphasia and phonological alexia received 120 hours of 1:1 treatment and completed repeated probes, standardized assessments, and fMRI sessions (pre-treatment, post-treatment and at 3-months follow-up).
Results: RESULTS: Some participants improved sublexical phonological processing, pseudoword reading and reading of orthographically regular words, with maintenance at 3-months. fMRI of overt pseudoword reading identified unique patterns of neural activity from pre to post-treatment and at 3-months follow-up (e.g. perilesional and/or right-hemisphere neural reorganization).
Conclusions: CONCLUSIONS: MMiT improves the degree of phonological alexia for some participants, but the positive response to treatment and concomitant changes in neural activity is unique between participants. Treatment data from additional participants may identify if relationships exist between lesion characteristics, pre-treatment levels of language skills and pre-treatment patterns of fMRI activity, which may help identify characteristics of treatment responders.
Correspondence: *Tim Conway, Ph.D., Clinical and Health Psychology, VAMC/BRRC & Univ of Florida, 1601 SW Archer Rd (151A), Gainesville, FL 32608. E-mail: twc@phhp.ufl.edu*

D. COOPER, R. PERNA & A. JACKSON. Education and Neurorehabilitation Outcome: A Rural Sample.
Objective: Many studies have investigated the association between higher education and increased cognitive reserve. Typically these samples are taken from predominately urban populations (Hall, 2007), and/or focus on response to natural decline (Tucker-Drob, 2009), as opposed to acquired injury. Our hypothesis is that the cognitive resilience effects provided by education will remain in a rural population of patients with a variety of ABIs.
Participants and Methods: Patients (n=296) at a predominately rural neurorehabilitation center who showed improvement from treatment were stratified according to level of education (72 = Less than HS, 153 = HS Degree, 71 = More than HS). The groups did not differ significantly in gender or length of treatment or severity of injury (mild, moderate, or severe). They differed significantly in age, but only within a range of 7 years (M=40.42, 42.80, 47.61).
Results: Level of education correlated significantly with all MPAI indices at admission and discharge (-.19 Λr_s Λ-.29, p< .001). MANOVA showed that those with increased levels of education are more likely to have lower and better MPAI indices at both admission and discharge (F (16, 542) = 2.49, p=.001). Level of education also correlated significantly with a better living status both at admission (r_s= -.24, p<.001) and discharge (r_s=-.20, p=.001).
Conclusions: The neuroprotective benefits provided by education appears to be consistent in rural populations and in injuries not associated with normal cognitive decline.
Correspondence: *David Cooper, MA, WestSide NeuroRehabilitation Services, Goodwill Industries of Northern New England, 618 Main St., Lewiston, ME 04240. E-mail: dccooper@gmail.com*

R.V. DYE, K. MILLER, J. KIM, J. LEA, J. WONG, E. O'TOOLE & G. SMALL. Memory Improves With Extended Use of Computerized Brain Fitness Program Among Older Adults.
Objective: Age-related memory decline affects approximately 40% of older adults and is characterized by self-perception of memory loss and decline in memory performance. Studies have suggested that engaging in mental activities can help to improve memory among older adults. The purpose of the study was to determine if a six-month memory program of computerized brain fitness improved memory in older adults.
Participants and Methods: A convenience sample of 33 participants (mean age 81, 69% female) was recruited from retirement communities. The intervention consisted of 30-minute sessions daily, five sessions per week, with testing at baseline and post-intervention at six months.
Results: Participants were separated into two groups: those who spent 20 sessions or less on the computerized brain fitness program (Group 1, N=8), and those who spent 85 sessions or more (Group 2, N=25). Post-pre change scores were calculated on subjective memory rating and on an objective memory measure. An independent t-test of post-pre change scores were examined between groups to determine if subjects improved in memory performance. Results showed significant improvement for Group 2 in objective memory performance compared to Group 1, specifically in delayed recall (change: M=-.23, SD=.80 for Group 1; M=.44, SD=.87 for Group 2, p = 0.07). For subjective memory domain, participants in Group 1 rated poorer memory for recalling tasks than Group 2 (change: M=-7.22, SD=5.76 for Group 1, M=-1.12, SD=5.33 for Group 2, p = 0.01).
Conclusions: This study suggests that extended use of a computerized brain fitness program enhances objective and subjective memory performance.
Correspondence: *Richelin V. Dye, M.A., Loma Linda University, 3600 Wheeler Street, Apt 2237, Dallas, TX 75209. E-mail: richelinv@gmail.com*

S.C. ALLEN, K.R. WILSON & G. ESKES. Making Working Memory Better: Role of the Central Executive.
Objective: Working memory (WM) forms the scaffolding for most of cognitive behaviour and is often affected in neurological disease, thus

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

effective treatments are needed. Working memory consists of a central executive (CE) that directs two maintenance buffers (verbal and spatial). Practice on WM tasks improves performance, but the locus and thus generalizability of improvement in WM capacity are unclear. The purpose of this study was to examine the locus of training effects in WM performance as measured in the n-back task. We hypothesized that training would improve CE performance, and therefore generalize between domains (e.g., spatial & verbal).
Participants and Methods: Eleven healthy young adults trained once a week, for three weeks, on either a Verbal or a Spatial task at both 0- and 2-back load via a web interface. Verbal and spatial tasks were completed at baseline and post-training and reaction time (RT) and accuracy data (error rate, ER) were collected.
Results: Training did not affect RT or ER on either the verbal or spatial 0-back tasks. For the 2-back tasks, spatial training significantly reduced RT on both verbal and spatial tasks, while verbal training reduced RT on only the verbal task. Both Verbal and Spatial trainers were more accurate for the verbal task and more accurate for the 0- than the 2-back task.
Conclusions: These results suggest that training on the spatial task may exert effects on the CE that generalize to the verbal task. The lack of generalizability from verbal training suggests some domain specificity, however.
Correspondence: *Gail Eskes, Ph.D., Psychiatry, Dalhousie University, 5909 Veterans Memorial Lane, Rm 4080 A.J.Lane Bldg, Halifax, NS B3H4B8, Canada. E-mail: gail.eskes@dal.ca*

P.L. FAZELI. Speed of Processing Training in Adults with HIV.
Objective: Those aging with HIV are more vulnerable to neuropsychological and functional deficits. In this study, 52 middle-aged and older adults (Mage = 51.5 years; range 40.7 – 70.6 years) with HIV were randomly assigned to a visual speed of processing training condition or a no-contact control condition to determine the effectiveness of this intervention.
Participants and Methods: In the visual speed of processing training condition, participants received 10 hours of computerized visuo-cognitive exercises. At baseline and posttest, the following measures were administered: Useful Field of View (UFOV®) Test, Wisconsin Card Sorting Test, Finger Tapping Test, and the Timed Instrumental Activities of Daily Living (TIADL) Test.
Results: Controlling for baseline performance, ANCOVAs were used to examine treatment effects on these measures between the two groups at posttest. Treatment effects were detected on UFOV®, $F(2,40) = 5.61$, $p = .022$; the visual speed of processing training group improved on their UFOV® performance. Furthermore, transfer of training was observed on the TIADL Test, $F(2, 37) = 4.104$, $p = .05$; the visual speed of processing group improved their speed and accuracy in performing these laboratory instrumental activities of daily living. Next, we examined the relationship between the cognitive measures and performance on the TIADL Test; only baseline ($r = .52$, $p = .001$) and posttest ($r = .48$, $p = .001$) UFOV® scores were significantly related to baseline and posttest TIADL performance, respectively.
Conclusions: This study emphasizes that computerized visual speed of processing training may benefit neuropsychological and everyday functioning in this growing population.
Correspondence: *Pariya L. Fazeli, M.A, Psychology-Graduate School, University of Alabama at Birmingham, 3454 Manor Lane APT 106, Birmingham, AL 35209. E-mail: plfazeli@uab.edu*

M.D. GRILLI & E.L. GLISKY. Enhancing Cued Recall in Memory-Impaired Individuals: the Mnemonic Advantage of Self-Imagining.
Objective: Recent research has demonstrated that knowledge of oneself is preserved in memory-impaired individuals with neurological damage. Therefore, cognitive strategies that capitalize on encoding and retrieval mechanisms related to self knowledge may be particularly effective at enhancing memory in individuals with neurologically-based memory deficits. The present study investigated the effect of "self-imagining," or the imagining of an elaborative event from a personal perspective, on cued recall.
Participants and Methods: Sixteen memory-impaired individuals with neurological damage and sixteen healthy controls intentionally encoded word pairs under four separate conditions: visual imagery, semantic elaboration, other person imagining, and self-imagining. Memory-impaired participants completed cued recall memory tests 2-min and 30-min after each encoding condition, whereas healthy controls completed a single cued recall memory test which was administered 20-min after presentation of all four encoding conditions.
Results: Findings demonstrated that self-imagining led to better performance in comparison to visual imagery, semantic elaboration, and other person imagining in the memory-impaired individuals at both immediate and delayed cued recall and in healthy controls. Additional analyses revealed that the "self-imagination effect (SIE)" in the memory-impaired individuals (.12) was equivalent to the healthy controls (.09), and that the magnitude of the SIE was greater in memory-impaired individuals with poorer memory functioning as measured by neuropsychological testing.
Conclusions: These results indicate that self-imagining provides a powerful and relatively long-lasting mnemonic advantage in memory-impaired individuals, irrespective of the severity of memory deficit, and suggest that self-imagining may tap into mnemonic mechanisms related to the self, which may be intact in memory-impaired individuals.
Correspondence: *Matthew D. Grilli, University of Arizona, 1503 E University Blvd, PO Box 210068, Tucson, AZ 85721. E-mail: mdgrilli@email.arizona.edu*

M.D. GRILLI, C.P. MCFARLAND & E.L. GLISKY. Imagining from a Field Perspective Enhances Recognition Memory more than Imagining from an Observer Perspective.
Objective: The imagination of an elaborative event may be done from one of two perspectives: a "field" perspective which requires imagining the event through one's own eyes or an "observer" perspective which involves imagining seeing oneself in the event from an impersonal vantage point. Previous research has demonstrated that autobiographical events retrieved from a field perspective include more emotion, physical sensations, thoughts, and feelings, whereas autobiographical events retrieved from an observer perspective include more spatial details, physical actions, and details about one's physical appearance. However, to our knowledge, no study has investigated whether taking a field or an observer perspective when encoding an event differently affects subsequent episodic memory for the event.
Participants and Methods: In the present study, 16 participants intentionally encoded neutral and emotional sentences under two separate instructions: for half the sentences, participants were instructed to imagine the event described by the sentence from a field perspective and for the other half participants were instructed to imagine from an observer perspective. After a 24-hour delay, participants completed a yes-no recognition memory test for the sentences.
Results: Results demonstrated that events imagined from a field perspective were better recognized than events imagined from an observer perspective. Neutral and emotional materials were remembered equivalently, irrespective of perspective taken.
Conclusions: These findings demonstrate that taking a field perspective when imagining provides a mnemonic advantage in recognition memory for emotional and neutral materials. Furthermore, these results may have implications for recent research that has shown that imagining events from a personal perspective enhances memory in memory-impaired individuals
Correspondence: *Matthew D. Grilli, University of Arizona, 1503 E University Blvd, PO Box 210068, Tucson, AZ 85721. E-mail: mdgrilli@email.arizona.edu*

A. HUERTA, C.R. JAYARO & S. ALONZO. Cognitive Decline and Theoretical Insights On Two Patients with Concurrent Epileptic Seizures and Pseudoseizures Studies.
Objective: From the nineteen century reports on hysteria cases and theoretical insights on unconscious processes and physical manifestations that seemingly mimetize neurological conditions many lines have been written but not definite conclusions have been drawn about pseudoseizures. A MEDLINE search has revealed how obscure this field still is, with a lot of controversy and little empirical evidence and consensus.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: This paper's purpose is to show clinical and neuropsychological data from two patients suffering from concurrent Epilepsy and Pseudoepilepsy.
A multidisciplinary approach applying: Behavioral Under Suggestion-Induced Pseudoseizures Extinction Therapy (BUSIPET), Insight Psychotherapy and Pharmacotherapy is here described.
Results: Both patients showed partial remission of the frequency of seizures with this approach.
Conclusions: On the other hand, these patients showed cognitive deficits, complex partial seizures with behavioral features (depression, irritability, aggression, self inflicted injuries), suggestionability and cortical paroxistic activity as features that they both showed in common. Finally theoretical and empirical insights are being shared in this paper in order to shed light on the nature of this rare condition.
Correspondence: *César R. Jayaro, Doctor, Behavioral Sciences, Neuroscience, UCAB, UNIMET, Av Teheran, UCAB., Caracas 1040, Venezuela. E-mail: crjayaro@yahoo.com*

S.B. LEE. Rehabilitative Mindfulness Training for Car Accident-related Traumatic Brain Injury Patients: A Pilot Study.
Objective: This study intended to utilize mindfulness training resource as a rehabilitative aid in helping car accident-related traumatic brain injury patients to recover from their severe complaint of PTSD-related syndromes.
Participants and Methods: Ten traumatic brain injury patients (n=10, Mean Age= 34.56, SD=12.87) were selected as the participants for this study after they were screened by the Halstead-Reitan Neuropsychological Test battery, Neurobehavioral Rating Scale (NRS), Hamilton 24-item Depression Rating Scale (HDRS 24), and the Posttraumatic Diagnostic Scale (PDS).
Severe patients were excluded from this study because mindfulness training would be too much stressful for them to maintain all sessions. The patients were asked to fill in the survey forms of depression, pain, loneliness scales as well as of life satisfaction, hope, happiness, and life mastery scales before and after the mindfulness training sessions. The mindfulness training sessions were comprised of total 18 sessions (40 minute session, three sessions per week, and six week program). The mindfulness training program included rapid relaxation techniques, cultivating positive emotion techniques based on positive psychology, hypnotic right-brain activation techniques and writing a healing journal.
Results: The t-test on the mean of each scale of pre- and post-treatment for the participants. The outcomes of the intervention were that negative emotion variables (depression, pain, loneliness) were significantly reduced (depression: $p<0.01$, pain: $p<.05$, loneliness: $p<.01$), and that positive emotion variables were significantly increased (life satisfaction: $p<.01$, hope: $p<.05$, happiness: $p<.001$, life mastery: $p<.05$).
Conclusions: These findings further suggest the efficacy of mindfulness in trauma brain injury patients.
Correspondence: *Sang B. Lee, Ph.D., NeuroLab, Pastoral Counseling Graduate Program, Kangnam University, 111, Gugal-Dong, Giheung-Gu, Yongin City, Kyounggi-Do, Yongin City 446-702, Republic of Korea. E-mail: brainpower28@gmail.com*

J. MACSWEEN, S. VANDER WEKKEN, K. SINCLAIR, D. BARTLE & K. KERNS. Investigating the Efficacy of an Computerized Attention Training Program in Children with Epilepsy.
Objective: Epilepsy is one of the most common neurological disorders in childhood with an estimated prevalence of 4–5/1,000. Children with epilepsy commonly experience learning difficulties in academic areas of math, reading and writing. Multiple studies have also reported an increased incidence of deficits in aspects of attention and memory among children with epilepsy. The purpose of this project is to investigate if children with epilepsy would benefit from a process specific intervention aimed at specifically improving attention, concentration and working memory skills.
Participants and Methods: Eight children with epilepsy, aged 6 to 13, completed approximately 6 hours of intervention training, delivered in weekly 30-minute sessions over a 12-week period. The cognitive intervention utilized the CogCarnival, a new computerized training program consisting of a series of mini-games designed to target areas of attention and working memory. Children advanced through the levels by meeting the minimum accuracy criterion. Further, tasks were hierarchically organized, such that levels increased in difficulty as the child progressed. Children worked individually with a research assistant who provided metacognitive strategies and motivation.
Results: Results indicate significant improvements on a measure of spatial working memory, and on standardized math and reading academic fluency measures. Further, marginally significant decreases in response errors were demonstrated on two sustained attention tasks.
Conclusions: Results provide support for the use of computerized attention training materials as part of an effective intervention for cognitive performance in children with epilepsy.
Correspondence: *Jennifer MacSween, BA, Department of Psychology, University of Victoria, 3800 Finnerty Road, Victoria, BC V8P 5C2, Canada. E-mail: macsween@uvic.ca*

S. MCCANN, S. SUSKAUER, A. AMARI, H. PENNINGTON & B. SLOMINE. Use of Neurobehavioral Assessment to Detect Effects of Weaning Sedating Medications in a Minimally Conscious Child.
Objective: A minimally conscious state (MCS) is a condition of severely altered consciousness, involving inconsistent behavioral evidence of awareness of self or the environment. There is a growing literature describing serial neurobehavioral assessment of individuals in a MCS. To date, the utility of neurobehavioral assessment of children in MCS has not been reported.
Participants and Methods: We describe serial neurobehavioral assessment of an 11-year-old female in a MCS admitted to inpatient rehabilitation 3-weeks following anoxic brain injury secondary to cardiac arrest. Initial course was complicated by myoclonic spasms necessitating multiple sedating medications (i.e., Phenobarbital, Ativan, Oxycodone, and Keppra).
To monitor effects of medication weaning and guide treatment, the Rappaport Coma-Near Coma Scale (CNCS, scores range from 0-4, higher scores denote less responsiveness), and individualized assessment protocols were used. Individualized assessment protocols were developed by neuropsychology based on the child's neurobehavioral evaluation at admission. For this case, protocols included tailored operationalized definitions of arousal, responsiveness, and spasms. The protocols were completed by physical, occupational, and speech-language therapists and tracked by neuropsychology across settings, time of day, and evaluators over 25 weeks.
Results: During medication weaning, arousal and responsiveness increased as measured by the CNCS (score decreased from 3.21 to 1.39) and individualized assessment protocols (eyes open increased from 67% to 100%, presence of spasms decreased 67% to 1%).
Conclusions: This case illustrates the utility of individualized neurobehavioral evaluation in identifying change in children in a MCS. Neuropsychologists are well-positioned to operationally define and monitor changes in consciousness utilizing systematic and individualized assessment.
Correspondence: *Sarah McCann, Ph.D., Children's Healthcare of Atlanta/Emory University, 1133 Nicholson Road, Jacksonville, FL 32207. E-mail: mccann.sarah@gmail.com*

K.M. O'DELL, K.A. MYSZKA, D. FRANCIS, L. WIGGS & T. VERAMONTI. The Impact of Participation in a Post-Acute Brain Injury Program on Functional Outcome Following Acquired Brain Injury.
Objective: To examine a) the characteristics of individuals who participated in a post-acute brain injury program, b) the impact of participation in the residential (RP) vs. outpatient (OP) vs. combined program (CP; individuals admitted into residential program with transition to outpatient program) on level of functioning, and c) the unique effect of participation type on functional outcome.
Participants and Methods: Individuals with an acquired brain injury participated in either the RP (N=56), OP (N=27), or CP (N=31) at a

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

post-acute brain injury facility in Houston, TX. Level of functioning in five domains (physical independence, cognitive independence, mobility, occupation, and social integration) was rated at admission and discharge using the Craig Handicap and Reporting Technique-Short Form (CHART-SF).
Results: One-way ANOVAs indicated that the three groups were demographically equivalent and that individuals in the OP functioned higher in all domains at admission compared to those in the RP and CP, who were equivalent. Dependent t-tests revealed that individuals in every program improved from admission to discharge in every domain with the exception of physical independence for the OP. One-way ANCOVAs indicated that at discharge, individuals in the CP performed significantly better than those in the RP in all domains except physical independence, after controlling for level of functioning at admission and length of participation.
Conclusions: Participation in a post-acute brain injury program largely resulted in significant improvement in functioning across all domains. Participation in the CP predicted better functional outcome than participation in the RP only, which provides support for a transitional model of neurorehabilitation.
Correspondence: *Keira M. O'Dell, BA, Psychology, University of Houston, 2210 W. Dallas St., Apt. 1944, Houston, TX 77019. E-mail: kmodell2@uh.edu*

K.D. PATEL, S.D. ALL, S. SOHNLE, M. ROSS & S.M. SILVERSTEIN. Feasible Implementation of a Computer-based Cognitive Enhancement Group for Very Old Adults in Assisted Living.
Objective: With the increase in understanding about brain plasticity and cognitive reserve, the market for cognitive enhancement interventions has grown considerably in recent years. Many such interventions have centered on older adults either without dementia or with mild cognitive impairment in an effort to build brain reserve to lower the risk for dementia. Many new interventions are computer-based, packaged as software applications, specialized computer systems or online programs. While many of these interventions are grounded in evidenced-based theory, software development and marketing have clearly outpaced outcome research. Therefore, many clinical trials, testing various applications in a variety of populations will need to be performed over the coming years. In preparation for such clinical trials research, key issues in feasibly using these products with the very old need to be addressed. This study sought to assess the feasibility of starting a computer-based intervention using the web-based program 'Challenging Our Minds' in an assisted living home setting with very old adults.
Participants and Methods: Participants recruited for this study were 65 years or older without dementia diagnoses living in a single assisted living facility in the northeast United States.
Results: This multi-phase project identified several key administrative and clinical issues important for computer-based cognitive enhancement interventions in the assisted living home setting. Some such issues included equipment issues, ability to learn the web application, perception and motor issues and comfort of staff and residents with using the computer and internet.
Conclusions: The findings in this study provide important considerations for future studies implementing similar cognitive interventions.
Correspondence: *Kruti D. Patel, BA, University Behavioral HealthCare, University of Medicine and Dentistry of New Jersey, 307 Oradell Avenue, Paramus, NJ 07652. E-mail: krutip@gmail.com*

A. PEDOTO. Application of a Game-like Biofeedback System in the Management of Obstructive Sleep Apnea.
Objective: One of the most common sleep disorders is obstructive sleep apnea (OSA) with a prevalence rate of 2–10%. OSA is characterized by periods with a recurrent cessation of breathing during the night causing oxygen desaturations, heart rate and blood pressure raises, and sleep disruptions. Thus, during the daytime OSA patients suffer from fatigue, an impaired state of attention, and alertness.
Participants and Methods: There were 14 OSA patients and 14 non-suffers whose ages ranged from 17-34. For measuring daytime functioning, a game-like biofeedback system was given together with standardized questionnaires. To measure cognitive functions and attention a performance test (LPS-3), a vocabulary test (WST), and a concentration test (d2) were performed together. All these measures were repeated after 6 month (T1) while leaving the patients untreated with regard to the OSA.
Results: At six months, the OSA severity (mean number of apneas) decreased from 8.0 ± 4.9 to 6.8 ± 3.8/h and the tests LPS-3, WST and d2 revealed minor positive changes between the point of times T0 and T1. A positive correlation was found between the age and the RT of the patients ($P < 0.03$). Preliminary results showed performance advancement in the reaction time which is inline with the improvement of the OSA degree.
Conclusions: Considering all the risks and concerns surrounding those with sleep apnea, these results demonstrate the progress in treatment being made to help patients suffering from OSA. The results of this study suggest a proven helpful non-medicated option for patients offering a more productive normal life.
Correspondence: *Amy Pedoto, baylor university, 141 Stoneway Trail, Madison, AL 35758. E-mail: amy_myers@baylor.edu*

A. PEDOTO. Effectiveness of Cognitive Behavioral Approach for Childhood Brain Tumor Survivors.
Objective: Often cognitive and behavioral therapy (CBT) is used to treat behavioral and emotional disorders in children, and its efficacy has been described in several studies. While behavioral and emotional disorders are common in brain tumor survivors, the goal of this study was to describe the efficacy of a CBT intervention in the treatment of childhood brain tumor survivors.
Participants and Methods: Fifteen young patients, aged 4-18 years, were included in the study. The treatment group, composed of 7 patients, received sessions of CBT. The Child Behavior Checklist 4-18 (CBCL/4-18) and the Vineland Adaptive Behavioral Scales (VABS) were administered to parents at the beginning and at the end of the hospitalization.
Results: The statistical significance of changes for clinical subjects during the CBT administration was estimated. As a result, the CBCL/4-18, the clinical group showed a significant advantage on the withdrawn, somatic complaints, social problems, attention problems, internalizing, and total problem scales. On the VABS, the treatment group improved to a significantly when it came to the social skills domain.
Conclusions: These results corroborate our supposition that CBT is an effective intervention for young patients surviving brain tumors and may be particularly helpful to younger individuals in managing cancer-related limitations.
Correspondence: *Amy Pedoto, baylor university, 141 Stoneway Trail, Madison, AL 35758. E-mail: amy_myers@baylor.edu*

E. PEREZ, V. NG, C. ZENETZIS, S. RABIPOUR & A. RAZ. Attention Training in ADHD Children.
Objective: The present study sought to identify the optimal period for an attention training program aimed at children with Attention Deficit Hyperactivity Disorder (ADHD). We compared outcomes between preschool and primary school children.
Participants and Methods: Thirteen ADHD children (six 4-6 years; seven 7-10 years) participated in a variation of a published attention training program: 10 sessions lasting 30 minutes each, occurring over a period of 3-4 weeks. Pre- and post-assessment: verbal and non verbal (RIST and sections of RIAS); parent report of hyperactivity and problems associated with attention based on the Behaviour Assessment Scales for Children (BASC2). Post assessment: two weeks after finishing the training program.
Results: Within-subject ANOVAs assessed the effect of group (preschool/primary school) and assessment session (pre/post). Analysis revealed a significant interaction between assessment session and group [$F(1,6)=7.76$, $p<0.012$]. We applied Bonferroni-correction for all binary and multiple comparisons. Improvements were evident after two weeks of training for both groups on verbal as well as non-verbal tasks. Analysis of parent reports revealed a statistically significant reduction of attention symptoms in primary school children ($p<0.008$) while improvements in preschool children were not significant.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Our findings suggest that the attention training used reduced ADHD symptomatology. Based on parent reports, primary school children – but not preschool children – experienced a significant reduction in undesirable symptoms. It may be beneficial to implement attention training in primary schools for children with ADHD.
Correspondence: *Elena Perez, Dr, Developmental Psychology, Complutense University, Murillo, 7 P-11, Madrid 28223, Spain. E-mail: elenaperezhernandez@psi.ucm.es*

K. RANDALL, S. GRAHAM, U. MUELLER & K. KERNS. First Friends: Outcomes of a Novel Social Skills Intervention on Social-Emotional and Executive Functioning.
Objective: Early school years are a critical developmental period to intervene to facilitate social competency and reduce problem behaviours. Social, emotional, and behavioural adjustment of children is as important to school success as cognitive and academic readiness. Children from socio-economically disadvantaged backgrounds are at- risk as many suffer from behavioural problems and begin school without the social maturity and behavioural regulation skills needed, thus impeding their progress in school, success in academics, and later life employment.
Executive functions (EF) have been linked to social-emotional competence. Children with the capacity to inhibit inappropriate behaviours, delay gratification, and use cognitive methods to control their emotions and behaviours tend to be more socially competent overall, liked by their peers, and well-adjusted. Brain regions involved in social-cognitive and emotional functioning often overlap, and these abilities follow a similar developmental trajectory. Therefore, interventions promoting social development should also conceptually impact EF, given that similar neural structures are involved.
This study assessed the efficacy of the novel "First Friends" 8-week social skills intervention on social functioning and EF components (working memory, inhibition, mental flexibility).
Participants and Methods: 87 kindergarten children (41 controls, M = 5.42 years; 46 intervention, M = 5.40 years) from socio-economically disadvantaged areas. Children's EF and social-cognitive skills were assessed and social behaviors observed before and after the intervention.
Results: Results revealed significant (all ps < .05) intervention effects on social-cognitive skills, social behaviours, working memory and mental flexibility.
Conclusions: These exciting results will be discussed further to help in understanding the scope of social intervention outcomes on cognitive processes and guide the selection/ implementation of effective prevention programs with early childhood populations.
Correspondence: *Kate Randall, University of Victoria, 1344 Birmingham Street, Halifax, NS B3J 2J2, Canada. E-mail: krandall@uvic.ca*

S. SCHETTLER, M. BLAHNIK, S. LUNDGREN & T. L-B PAPE. Relationships between the Galveston Orientation and Amnesia Test (GOAT), Disorders of Consciousness Scale (DOCS) and Functional Independence Measure (FIM) of Cognitive Functioning One Year Post Brain Injury.
Objective: Posttraumatic amnesia (PTA) is a well established predictor of recovery and long-term functional outcome after severe brain injury (BI), and the GOAT is a widely used measure of PTA. Evidence indicates that neurobehavioral change measured with the DOCS, obtainable during states of altered consciousness, is valuable in predicting time to consciousness within the first year of recovery. Since DOCS measures can be obtained earlier in the recovery trajectory than the GOAT, we set out to determine if DOCS composite measures (e.g., visual, tactile, auditory) are useful for predicting level of independence with cognitive functioning one year post severe BI.
Participants and Methods: A sample of 20 persons, unconscious after severe BI, were abstracted from a larger study. The DOCS was administered weekly, up to six weeks during acute rehabilitation. PTA was assessed monthly via serial GOAT administrations upon recovery of consciousness. Level of independence with cognitive functioning was assessed with the FIM via interviewing caregivers, one year after injury.
Results: Significant correlations were seen between GOATAvg and FIMCog (r = .75; p = .001), DOCSVisTotalChg and FIMCog (r = .52; p = .033), DOCSAudTotalChng and FIMCog (r = .58; p = .014). Results from a one-way repeated-measures ANOVA indicated a significant modality main effect, Wilks' Lambda = .65, F(2,17) = 3.97, p = < .05, multivariate n2 = .35. Pairwise comparisons revealed a significant difference between the DOCSVisTotalChg (M = 20.37) and DOCSTacTotalChg (M = 9.12), p = .010.
Conclusions: Results support previous findings that the DOCS obtained earlier in the recovery trajectory than the GOAT may be useful for predicting level of independence in cognitive functioning one year post injury. Visual and auditory composites may show greater utility than the tactile composite in development of a prediction model and warrant further exploration in future studies.
Correspondence: *Sarah Schettler, MA, Minneapolis VA Medical Center, One Veterans Drive, Minneapolis, MN 55417. E-mail: sarahschettler@comcast.net*

J.C. WERTHEIMER, S. BACKHAUS, K. LATHRAM-SAWADA, A. MOESSNER, S. IBARRA, S. LEPORE, D. PARROT & J. MALEC. An Empirically Based Coping Skills Group for Individuals with Brain Injury and Their Caregivers: A Replication, Multi-centered Study.
Objective: Replicate and determine generalizability of previous findings from Backhaus et al (2010), which found that a Brain Injury Coping Skills Group (BICS) improved perceived self-efficacy (PSE), and prevented emotional distress at a 3 month-follow-up in survivors with brain injury (BI) and their caregivers.
Participants and Methods: Sixteen survivors with BI and 16 caregivers recruited from Mayo Clinic TBI Model System and Brooks Rehabilitation Center participated. BICS is a 12-session, manualized, cognitive-behavioral treatment group including both survivors and caregivers that provides psychoeducation and coping skills training with goals of increasing PSE and preventing emotional distress. A randomized, wait-list controlled design was used. Outcome measures included the Brain Injury Self-Efficacy Scale and the Brief Symptom Inventory-18 (BSI-18).
Results: Analysis of Covariance showed a significant positive treatment effect for PSE (F=37.45, p<.001) but not on the BSI-18 indicators of emotional distress. Immediately post-treatment, PSE was higher for the BICS group than for the control group (t=-2.82, p=.009). Paired-samples t-tests showed that that BICS group had significantly improved PSE immediately post treatment (t=-6.88, p<.001). Although the treatment group still showed improved PSE at 3 months post treatment, the difference from baseline was not statistically significant (t=-1.49, p=.157), but it was clinically significant.
Conclusions: There is a paucity of studies using a randomized-controlled design that examines the efficacy of a coping skills group for BI patients and their caregivers. This study replicated Backhaus's findings that individuals who participate in BICS improve in PSE when compared to controls, and also supports the notion that PSE should be a targeted area of intervention. Practical implications are discussed.
Correspondence: *Jeffrey C. Wertheimer, Ph.D., Physical Medicine and Rehabilitation, Cedars-Sinai Medical Center, 8700 Beverly Blvd., Suite 7215, Los Angeles, CA 90048. E-mail: Jeffreycwertheimer@yahoo.com*

D. WOODS, C. CATROPPA, J. MATTHEWS, R. GIALLO, P. BARNETT & V. ANDERSON. Pediatric Traumatic and Non-traumatic Brain Injury: How Clinical Neuropsychology Can Help in the Rehabilitation Process.
Objective: The objective of this study was to: (1) determine whether a family-centred behavioral intervention program could reduce challenging behaviors in children with ABI and improve family-parental well-being and functioning; and (2) ascertain the efficacy for either face-to-face or telephone-support delivery modes of intervention.
Participants and Methods: Sixty-one parents (48 biological mothers, 13 biological fathers) of 48 children aged between 3 and 12 years with

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

mild, moderate, and severe ABI received Signposts for Building Better Behaviour program in face-to-face (n = 23) or telephone-support (n = 25) format. The program was delivered by trained Signposts practitioners over a 5 month period. Families completed pre-intervention, post-intervention, and 6-month follow-up assessments, respectively.
Results: Parents reported feeling less stressed and more confident in managing their children's behavior after the intervention. All parents approved of the strategies taught and a majority felt the materials were helpful in teaching new skills. In its two service delivery modes, the program was able to significantly reduce the number of challenging behaviors in injured children as well as lower dysfunctional parenting practices, stress and family burden. Further, treatment effects were maintained at 6-month follow-up.
Conclusions: The current research has provided the efficacy of a family-centred behavioral intervention program for a pediatric ABI population, and provides evidence for a less costly option of intervention delivery via telephone-support.
Correspondence: *Damith Woods, Psychology, University of Melbourne, 75 Alfred Street, Parkside, Adelaide, SA 5063, Australia. E-mail: damith.woods@gmail.com*

M. YUTSIS, T. BERGQUIST, P. DEAN & J. MICKLEWRIGHT. The effect of internet-based cognitive rehabilitation in persons with memory impairments after severe traumatic brain injury: A randomized clinical trial.
Objective: Examined whether the compensation use in an internet-based cognitive rehabilitation program was associated with improved neuropsychological sequelae and emotional functioning in persons with severe traumatic brain injury (TBI).
Participants and Methods: A total of 12 persons (7 females and 5 males) with medically documented TBI completed a baseline and follow-up assessment including measures of cognitive impairment, activity, and participation. Five persons were randomized to receive 30 sessions of active calendar acquisition training over an instant messaging system and seven to the wait list condition. There were no demographic differences between the two groups.
Results: At baseline, compensation use was not associated with cognitive impairment and there were no differences in functioning between treatment conditions. At follow up, greater family ratings of memory difficulties were linked with less compensation use ($r = -.89$, $p < .02$) in the wait list group. Family ratings of greater memory problems at baseline were linked to greater improvement on RBANS Delayed Memory Index between baseline and follow-up ($r = .90$, $p < .01$). In the active condition, greater family ratings of depression at follow up were related to improved scores RBANS List Learning subtest ($r = .90$, $p < .04$).
Conclusions: These results suggest that compensation use is associated with both mood and memory ratings independent of degree of cognitive impairment after TBI. Greater family concern of problems with mood and memory functioning in the context of improved memory scores may reflect increased awareness of the TBI sequelae and/or accumulating frustration with disability-related limitations.
Correspondence: *Maya Yutsis, Ph.D., Mayo Clinic, 200 First St SW, Rochester, MN 55905. E-mail: datomaya@yahoo.com*

T.D. VANNORSDALL, B. GORDON, K. SUNG, E.J. PICKETT, C. LASSEN-GREENE, M. ANDREJCZUK, J.R. WEAVER, L. VANDROOF & D.J. SCHRETLEN. Transcranial Direct Current Stimulation Modifies Processing Speed in Healthy Adults.
Objective: Transcranial direct current stimulation (tDCS) involves passing a weak, direct electrical current through the cortex. It may enhance or inhibit the functions of underlying cerebral tissues depending on the current polarity. tDCS has shown promise as a tool for improving motor functioning in the affected limb following stroke. Here we investigate whether it can also augment aspects of cognitive and motor functioning in the neurologically normal.
Participants and Methods: In this single-blind experiment, 8 healthy right-handed adults (M age = 30.0, SD = 14.3) were randomly assigned to receive 30 minutes of 1 mA active (anodal/excitatory) stimulation and 30 minutes of sham stimulation in a counterbalanced order. The active electrode was placed over the left prefrontal region and the indifferent electrode was on the right deltoid. Directly following the first stimulation session, participants completed tests of manual speed (Grooved Pegboard), verbal and design fluency, and processing speed (Perceptual Comparison Test).
Results: After adjusting for age and sex, between-groups analyses revealed that anodal stimulation was associated with significantly better Perceptual Comparison Test performance (M = 82.0, SD = 8.72) as compared to sham stimulation (N = 71.0, SD = 12.11, $p = 0.007$). However, verbal fluency, design fluency, and Grooved Pegboard performances did not differ under conditions of anodal and sham stimulation.
Conclusions: Here we demonstrate that anodal tDCS can enhance performance on a measure of psychomotor processing speed in neurologically normal adults. Notably, this difference could not be attributed to improvements in either simple motor speed or nonverbal generativity.
Correspondence: *Tracy D. Vannorsdall, Ph.D., Psychiatry, Johns Hopkins University School of Medicine, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21224. E-mail: TVannor1@jhmi.edu*

Language and Speech Functions/Aphasia

T.D. VANNORSDALL, B. GORDON, K. LEDOUX, K. SUNG, E.J. PICKETT, M. ANDREJCZUK, C. LASSEN-GREENE, J.R. WEAVER, L. VANDROOF & D.J. SCHRETLEN. Altering Automatic Verbal Processes with Transcranial Direct Current Stimulation.
Objective: On verbal fluency tasks, a distinction has been made between item runs (thought to reflect automatic selection of words within a subcategory) and category switches (representing more controlled, non- automatic, processing). Some evidence suggests that transcranial direct current stimulation (tDCS), wherein a weak, direct electrical current is passed through the scalp, can enhance or inhibit functions of the underlying cerebral tissue depending on the current polarity applied. Here we investigated whether tDCS could modify automatic and/or controlled aspects of speeded verbal production.
Participants and Methods: In this single-blind experiment, 40 adults were randomly assigned to receive 30 minutes each of 1 mA active (anodal/excitatory or cathodal/inhibitory) stimulation and sham stimulation. The "active" electrode was over the left prefrontal region; the "indifferent" electrode, over the vertex. At the end of each session, phonemically- and semantically-cued verbal fluency tests were performed. Productions were scored as to the number of words generated, switches, runs, words in runs, and mean run size.
Results: On the semantic fluency task, anodal stimulation with older participants (>25 years, n = 21) resulted in significantly more runs and words in runs compared to sham stimulation. With cathodal stimulation, there were fewer runs compared to sham stimulation.
Conclusions: tDCS can selectively alter automatic aspects of speeded lexical retrieval in a polarity-dependent fashion during a semantically-guided verbal fluency task. Adults over age 25 were most responsive, suggesting that tDCS holds its greatest potential as a tool for altering verbal skills in those who are not already performing at ceiling.
Correspondence: *Tracy D. Vannorsdall, Ph.D., Psychiatry, Johns Hopkins University School of Medicine, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21224. E-mail: TVannor1@jhmi.edu*

S.T. BERENTSEN, J.R. BINDER & M. SEIDENBERG. The Relationship Between Verbal Short-term Memory and Long-term Phonological Codes in Aphasia.
Objective: Verbal short-term memory (VSTM) is usually assumed to depend on a specialized short-term phonological store. An alternative possibility is that VSTM is subserved by temporary activation of long-term phonological representations in the language production system.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

We measured VSTM and phonological reading ability in a group of aphasic patients. If these tasks depend on the same phonological codes, correlations in performance should increase with increasing phonological load in the VSTM task. An auditory-visual word matching task (AVWM) was used to control for overall aphasia severity.
Participants and Methods: VSTM, nonword rhyme judgment (NRJ), and AVWM tasks were administered to 25 individuals with chronic aphasia. In the VSTM task, subjects performed a yes/no matching task on nonwords varying from 1-5 syllables in length, separated by a 5-second inter-stimulus interval. In the NRJ task, subjects matched a printed nonword to other nonwords based on rhyme similarity. AVWM consisted of hearing a word and matching it to its orthographic form.
Results: Overall accuracy on VSTM was correlated with NRJ accuracy ($r = .428$, $p = .033$), but not with AVWM ($p = .336$). VSTM performance decreased monotonically with increasing phonological load, from 93% for 1 syllable to 67% for 5 syllables. VSTM accuracy was significantly correlated with NRJ only for the 4-syllable ($p = .033$) and 5-syllable ($p = .041$) VSTM conditions.
Conclusions: As phonological memory load increases, VSTM performance is increasingly correlated with ability to retrieve long-term phonological codes. The results support the view that VSTM and language production depend on the same phonological representations.
Correspondence: *Sara T. Berentsen, Rosalind Franklin University of Medicine and Science, 6015 W. Wells, Wauwatosa, WI 53213. E-mail: sara.berentsen@gmail.com*

B.C. EMERTON, D.A. GANSLER, E.H. SANDBERG & M. JERRAM. Anatomical Dissociation of Picture and Description Naming in the Left Temporal Lobe: An fMRI Study of a Community Sample.
Objective: fMRI was used in a community sample to assess the generalizability of a previously reported neuroanatomical dissociation of visual and auditory/verbal description naming in temporal lobe (TL) epilepsy patients where auditory but not visual naming is represented in anterior left TL (Hamberger et al., 2001). It was hypothesized that, akin to these patient-derived findings, description naming would activate TL regions anterior to those associated with visual naming; overlap in middle and posterior TL lobe was also expected.
Participants and Methods: Fifteen healthy, right-handed, native English speakers underwent fMRI (3T) while covertly naming target words during picture naming (PN; 50 line drawings) and description naming (DN; 50 orthographic phrases) tasks. Stimuli were drawn from the Auditory and Visual Naming Tests (Hamberger & Seidel, 2003) and presented in an events-within-blocks design counterbalanced across participants (ABB'A' or BAA'B').
Results: Images were preprocessed using SPM8 and analysis was a priori restricted to the left TL. Four regressor weight contrasts (DN>PN, PN>DN, DN, PN) were examined at the group level using one-sample t-tests to assess statistical significance at a voxelwise threshold of $p < 0.005$ (uncorrected). Group results of direct contrasts confirmed the hypothesized dissociation with DN activating anterior TL and PN activating middle and posterior TL. Within-condition contrasts yielded additional support. Contrasts also yielded activation in fusiform gyrus indicating construct validity for tasks employed.
Conclusions: Results demonstrate generalizability of the dissociation of visual and verbal description naming in the left temporal lobe beyond TL epilepsy patients to a non-patient community sample. Anterior TL involvement in description naming is unlikely due to atypical cortical organization secondary to neuropathology. Additional theoretical and clinical implications will be discussed.
Correspondence: *Britt C. Emerton, Suffolk University, 41 Temple Street, Donahue, 6th Floor, Boston, MA 02114. E-mail: car11671@suffolk.edu*

G. FERGADIOTIS, H.H. WRIGHT & S. CHRISTENSEN. Productive Vocabulary Across Discourse Types in Aphasia.
Objective: Differences in lexical diversity (LD) across different types of discourse (i.e., recounts, stories, procedures) have been found in cognitively healthy adults (Fergadiotis et al., 2010). Measuring productive vocabulary in adults with aphasia may serve as a useful clinical tool for evaluating their naming difficulties at the discourse level. The goal of the current study was to examine the effect of discourse type on LD in adults with aphasia.
Participants and Methods: Participants included 34 adults who presented with anomic aphasia. Samples consisted of the participants' description of two picture scenes, telling the Cinderella story, and recounting three past experiences. Samples were digitally recorded and then orthographically transcribed in the CLAN format (MacWhinney, 2000). The language samples were analyzed using the voc-D program in CLAN to obtain estimates of their LD.
Results: An one-way within subjects ANOVA (factor: discourse type; dependent variable: D) indicated a significant discourse type effect, Wilk's $\eta = .50$, $F(2, 31) = 15.68$, $p < .01$
The participants with aphasia had significantly lower LD scores for the Cinderella story and the picture descriptions compared to the recounts, as indicated by paired-samples t tests, $t(33) = -21.53$, $p < .01$ and $t(33) = -19.74$, $p < .01$, respectively.
Conclusions: The elicitation technique can influence LD. The clinical and methodological implications of this finding will be discussed.
Correspondence: *Gerasimos Fergadiotis, MA, Speech and Hearing Science, Arizona State University, PO Box 870102, Tempe, AZ 85287. E-mail: gfergadiotis@gmail.com*

T. GEFEN, C. WIENEKE, S. WEINTRAUB, M. MESULAM & E. ROGALSKI. Neuroanatomic Correlates of Naming and Recognition of Famous Faces in Primary Progressive Aphasia.
Objective: Primary Progressive Aphasia (PPA) is a neurodegenerative syndrome characterized by selective language disruption. While all variants of PPA feature diverse combinations of verbal impairments, individuals with the semantic variant of PPA often display non-verbal face and object recognition impairments. Past neuroimaging studies have provided evidence for the involvement of the fusiform gyrus in face processing. The current study explores impaired facial naming and recognition in PPA subtypes and the relationship of this impairment to fusiform atrophy.
Participants and Methods: Forty-five individuals with PPA were characterized as semantic (PPA-S; N=10), agrammatic (PPA-G; N=13), or logopenic (PPA-L; N=22) based on a previously published classification algorithm (Mesulam et al., 2009). Patients and thirty-eight controls were administered twenty famous faces, which they were asked to name or identify through description. Cortical thickness and volume of the bilateral fusiform gyri were then acquired and analyzed in each group to determine correlations between performance and fusiform integrity.
Results: Facial recognition was reduced significantly in PPA-S compared to PPA-G, PPA-L, and controls ($p<0.01$). A positive correlation was found between facial naming/recognition and bilateral fusiform volume in PPA-S ($p<0.05$). In general, PPA facial recognition scores correlated positively with bilateral fusiform volume and cortical thickness, while facial naming correlated positively only with left fusiform volume and cortical thickness ($p<0.01$).
Conclusions: The loss of fusiform volume and thickness (i.e. atrophy) may represent the neuroanatomic correlate of impaired facial naming and recognition in semantic PPA. The absence of fusiform atrophy in PPA-G and PPA-L may explain why these subtypes tend to have preserved facial recognition.
Correspondence: *Tamar D. Gefen, Northwestern University, 3409 N. Elaine Place, Chicago, IL 60657. E-mail: Tamar.Gefen5@gmail.com*

M. GUTMANN. The Effect of Frontal Lobe Function on a Proverb Interpretation Task in Parkinson's Disease.
Objective: A growing body of literature supports the presence of a figurative language deficit alongside the known motor and cognitive deficits associated with Parkinson's disease (PD). To better characterize this

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

phenomenon, this cross-sectional study sought to (a) compare the performance of people with and without idiopathic PD on a proverb interpretation task, and (b) investigate whether performance on the proverb interpretation task was related to frontal lobe function in both the clinical and non-clinical populations.
Participants and Methods: A proverb interpretation task, Gorham's Test of Proverbs (1956), and a statistically-derived measure of frontal lobe (FL) function comprised of five neuropsychological tests (Glisky, Polster, & Routhieaux, 1995; Glisky & Kong, 2008) were administered to all participants. Sixty participants aged 65-85 years participated in this study; 30 NDPD participants and 30 age-and education-matched control participants. Inclusionary and exclusionary criteria defined the PD participants.
Results: Results revealed between-group performance differences for both the Proverbs Test and the FL function factor. Regression analysis revealed that performance on the FL function factor was a significant predictor of performance on the Proverbs Test in the PD group. Further, performance on the Proverbs Test was negatively correlated with three PD-specific variables (i.e., years since diagnosis, UPDRS score, and total L-dopa equivalent). These same PD-specific variables did not alter the robust relation between performance on the Proverbs Test and performance on the measure of FL function.
Conclusions: Results of this study indicated a relation between the cognitive deficit associated with PD and performance on a higher-level language task.
Correspondence: *Michelle Gutmann, Vanderbilt University, 1215 21st Ave. S., MCE-South, Ste. 8310, Nashville, TN 37232. E-mail: michelle.gutmann@vanderbilt.edu*

L.M. LEJEUNE, J.V. BALDO & N.F. DRONKERS. The Effect of Language Impairment on Non-verbal Cognition on the WAIS Picture Arrangement and Picture Completion Tasks.
Objective: The current study assessed whether or not impairment in language abilities might produce cognitive impairment on non-verbal tasks by comparing performance in patients with and without aphasia.
Participants and Methods: A group of 56 left hemisphere, middle cerebral artery stroke patients were tested on the Picture Arrangement subtest of the Wechsler Adult Intelligence Scale (WAIS), a test of sequencing and integration that requires examinees to arrange sets of comic-strip-like picture cards in the order that best tells a logical, coherent story. Patients were also tested on the Picture Completion subtest of the WAIS, which is a test of perceptual organization and requires the examinee to identify the missing detail in a drawing. Lastly, as a visual-perceptual control, patients were also tested on the Benton Facial Recognition Test, in which examinees must match a target face to one or more simultaneously-presented faces.
Results: Aphasic patients showed significant impairment compared to non-aphasic patients on both the Picture Arrangement and the Picture Completion tasks. Performance of aphasic patients did not differ, however, from that of non-aphasic patients on the Benton face-matching task. Age, education, chronicity, and lesion volume were used as covariates in all analyses.
Conclusions: These findings support the idea that language impairment can result in impairments in non-verbal cognitive functioning on tasks that require a degree of higher-level planning and reasoning.
Correspondence: *Lisa M. LeJeune, The Wright Institute, 2728 Durant Ave., Berkeley, CA 94704. E-mail: lisalejeune@yahoo.com*

J. MEDINA, M. LAMAR, O. AJILORE & A. KUMAR. The Impact of Diabetes and Depression on Semantic Integrity and Response Production in Mid-life.
Objective: Diabetes and depression are associated with white matter damage and cognitive dysfunction, particularly executive functioning, with advancing age. For example, individuals with diabetes display deficits in establishing and maintaining mental set as do individuals with depression. Such deficits are thought to negatively impact other aspects of cognition that rely on intact executive abilities. The degree to which this pattern of impairment exists in mid-life and how it might be further exacerbated in the presence of both diabetes and depression is unclear.
Participants and Methods: Using responses to 'animal' fluency in 17 healthy controls (HC; mean age=45.3, sd=12.8), 20 diabetic adults (DA; mean age=57.7, sd=9.5), 24 individuals with major depression (MD; mean age=44.0, sd=8.3) and 17 depressed diabetics (DD; mean age=53.1, sd=8.4) we calculated measures of total output, semantic integrity and switching semantic set.
Results: Controlling for age and education, total output did not differ between the groups but a qualitative analysis of semantic integrity revealed significant between-group differences, $F(3,66)=3.3, p=0.02$. Thus, the DD group displayed less semantic relatedness of consecutive responses when compared to HC and MD participants (p-values<0.01) but equivalent semantic associations with their DA counterparts. A more in-depth assessment of semantic integrity including the number of semantic clusters produced did not result in significant between-group differences; nor did a measure of switching between semantic clusters – although this executive-based skill approached significance (p=0.07).
Conclusions: Taken together, results suggest that mid-life diabetes in isolation or combined with depression results in weak semantic associations but no differences in overall output, semantic or executive flexibility.
Correspondence: *Jennifer Medina, Ph.D., Psychiatry, University of Illinois - Chicago, 912 S. Wood St, Chicago, IL 60612. E-mail: medina.jen@gmail.com*

P.E. MOES, T. LARSEN, J. VANDER WOUDE & J. WILCOXSON. Hemisphere Specialization and Individual Differences in Processing Familiar Idioms.
Objective: The current study explores normal hemisphere functions and individual differences in processing idioms, which may shed additional light on syndromes (i.e., autism) showing non-literal language deficits. Participants heard familiar idiomatic and literal phrases followed by a word representing the idiomatic meaning (I-I) or the literal meaning of the idiom (I-L), the literal meaning of the literal phrase (L-L) or a non-word (NW). Using a similar paradigm, Mashal et al. (2007) found greater right hemisphere (RH) involvement for the Idiomatic-literal condition. They concluded that this result occurred because the literal interpretation was less salient and more weakly associated. We predicted that males would show results similar to Mashal et al., but that females would show reduced LH advantage across conditions.
Participants and Methods: Fifty undergraduates made lexical decisions of a word presented in the left or right visual field following an auditory presentation of an idiom or literal phrase - yielding 4 conditions: I-I, I-L, L-L and NW. Dependent measures included RT and EEG-ERP.
Results: Contrary to expectations, idiomatic meanings and literal meanings of idiomatic phrases did not show differential hemisphere specialization - as measured by RT or ERP. However, in parietal areas, both idiomatic phrase conditions were processed more efficiently in RH, while literal phrases showed a LH advantage. Gender differences were small, but the pattern supported reduced lateralization for females.
Conclusions: Our data suggests that both figurative and literal interpretations of idioms show greater RH processing, but that gender differences influence the strength of this specialization.
Correspondence: *Paul E. Moes, Ph.D., Psychyology, Calvin College, 3201 Burton St. SE, Grand Rapids, MI 49504. E-mail: pmoes@calvin.edu*

S. PEKKALA, M. IKKALA & S.R. BORGWALDT. Processing of Finnish Compounds in Fluent Aphasia.
Objective: We examined the processing of lexicalized and novel compounds in fluent aphasia.
Participants and Methods: The participant was a Finnish-speaking male with fluent aphasia.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

In two production tasks, the participant named photographs of objects representing simplices and lexicalized compounds, matched for syllable length and frequency, and digitally manipulated photographs of hybrid objects, composed of two components (e.g., an animal that was part dog, part frog [frog dog]), representing novel compounds.

Responses were scored as correct, or as one of two kinds of errors: insertions between compound constituents (e.g., dog and frog), and other errors (e.g., component omissions or unrelated errors).
In two comprehension tasks, the participant matched auditorily presented lexicalized compounds and novel compounds, presented along with three distractors, with the corresponding object image.
Results: Production tasks:
Simplices (n = 20): correct 75%, errors: insertions 0%, other 25%.
Lexicalized compounds (n = 20): correct 65%, errors: insertions: 0%, other 35%.
Novel compounds (n = 50): correct 20%, errors: insertions 34%, other 46%.
Comprehension tasks:
Lexicalized compounds (n = 40): correct 100%.
Novel compounds (n = 40): correct 92.5%, errors 7.5%.
Conclusions: The data show intact compound comprehension abilities and relatively unimpaired performance on lexicalized-compound production, and strongly impaired performance on novel-compound production, with a preference for insertions between components.
These results might point to dissimilar underlying representations at the componential level for lexicalized and novel compounds and, consequently, selectively impaired processing.
Correspondence: *Seija Pekkala, Ph.D., Institute of Behavioural Sciences, University of Helsinki, P.O.Box 9, (Siltavuorenpenger 5A), Helsinki 00014, Finland. E-mail: seija.pekkala@helsinki.fi*

A.D. RODRIGUEZ, J. REILLY & L. ALTMANN. Effects of Word Meaning on Concurrent Verbal Fluency and Finger Tapping: Further Evidence for Language-Motor Interaction.
Objective: Embodied/modality-specific theories of semantic memory hold that concepts are grounded in sensory and motor systems. Supporting studies have demonstrated a functional link between language and motor brain regions when concepts involving human motor action (i.e., semantic-motor representations) are engaged. However, the majority of studies have utilized sequential perceptual language tasks, leaving unanswered questions about how language and motor systems influence one another during concurrent production tasks. We investigated the effect of engaging shared semantic-motor representations during concurrent word generation and finger tapping.
Participants and Methods: Forty right-handed, English-speaking, healthy adults, age 18-22 years, completed a series of verbal fluency and finger tapping tasks under single and dual task conditions. We manipulated motor salience of the verbal fluency categories, resulting in two semantic conditions. In the Semantic-Motor condition, the categories were highly associated with human motor action (e.g., things you do with your hands). In the Semantic-Other condition, categories were not associated with human motor action (e.g., cities).
Results: Compared to the single task conditions, concurrent (dual task) tapping and word generation significantly interfered with time spent tapping and number of words produced in the Semantic-Other condition relative to the Semantic-Motor condition.
Conclusions: The absence of expected dual task effects (i.e., reduced performance) in the concurrent Semantic-Motor condition suggests that engaging semantic-motor representations by tapping or producing motor-related words was sufficient to facilitate language and motor production. These results provide further evidence for functional interactions between motor representations and semantic representations for motor-related words, thereby supporting embodied/modality-specific theories of semantic memory.
Correspondence: *Amy D. Rodriguez, PhD, Neurology, University of Florida, UF College of Medicine, HSC Box 100236, Gainesville, FL 32610. E-mail: arod1076@phhp.ufl.edu*

G. ALTAWEL. Neuropsycological damage presented after glioblastoma multiforme.
Objective: Analise the neuropsychological findings in this patient by comparing the findings reviewed in the literature.
Participants and Methods: A 54-year-old native from Jalisco, Mexico, diagnose with glioblastoma multiforme in operculum left temporo-parietal extending to thalamus. Operated without achieving complete resection. Undergoing radiation therapy and chemotherapy. He presented tonic-clonic seizures. Neuropsychological assessment is requested applying Test Barcelona Revisado (J. Peña-Casanova, 2005), Rey's Complex Figure Test (Rey, 1941, Salvador, Galindo & Cortes, 1996), Western Aphasia Battery (Shewan & Kertesz, 1980) Wisconsin Trading Score Card and Token Test (De Renzi & Vignolo,1966).
Results: we found loss in recent memory, he is not capable of storing new information, easily forgeting what he had done a day before, and he was able to repeat the same story about his journey everyday. Aphasic speech mainly with semantic paraphasias. Presents anomia responding only when we offer semantic clues or by word-image confrontation. Unable to realize repeating tasks. He also showed trouble in reading comprehension. He does not follow complex instructions. Presents agraphia due right hemiparesis.
Conclusions: These results don't match with the findings in the literature reviewed. The patient remains in neuropsychological monitoring because we are applying an intervention program with ecological validity.
Correspondence: *Gissele Sami Altawel, UNAM, Paseo de los Cipreses 180, Distrito Federal 04250, Mexico. E-mail: gis.sami@gmail.com*

C. SANDBERG & S. KIRAN. Abstract and Concrete Word Processing in Patients with Aphasia.
Objective: Normal subjects and persons with aphasia exhibit a concreteness effect during a variety of lexical tasks. Recent evidence from neuroimaging studies suggests dissociable neural correlates for processing abstract versus concrete words. However, there have been no neuroimaging studies of abstract and concrete word processing in persons with aphasia. This study sought to determine whether or not patients with aphasia also exhibit patterns of dissociation of neural activation during abstract versus concrete word processing.
Participants and Methods: Three persons with aphasia due to left hemispheric stroke and one healthy older adult completed both a synonym judgment task utilizing abstract and concrete words and a task explicitly labeling words as either abstract or concrete (i.e., word judgment task) in a 3T MRI scanner.
Results: During the synonym judgment task, areas of overlap among the patients and the healthy control for abstract > concrete nouns tended to be in the left hemisphere, whereas areas of overlap for concrete > abstract nouns tended to be in the right hemisphere. On the other hand, during the word judgment task, areas of overlap for both abstract > concrete and concrete > abstract nouns tended to be in the left hemisphere. Left hemisphere activation in patients for these contrasts was largely perilesional.
Conclusions: These tentative results indicate that a) some dissociation of neural activation exists between abstract and concrete word processing in persons with aphasia, and b) neural activation patterns for abstract versus concrete words may be task-specific in persons with aphasia.
Correspondence: *Chaleece Sandberg, M.A., Communication Sciences and Disorders, Boston University Sargent College, 580 Commonwealth #210, Boston, MA 02215. E-mail: cws@bu.edu*

J.P. SILKES & M.A. ROGERS. Masked Priming Investigation of Automatic Spreading Activation Deficits in Aphasia.
Objective: Prior research has suggested that the language processing deficits of aphasia may be related to impairment of the speed of automatic spreading activation, and/or the ability to maintain activation over time. These prior studies, however, have mainly used list-priming

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

paradigms, so assessment of unconscious automatic spreading activation may have been confounded by conscious awareness of primes. This study used a masked priming paradigm to explore the status of automatic spreading activation in individuals with aphasia while eliminating conscious processing of primes.
Participants and Methods: Twenty-one adults with aphasia and 31 typical control participants completed a visual lexical decision task. All lexical decision targets were preceded by a visually-masked neutral prime or identity prime. The time course of priming effects was assessed by systematically varying the interstimulus intervals (ISIs) across 11 different values ranging from 30 to 1500 msec.
Results: Typical adults showed maximal priming effects with an ISI of 200 msec (t=3.23, p=.003), with significant priming noted across a range of ISIs. Adults with aphasia showed a statistically significant priming effect only in the 250 msec ISI condition (t=2.65, p=.015), with no significant priming at any other interval.
Conclusions: Participants with aphasia primed at a longer ISI than typical controls, suggesting slowed automatic spreading activation. They also showed priming only at a single ISI, rather than across a range, suggesting impaired maintenance of activation. These differences have practical implications both for modeling of aphasia and for development of aphasia treatments that capitalize on residual implicit language processing abilities.
Correspondence: *JoAnn P. Silkes, PhD, Speech & Hearing Sciences, University of Washington, 1417 NE 42nd St., Seattle, WA 98105. E-mail: jsilkes@uw.edu*

D.M. SZELES, S.M. HARNISH, B.A. CROSSON, L.J. GONZALEZ-ROTHI & T.W. CONWAY. Diadochokinetic Rate in Adults with Apraxia of Speech Following a Multimodal Intensive Treatment (MMiT) of Phonological Alexia.
Objective: Apraxia of speech (AOS) is a post-stroke motor speech disorder of planning and programming which endures despite treatment. Previous research on a Multimodal Intensive Treatment (MMiT) for phonological alexia, a post-stroke reading impairment, reported subjective improvements in AOS. MMiT intensively trains sensory and motor features of phonemes, involving multiple, repeated trials of spoken phonemes and nonwords. We investigated MMiT's effect on rapid alternating speech movements, a skill commonly impaired in AOS, by comparing measures of MMiT effectiveness (multiple probes of nonword repetition) to Didochokinetic Rate (syllable sequence repetition).
Participants and Methods: Before and after 120 hours of MMiT, we administered the Diadochokinetic Rate subtest from the ABA-2 to three adults with post-stroke aphasia, phonological alexia, and AOS. We hypothesized that MMiT would improve motor planning and programming for motor speech sequences, thereby improving diadochokinetic accuracy. Enhanced verbal praxis (as measured by diadochokinetic accuracy) was expected to coincide with increased repeated probe accuracy.
Results: From Pre- to Post-treatment, percent accuracy during diadochokinesis increased for all subjects. Improved accuracy occurred at the expense of speed for Subjects 1 & 3, who at post-treatment repeated fewer timed syllable sequences. These subjects also showed less robust gains on MMiT probes of nonword repetition.
Conclusions: MMiT appears to improve features of AOS, as evidenced by improved diadochokinetic accuracy. Greater improvement through treatment on nonword probes appeared to be associated with increased diadochokinetic speed. Data from additional participants and ABA-2 subtests will determine whether MMiT is a viable treatment for multiple AOS deficits.
Correspondence: *Dana Szeles, B.S., Clinical and Health Psychology, Malcom Randall VAMC/University of Florida, 999 SW 16th Ave Apt 36, Gainesville, FL 32601. E-mail: dmszeles@phhp.ufl.edu*

R.B. TANGEN & M. SCOTT. Developmental Delays in Young Children Presenting for Cochlear Implantation.
Objective: Young children with severe to profound hearing loss are known to have language delays. Research has shown that visual processing and fine motor skills may also become more affected as children get older. It was hypothesized that children with severe to profound hearing loss would also have greater difficulty with adaptive and emotional/behavioral functioning with age. In addition, whether the child had some level of spoken language at the time of evaluation would predict better developmental, adaptive, and behavioral functioning.
Participants and Methods: Thirty-two children with severe to profound hearing loss who presented for pre-cochlear implant evaluation were administered a standardized developmental test and parent ratings of adaptive and emotional/behavioral functioning. Participants were 56% female and under the age of 5 (Mean = 26 months).
Results: Language skills were delayed regardless of age, but deficits became greater with increasing age. While fine motor skills were within the average range for young children, they became increasingly worse with age. Parent ratings of adaptive and emotional/behavioral skills did not significantly differ by age. Whether the children had spoken language skills did not differentiate them on developmental or adaptive measures, but children without spoken language were rated as demonstrating greater symptoms of anxiety and withdrawal.
Conclusions: Children with severe to profound hearing loss demonstrate early delays in development skills, which increase with age. Greater social/emotional symptoms are also perceived in children who are not communicating orally. This has implications for identification of hearing loss and subsequent cochlear implantation and/or other intervention at younger ages to decrease developmental impact.
Correspondence: *Rachel B. Tangen, Ph.D., Division of Developmental Pediatrics & Psychology, Rainbow Babies & Children's Hospital, 10524 Euclid Ave., W.O. Walker Building, Suite 3150, Cleveland, OH 44106. E-mail: Rachel.Tangen@UHHospitals.org*

J. URLACHER & A. BAIRD. Second Language Proficiency: Relationship with Sentential Priming in the Processing of Interlingual Homographs.
Objective: Prevailing theories state that bilingual lexical access is exhaustive: representations in both languages are activated when reading words in either language. This study investigated the influence of second language proficiency and word frequency using interlingual homographs – words with identical orthography but different meanings in participants' first language (English) and second language (French). It was hypothesized that if lexical access is exhaustive semantic representations from both languages would be activated when participants read a French sentence ending with a homograph. Moreover, when participants engaged in a subsequent lexical decision task, processing time was expected to be longer when the item was the French translation of the English meaning of the homograph rather than a non-related French control word. In the former condition it was expected that participants would have to exert greater effort to inhibit attention to irrelevant aspects of the semantic representations of the homograph.
Participants and Methods: 94 bilingual participants were recruited from an undergraduate population for screening with a self-report language use questionnaire. Those with adequate French skills (n = 40) returned for a testing session which included measures of bilingual language proficiency and a lexical decision task.
Results: Lexical decision times were longer for homograph translations than control words. The low French proficiency group made more errors on the lexical decision task than the high proficiency group. Both groups made more errors when the homograph presented in the sentence was low frequency in English or in French.
Conclusions: Results were consistent with exhaustive bilingual language processing. However, the precise nature of the role of second language proficiency and word frequency remained unclear. Integration of neuroimaging and neuropsychological studies may assist in illuminating these aspects of language processing in bilinguals.
Correspondence: *Jordan Urlacher, Psychology, University of Windsor, Chrysler Hall South, Room 173, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada. E-mail: urlache@uwindsor.ca*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

E.J. WALDRON, N.M. FEUERBACH, K. MANZEL & D. TRANEL. Is the left temporal pole an amodal hub for retrieving proper names?
Objective: We have proposed that word retrieval is supported by "third-party" mediation systems in left temporal lobe, with the temporal pole (TP) being specialized for proper names. We have also proposed that these systems are modality neutral, and subserve retrieval irrespective of the sensory modality through with the stimulus is apprehended. Part of this framework that has not been well tested is whether naming famous voices would depend on left TP. The current study provides a preliminary step, by presenting normative data on naming familiar voices.
Participants and Methods: Twenty (8 women) healthy participants (age = 48.0 years, SD = 15.3, education = 15.7 years, SD = 2.2) were presented with audio clips of famous voices, and were asked to identify the speaker. We have also begun administering this task to patients with damage to left TP or regions outside left TP.
Results: Overall identification of the famous speakers M = 0.65 (SD = 0.18). No differences in accuracy were noted by participant gender t(18)=.816, p=n.s., or for famous voice gender t(34)=.493, p=n.s. Preliminary results indicate that patients with left TP damage perform below normal on the task.
Conclusions: Identification of famous persons from their voices is less accurate than for famous faces (cf. Tranel et al., 2008). The finding that patients with left TP lesions perform more poorly than other patients and healthy control participants provides support for the notion that left TP is involved in naming of unique concrete entities, regardless of the sensory modality of input.
Correspondence: *Eric J. Waldron, Ph.D., Neurology, University of Iowa, 200 Hawkins Dr., 2007 RCP, Iowa City, IA 52242. E-mail: ericwaldron@uiowa.edu*

Stroke/Aneurysm

B. BUTCHER, P. STAVINOHA & A. SPURGIN. Developmental Effects on Working Memory Following Pediatric Stroke.
Objective: Recent literature challenges the once dominant theory that there is greater capacity for recovery resulting in milder deficits after brain damage early in life. Emerging research on populations with traumatic brain injury, brain tumor, and stroke suggests that there is greater neurocognitive vulnerability with earlier insult to the brain resulting in deficits in overall cognitive functioning, memory, processing speed attention, executive functions, and behavioral functioning. This greater vulnerability may be related to lack of skill consolidation and disruption during rapid stages of development. This study specifically examined effects of age at time of pediatric stroke on clinical and behavioral manifestations of working memory. Working memory is the ability to direct attention to and temporarily store information to manipulate for immediate task-related or environmental demands.
Participants and Methods: This study included 25 patients who experienced a stroke from birth to 16 years of age (M=6.9, SD=5.18) and were subsequently referred for neuropsychological evaluation at Children's Medical Center of Dallas. Younger age at time of stroke was expected to negatively affect working memory.
Results: Pearson's Product Moment Correlation coefficients were computed to determine the relation between age at time of stroke and working memory. The age at time of stroke was strongly correlated with the Working Memory Index based on behavior rating by parent report on the BRIEF r(23)=-0.523, p=0.01. A higher t-score on the BRIEF indicates poorer working memory compared to same-age peers. The age at time of stroke was also strongly correlated with the Working Memory Index from the WISC-IV, a direct clinical measure of working memory, r(23)=0.498, p=0.016.
Conclusions: Age at time of stroke is strongly correlated with working memory. Specifically, children who are younger at time of stroke experience greater deficits on both direct measures of working memory, as well as behavioral functioning associated with working memory.
Correspondence: *Brianne Butcher, Ph.D., Neuropsychology, Children's Medical Center in Dallas, 6300 Harry Hines Boulevard, Chase Bank Building, Suite 900, Dallas, TX 75235. E-mail: brianne.butcher@childrens.com*

L. CASAS, D. BADENES, N. CALZADO, J. ROYO, M. AGUILAR, M. GAROLERA & J. CEJUDO. Incidence of cognitive impairment in patients with severe carotid stenosis will be undergoing endarterectomy: case-control study.
Objective: A) To study whether people with severe stenosis of the carotid artery without cerebrovascular symptomatology (AVC) and without dementia have cognitive impairment than healthy people. B) Describe how cognitive functions are impaired and whether there are cognitive differences based on the severity of the stenosis, the side that will be operated, the presence of neurological symptoms (TIA) and the role played by vascular risk factors .
Participants and Methods: We included 106 subjects: 53 patients with severe carotid stenosis without dementia and 53 healthy controls individually matched for age, sex, education and handedness. Cognitive assessment was performed by RBANS. We used the statistical program SPSS version 8.0 to find cognitive differences between groups and subgroups by comparison of means considering a statistical significance p <0.05 with a bilateral approach.
Results: The data showed that patients had lower cognitive performance in attention, verbal memory, verbal fluency and ability visuespacial-constructive. Only the subgroup of patients according to degree of stenosis showed cognitive differences.
Conclusions: Patients with severe carotid stenosis have a lower baseline cognitive state compared to healthy people of the same demographic characteristics cognitive impairment being related to the degree of carotid stenosis.
Correspondence: *Laura Casas, Neurology, Hospital Universitari Mutua Terrassa, Castell 25, Terrassa 08221, Spain. E-mail: lauracasass@gmail.com*

J. CLARK, C.D. VICKERY, C. EVANS, A.M. SCHMELZER, A. SEPEHRI, R. JONES, J. IRBY & S.F. WATSON. Facets of depression that contribute to depressive symptoms among patients in an inpatient stroke rehabilitation unit.
Objective: Depression is a multidimensional syndrome, the dimensions of which have not been adequately explored in the inpatient stroke rehabilitation setting. The purpose of the current study was to determine what factors of depression contribute to higher scores on a measure of depressive symptoms in an inpatient stroke rehabilitation sample.
Participants and Methods: Data from 100 inpatients (45 male, 55 female) in a stroke rehabilitation inpatient unit were examined. Average age and education was 66.60 (SD = 12.25) and 12.79 (SD = 2.75), respectively. At several time points during their rehabilitation stay, patients were administered self-report instruments assessing depression (Geriatric Depression Scale) and factors of depression, including apathy, energy level, self-efficacy, and self-esteem. Average scores on the apathy, energy level, self-efficacy, and self-esteem measures were entered into regression equations predicting average level of depression across inpatient stay.
Results: After controlling for stroke severity and admission functional independence (FIM) scores, only low self-esteem (t = -6.42, p < .01) was significantly predictive of higher scores on a depressive measure. Lower energy level was marginally predictive of higher depression scores (t = 1.93, p = .06). Levels of apathy and self-efficacy were not significantly predictive of depressive symptoms.
Conclusions: Findings suggest that in a population of stroke rehabilitation patients, lower self-esteem and lower energy levels are associated with higher levels of depression across inpatient stay regardless of stroke severity or level of independent functioning. These findings further emphasize depression as a multidimensional construct, the dimensions of which should be evaluated individually.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Joy Clark, Ph.D., Methodist Rehabilitation Center, 1350 E. Woodrow Wilson, Jackson, MS 39216. E-mail: jclark@mmrcrehab.org*

J. CLARK, C.D. VICKERY, C. EVANS, A.M. SCHMELZER, A. SEPEHRI, R. JONES, J. IRBY & S.F. WATSON. Determinants of learning curves on RBANS memory subtests in an inpatient stroke rehabilitation setting.

Objective: The literature regarding memory performance in stroke populations has historically focused on memory test standard scores. Learning curves and factors that contribute to rate of learning, conversely, have rarely been examined in the literature. The purpose of the current study was to determine what factors are associated with learning curves on RBANS List Learning and Story Memory subtests in a sample of patients on a subacute stroke rehabilitation unit.

Participants and Methods: Participants were 424 (230 females) stroke patients in an inpatient rehabilitation center with mean age and education of 66.76 (SD = 13.22) and 12.55 (SD = 2.90), respectively. Subjects completed a full battery of neuropsychological tests including the RBANS prior to discharge. Individual growth curves were plotted for List Learning and Story Memory subtests, and multi-level modeling procedures determined what factors were associated with rate-of-learning.

Results: After controlling for laterality, the following variables were significantly associated with learning curves on the List Learning subtest (R = 0.75): confrontation naming, semantic fluency, processing speed, and verbal reasoning. After controlling for laterality, education, semantic fluency, processing speed, concentration, and verbal reasoning variables were significantly associated with learning curves on the Story Memory subtest (R = 0.85).

Conclusions: Findings suggest that different factors are associated with learning curves on structured (Story Memory) vs. unstructured (List Learning) memory tasks.

Correspondence: *Joy Clark, Ph.D., Methodist Rehabilitation Center, 1350 E. Woodrow Wilson, Jackson, MS 39216. E-mail: jclark@mmrcrehab.org*

C.D. VICKERY, C.C. EVANS, J. CLARK, A. SEPEHRI, A. SPENCE & S. WATSON. Antidepressant use and rate of change in depressive symptoms and functional status during inpatient rehabilitation.

Objective: Objective: Depression has been suggested to attenuate post-stroke recovery such that patients are being treated with SSRIs earlier in rehabilitation. The present study compared rates of recovery of depressive symptoms and functional status in 3 inpatient groups: patients started on an antidepressant (AD) after CVA, a premorbid AD group and a no AD group.

Participants and Methods: Method: One hundred participants (M age = 66.6, SD = 12.3; M education = 12.8, SD = 2.8; 55% female; 60% Caucasian; 53% right CVA, 38% left CVA, 9% bilateral), consecutively admitted to acute stroke rehabilitation were rated on FIM at admission and discharge. The GDS was administered once/week starting at admission. Linear mixed modeling explored the rate of change in depressive symptoms and FIM scores during hospitalization, and ANOVA was used for between-group comparisons.

Results: Results: Elevated GDS scores were found in 42% of inpatients at admission and 28% by discharge. Linear mixed modeling showed no significant differences among the three groups in GDS score rate of change (AD-new slope = -.43; AD-premorbid slope = -.28; No AD slope = -.18, p = .24), though both AD groups had higher admission GDS scores (p = .004). Likewise, FIM Scores improved at similar rates across the three groups (AD-new slope = 2.7; AD-premorbid slope = 2.7; No AD slope = 2.8, p = .91), though the AD-new group had lower scores on admission (p = .02).

Conclusions: Conclusions: Results indicated that inpatients undergoing stroke rehabilitation improve in mood and functional status at similar rates regardless of antidepressant use.

Correspondence: *Clea C. Evans, Ph.D. in Clinical Psychology, Methodist Rehabilitation Center Quest Program, 1350 E. Woodrow Wilson Drive, Jackson, MS 39216. E-mail: cvickery@mmrcrehab.org*

J.W. IRBY, C. VICKERY & C. EVANS. Effect of Apathy and Depression on Functional Outcome After Stroke.

Objective: Apathy and depression are overlapping but distinct syndromes that have been well-documented following cerebrovascular accident (CVA). While there is extensive research on depression following CVA, there is less research on apathy and functional outcome. The present study examined the effect of apathy and depression on functional outcome measures at the time of discharge from an acute rehabilitation hospital.

Participants and Methods: One hundred participants (M age = 66.6, SD = 12.3; M education = 12.8, SD = 2.8; 55% female; 60% Caucasian; 53% right hemisphere CVA, 38% left hemisphere CVA, 9% bilateral), consecutively admitted to an acute stroke rehabilitation program, were administered the Apathy Scale (AS; Starkstein, 1992) and the Geriatric Depression Scale (GDS) once a week during their stay beginning within the first three days following admission. Linear mixed modeling explored the rate of change in AS and GDS during hospitalization, and regression procedures investigated the relationship between the GDS, the AS, and functional outcome at discharge as measured by the Functional Independence Measure (FIM).

Results: Linear mixed modeling showed that GDS scores significantly decreased during hospitalization (intercept = 10.5, slope = -.28, p<.001), whereas AS scores did not change (intercept = 28.5, slope = .07, p = .18). Regressions showed that, after controlling for admission functional status and stroke severity, AS scores accounted for significant variance in discharge FIM (FIM Total and Motor, Cognitive, Self-Care, and Mobility subscales) scores while GDS scores did not.

Conclusions: The results indicate that, relative to depression, apathy is a stronger predictor of functional outcome following CVA. Therefore, like depression, apathy should be regularly assessed and identified by treatment providers in stroke rehabilitation. Implications for post-acute rehabilitation and various treatment approaches for post-stroke apathy are briefly discussed.

Correspondence: *James W. Irby, Ph.D., Neuropsychology Department, Methodist Rehab Center, 1350 Woodrow Wilson, Jackson, MS 39216. E-mail: jirbyjr@yahoo.com*

R.P. KESSELS, P. SCHAAPSMEERDERS, N.A. MAAIJWEE, L.C. RUTTEN-JACOBS, E.J. VAN DIJK & F.E. DE LEEUW. A 7- to 29-Year Follow Up on Cognitive Outcome after Young Stroke: The FUTURE Study.

Objective: Most studies on cognitive outcome after stroke have focused on older patients, but less evidence exists on patients who have had a stroke before the age of 50 ('young stroke patients'). Existing studies on young stroke have a limited follow-up duration and/or lack measures on mood and fatigue. The present study examines a young stroke sample using an extensive neuropsychological investigation with a follow-up duration up to 29 years post onset, also focusing on mood and fatigue. We expect that especially tests requiring high levels of cognitive effort to be impaired and that post-stroke depressive symptoms may be prominent.

Participants and Methods: 50 patients who had a stroke between the ages of 18 and 50 between 1980 and 2003 were recruited for follow-up examination though the FUTURE study (mean follow-up duration 18.3 years, range 7-29; mean current age 57.7, SD=8.4). An age- and education matched control group was recruited as well (mean age 55.0, SD=13.6). The neuropsychological battery covered all major cognitive domains and overall cognitive decline was assessed by the MMSE. Fatigue was measured with the CIS-20-R and mood and anxiety with the HADS.

Results: The young stroke group performed worse on measures of episodic memory (AVLT; p<.001; Cohen's d=.7-1.0), psychomotor speed

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

(SDST; p<.01; d=.6) and executive function (Stroop interference p<.01; d=.6). Basic attention, language production and semantic memory were unimpaired (d=.1-.4). No between-group differences were found with respect to presence of dementia (MMSE; d=.1), mood or anxiety disorders (d=.1) and mental fatigue (d=.2-.3).
Conclusions: This is the first study with a follow-up duration up to 29 years demonstrating that the cognitive impairments reported in previous studies with a shorter follow-up duration after young stroke are robust and affect effortful domains, with large effect sizes. These deficits are unrelated to mood problems, anxiety or mental fatigue, suggesting that they may be the result of physiological changes.
Correspondence: *Roy P. Kessels, PhD, Department of Medical Psychology, Radboud University Nijmegen Medical Centre, PO Box 9101, Nijmegen 6500 HB, Netherlands. E-mail: r.kessels@mps.umcn.nl*

M. PAVOL, E. GOLDBERG, J.P. MOHR & R. LAZAR. Severe Aphasia Following Infarction in the Territory of the Left Anterior Choroidal Artery.
Objective: To describe a case of severe aphasia following infarction in the left anterior choroidal artery (AChA) territory.
Participants and Methods: Our patient is a 74 year-old, right-handed woman with acute onset of language disturbance and right hemiparesis. Diffusion-weighted brain MRI revealed acute infarction in the territory of the left AChA, including the posterior limb of the left internal capsule. She had no prior neurological deficits. Neuropsychological examination revealed signs of right neglect. Unable to be evaluated by lengthier aphasia batteries, she was given the Mississippi Aphasia Screening Test (MAST).
Results: The patient named 2/5 objects and performed 3/5 automatic speech tasks (Expressive subscale 10/50). She was accurate for 6/10 yes-no questions and followed 1-step auditory commands (Receptive subscale 16/50). Her total MAST score was 26/100. Repetition was notable for perseverations. She had no spontaneous output and responses to prompts were delayed and sparse. She was diagnosed with a mixed nonfluent aphasia. There was no improvement after 1 month.
Conclusions: Infarction of the AChA territory has been associated with hemiparesis, hemianopia, and hemianesthesia. Neglect has also been reported and the language disturbance, when present, has been described as mild. Our case of severe aphasia resulting from ischemic stroke in the left AChA territory was likely the result of disconnection between the thalamus and the cortex.
Correspondence: *Marykay Pavol, PhD, Columbia University, 710 W. 168th Street, room 607, New York, NY 10032. E-mail: mp2740@columbia.edu*

C.M. PEARSON & S.D. GALE. Left-Greater-Than-Right Medial Thalamic Stroke Presenting as Frontotemporal Dementia: A Long-Term Case Report.
Objective: Bilateral medial thalamic infarcts may result in behavioral and neuropsychological deficits characterized by socially inappropriate behavior, apathy, aggression, and dementia. Furthermore, asymmetrical lesions of the left versus right medial thalamus can also produce language or visual-spatial disturbances respectively. These deficits are presumably due to a disconnect in cortico-striatal-thalamo-circuitry, and in this case mimicked the neurobehavioral characteristics of frontotemporal dementia. The following case report presents longitudinal data of a man with a history of left-greater-than-right bilateral thalamic stroke, but intact cerebral cortex, whose presentation was concerning for frontotemporal dementia.
Participants and Methods: A 53-year-old, right-handed man with a history of left-greater-than-right bilateral thalamic stroke. The patient received comprehensive neuropsychological evaluation at 1-year and 3-years post stroke onset.
Results: Results of the initial evaluation revealed aphasia, memory disturbance, and executive impairment, as well as behavioral dyscontrol. At 3-years post-stroke the patient's neuropsychological impairments were essentially unchanged with the exception of mild improvements on tests of executive functioning and a return to average on tests of visual-spatial functioning. The patient's behavioral disturbances persisted.
Conclusions: Individuals with left-greater-than-right bilateral medial thalamic infarcts can have behavioral and neuropsychological deficits that closely resemble those of frontotemporal dementia. However, patient's with stroke should either remain stable or improve over time. This case demonstrates the important role of longitudinal neuropsychological evaluation in differential diagnosis.
Correspondence: *Caleb M. Pearson, Psy.D., Neuropsychology, Barrow Neurological Institute, 222 West Thomas Road, Suite 315, Phoenix, AZ 85013. E-mail: caleb.pearson@gmail.com*

A. SOPER, J. BALDO & N.F. DRONKERS. Neural Correlates of Post-Stroke Depressive Symptoms.
Objective: Depressive symptoms are common sequelae of stroke within the chronic phase of recovery (>1 year post-CVA). While there is considerable debate about an association between lesion location and depressive symptoms, the contribution of white matter tract involvement in the prediction of post-stroke depressive symptoms is unknown. We examined whether lesion location and white matter involvement differed between individuals reporting at least mild depressive symptoms and those below cutoff for mild depressive symptomatology (WNL).
Participants and Methods: 29 left hemisphere stroke patients were assessed with the Geriatric Depression Scale at least one year post CVA. Digitized lesion reconstructions of 13 patients who endorsed at least mild depressive symptoms were overlaid and compared with those of 16 patients who were WNL. Severity of aphasia was assessed with the Western Aphasia Battery.
Results: More than half (69%) of patients who endorsed at least mild depressive symptoms had relatively large anterior insular/opercular lesions. Further, these patients also had lesions involving the anterior portion of the superior longitudinal fasciculus (SLF), a white matter tract connecting frontal with temporal and parietal lobes. In contrast, the WNL group had significantly less SLF involvement, with fewer or smaller insular/opercular lesions. Severity of aphasia did not statistically distinguish the two groups.
Conclusions: While not a clear dissociation, lesion location and size, as well as disruptions in connectivity were associated with depressive symptomatology in this sample. This is the first known study to implicate involvement of a specific white matter tract with depressive symptomatology in chronic stroke patients.
Correspondence: *Ana Soper, PhD, VA Northern California Healthcare System, VA Northern California Healthcare System, 150 Muir Rd., Martinez, CA 94553. E-mail: ana.soper@va.gov*

W.S. VEENSTRA, R.J. GROEN & J.M. SPIKMAN. Impaired Theory of Mind, Affective Perspective taking and decisionmaking in SAH.
Objective: To characterize Theory of Mind, empathy, affective perspective taking and decisionmaking in SAH patients 4.5 months after aneurysm treatment.
Participants and Methods: 25 SAH patients 3-6 months after aneurysm repair (clipping/coiling)and 25 healthy controls Neuropsychological assessment included FEEST (Young et al. 2002), the Eyes Test (Baron Cohen, 2001), the Cartoon test (Happé, 1994), the Strange Stories test (Happé, 1994), the Faux-pas recognition test (Stone et al., 1998), the Emotional Empathy Questionnaire (Mehrabian et al., 1972, the Iowa Gambling Task (Bechara etal., 1994)
Subjective emotional and behavioural changes were assessed using self-rated and proxy-rated questionnaires; (Schure, 1995), the Dysexecutive Questionnaire (Burgess et al., 1996) and the Apathy Evaluation Scale (Marin et al., 2000)
Results: Independent sample t-test was used for comparison between patients and healthy controls. Pearson's correlation coefficients were used to investigate associations between variables. Alpha level was set at .001, .01 or .05 (two-tailed). SAH patients were significantly impaired on tasks measuring Theory of Mind, Empathy, Affective Perspective taking and decisionmaking when compaired to healthy controls.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: SAH patients were significantly impaired on attributing mental states (Theory of Mind), Empathy and Affective Perspective taking abilities as well as emotional decisionmaking and behavioural regulation within 6 months after aneurysm treatment.
SAH patients demonstrated poor decisionmaking and showed no learning effect. Possibly impairments in the group of SAH patients were the results of either direct damage of the orbito prefrontal cortex, as a result of micro-ischaemia, infarction and/or vasospasms or a disconnection of the ventromedial circuitry as a result of distant, more diffuse brain damage. A group of 150 SAH patients will be followed for a further 20 months up to 3 years post illness to evaluate changes in social cognitive functioning over time.
Correspondence: *Wencke S. Veenstra, MSc, Neurology, University Medical Center Groningen, Hanzeplein 1, 9700 RB, Groningen 30 001, Netherlands. E-mail: w.s.veenstra@neuro.umcg.nl*

M. WILDE & R. PARIKH. The Impact of Motor Impersistence on Functional Outcome in Subacute Stroke.
Objective: Investigate the relation between Motor Impersistence and functional outcome in acute stroke.
Participants and Methods: Seventy ischemic and hemorrhagic subacute stroke patients receiving rehabilitation served as subjects for this study. None of the patients had a preexisting neurologic, psychiatric or substance abuse disorder. The Motor Impersistence Test was administered along with the Mini Mental Status Examination (MMSE) and Line Bisection test. Hierarchical linear regression was used to examine the association between the severity of Motor Impersistence and clinical as well as background variables.
Results: There were 22, 35, and 13 patients with left, right, and bilateral lesions respectively. The mean number of days post stroke was 10.19 (sd =4.77). Thirty seven percent of the sample had motor impersistence. Of that, 59% had moderate and 41% had severe motor impersistence. Thirty four percent of the sample had neglect and amongst these, 92% had left neglect and 8% had right neglect. A hierarchical linear regression was calculated using the Functional Independence Measure (FIM) motor score
as the outcome variable. The following variables were entered in order: Age, Motor Impersistence Severity
(a scale ranging from 0(no motor Impersistence) to 2 (severe motor Impersistence), the presence or absence of neglect as measured by the line bisection test, and total MMSE score. The total model was statistically significant F = 31.30 p <.05 and accounted for 30% of the variance. Age accounted for 8% of the variance. The severity of motor impersistence accounted for 18% of the variance. The presence of neglect accounted for an additional 5% of the variance and the MMSE total score did not contribute a significant amount of variance in functional outcome (< 1%).
Conclusions: The presence and severity of motor impersistance after stroke significantly predicts outcome. The significance of these findings will be discussed within the context of stroke and cognitive impairment.
Correspondence: *Mark Wilde, Univeristy of Texas at Houston, 6431 Fannin, Houston, TX 77030. E-mail: mark.c.wilde@uth.tmc.edu*

K. WINGEIER, S. BIGI, M. EL-KOUSSY, E. BOLTSHAUSER, M. STEINLIN & T.H. HEINKS-MALDONADO. Physical and emotional well-being and quality of life following acquired hemorrhagic cerebellar lesions in childhood.
Objective: Cerebellar cognitive affective syndrome represents a neurobehavioral phenomenon comprising neuropsychological deficits and behavioral/affective symptoms. Studies have associated lesions of the posterior lateral cerebellar hemispheres with higher order cognitive problems, and injuries of the vermis with dysregulation of affect. In this study we focused on long-term neuropsychological outcome (reported elsewhere), physical well-being, quality of life and behavioral/emotional problems in patients with a history of acquired non-neoplastic cerebellar lesions during childhood.
Participants and Methods: All eight patients had a history of hemorrhagic cerebellar stroke due to arterial venous malformation or cavernoma at least one year prior to participation. In four of eight patients the vermis of the cerebellum was affected. To assess the patients' physical well-being, emotional health and behavioral problems, as well as quality of life the following questionnaires have been chosen: Child Behavior Check List, Youth Self Report, the Marburg inventory (quality of life in children and adolescents) and the Kidscreen-52.
Results: Quality of life was rated to be average or even above average by all patients and their parents. Furthermore, participants reported to be in good general mental health with slightly reduced physical well-being and mild somatic complaints. Those reporting affective and behavioral regulation problems exclusively mentioned internalizing problems, rather than rule-breaking or aggressive behavior. Higher scores on emotional and behavioral problem scales coincided with a lesioned vermis.
Conclusions: The presence of cerebellar cognitive affective syndrome was mildly expressed but only in children with vermis lesions. While hemorrhagic cerebellar lesions cause marked acute symptoms patients' long-term prognosis is promising along with good quality of life.
Correspondence: *Kevin Wingeier, MSc, Pediatric Neurology, University Children's Hospital, Inselspital, Bern 3010, Switzerland. E-mail: kevin.wingeier@insel.ch*

Visuopatial Functions/Neglect/Agnosia

D.B. BURTIS, M. MISHRA, J. WILLIAMSON & K. HEILMAN. Line Bisections in Normal Subjects with Constrained Monocular Viewing.
Objective: Collicular ablation causes contralesional neglect suggesting that unilateral collicular injury produces ipsilateral hemispheric de-activation. Constrained monocular viewing (CMV) takes advantage of the relatively higher concentration of retinal fibers decussating to the contralateral superior colliculus (SC). Thus with CMV there may be increased activation of the contralateral hemisphere and relative deactivation of the ipsilateral hemisphere. Contralesional CMV (e.g., right eye patch) was proposed by Posner/Rafal (1987) as a treatment for patients with left hemispatial neglect. The purpose of this study is to evaluate the impact of CMV on LBT in normal subjects.
Participants and Methods: 40 normal adults aged 18-79 years wore goggles designed to cover one eye while restricting the field of vision of the other open eye so that only the paper that contained the line was visible. We administered the LBT with random assignment of left vs. right CMV. The subjects bisected 12 – 26cm long lines with each eye.
Results: When viewing with the left eye the line bisections deviated a mean of 3.62mm rightward from midline; and when viewing with the right eye, subjects deviated to the left by 1.49mm. The between eye deviations were significantly different (p<0.000).
Conclusions: The finding that normal adults demonstrate a deviation contralateral to the viewing eye does not support the hemispheric monocular collicular-hemispheric activation hypothesis, but rather suggests ipsilateral inhibition. Alternatively, this deviation on the LBT may be the result of an attempted compensation for an altered visual field, and thus similar to the deviation seen with hemianopia.
Correspondence: *David B. Burtis, DO, Neurology, University of Florida, 100 South Newell Drive, P.O. Box 100236, Gainesville, FL 32610-0236. E-mail: brandon.burtis@neurology.ufl.edu*

M.R. KIRKPATRICK, A.E. WAGNER, N. CROCKER & S.N. MATTSON. Children With Heavy Prenatal Alcohol Exposure are Distinguishable from Children with ADHD and Controls on Visuospatial Memory.
Objective: Prenatal exposure to alcohol is associated with impaired visuospatial processing and memory, and is related to increased rates of ADHD. Previous studies suggest that attention deficits may impact visuospatial memory performance. The current study assessed children with heavy prenatal alcohol exposure, ADHD, and typically developing controls on visuospatial memory tasks to determine whether there is a unique effect prenatal alcohol exposure on these skills.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: 100 subjects (7-13 yrs, M 9.937) in 3 groups participated: children with heavy prenatal alcohol exposure (ALC, N=38), non-exposed children with ADHD (ADHD, N=29), and age- and sex-matched controls (CON, N=33). Most of the children in the ALC group met DSM-IV criteria for ADHD. Subjects were administered the spatial recognition memory (SRM) and pattern recognition memory (PRM) tests from the CANTAB.
Results: Raw scores were analyzed using a 2 x 3 ANOVA with test as the within-subjects factor and group as the between-subjects factor. The group main effect was significant ($F(2, 97) = 5.315$, $p = .006$). Poc-hoc analyses revealed that the ALC group performed worse than both CON ($p = .003$) and ADHD ($p = .020$) groups, which did not differ from each other ($p = .561$). There was a differential relationship between IQ and memory scores: IQ was significantly correlated with PRM scores in only the ALC group, and with SRM scores in the CON and ADHD groups, but not in the ALC group. Results were unchanged when children in the ALC group without ADHD were excluded.
Conclusions: ALC subjects were distinguished from ADHD and CON subjects on visuospatial memory tests. Results did not appear to be solely attributable to IQ. These findings show the utility of comparing children with FASD and ADHD by illustrating unique deficits related to prenatal alcohol exposure and help define the profile of children with FASD by comparing them to children who display similar clinical symptoms.
Supported by NIAAA Grants R01 AA010820, R01 AA010417 and U01 AA014834.
Correspondence: *Nicole Crocker, MA, Psychology, SDSU/UCSD Joint Doctoral Program in Clinical Psychology, 906 21st Street Apt 7, San Diego, CA 92102. E-mail: ncrocker@projects.sdsu.edu*

J. DOUGLAS. Relation of Executive Functioning to Pragmatic Outcome following Severe Traumatic Brain Injury.
Objective: This study was designed to explore the behavioural nature of pragmatic impairment following severe traumatic brain injury (TBI) and to evaluate the contribution of executive skills to the experience of pragmatic difficulties after TBI.
Participants and Methods: Participants were 43 TBI dyads (TBI adults and close relatives) and 43 control dyads. All TBI participants had sustained severe injury (mean posttraumatic amnesia duration 45.19 days, SD 39.15 days) due to moving vehicle-related trauma. A minimum of 2 years had elapsed since injury (mean 5.36 years, SD 3.61 years). The La Trobe Communication Questionnaire was administered to all participants. Measures of executive function included: FAS verbal fluency task, Speed and Capacity of Language Processing test and Rey Auditory Verbal Learning Test.
Results: Perceptions of TBI participants and their relatives were significantly correlated ($r = .63$, $p < .001$) and significantly different from those of controls ($F(1, 84) = 37.2$; $p < .001$). Pragmatic difficulties represented violations in three domains of Grice's Cooperative Principle (Quantity, Relation, Manner) and executive function measures predicted 37% (32% adjusted) of the variability in LCQ scores.
Conclusions: The study demonstrates evidence of a significant association between executive impairment and the pragmatic communication difficulties experienced by individuals with TBI.
Correspondence: *Jacinta Douglas, PhD, Human Communication Sciences, La Trobe University, Kingsbury Drive, Bundoora, VIC 3086, Australia. E-mail: J.Douglas@latrobe.edu.au*

K.M. GOEDERT, P. CHEN, A. BOTICELLO, J. MASMELA, U. ADLER & A.M. BARRETT. Assessment of Spatial Neglect in an Acute Post-Stroke Sample: Psychometric Properties of the Catherine Bergego Scale and Behavioral Inattention Test.
Objective: Spatial neglect is a disorder associated with poorer stroke recovery that results in the failure or slowness to respond, orient, or initiate action towards contralesional stimuli. Despite the importance of early detection, psychometric evaluation of assessment tools has focused on subacute and chronic populations. We addressed this gap by assessing the properties of psychometrically developed, validated neglect measures – the Behavioral Inattention Test-conventional (BIT) and the Catherine Bergego Scale (CBS) – in an acute sample of stroke patients with left neglect.
Participants and Methods: Patients presenting with left neglect (n = 44, 23 female) tested an average of 23.8 days post-stroke. We obtained BIT-conventional, CBS, and Barthel Index assessments for each patient, as well as clinical and laboratory assessments of perceptual-attentional and motor-intentional deficits.
Results: A 5-item version of the BIT demonstrated good reliability and loaded onto a single factor. Principal components analysis of the CBS, however, identified two underlying factors: perceptual-attentional items (CBS-PA) and embodied, motor exploratory items (CBS-ME). More severe neglect on the CBS-PA measure was associated with greater perceptual-attentional bias on the clinical and laboratory tests. Performance on the CBS-ME measure was not related to clinical and laboratory assessments, but did predict more problems in activities of daily living on the Barthel Index.
Conclusions: Our results indicate that psychometrically developed assessment tools for spatial neglect may examine two major categories of spatial deficit. CBS-ME scores, in particular, may improve detection of individuals with spatial action deficits most likely to require increased assistance from caregivers or long-term nursing care.
Correspondence: *Kelly M. Goedert, Psychology, Seton Hall University, 400 South Orange Ave., South Orange, NJ 07079. E-mail: kelly.goedert@shu.edu*

S. HAQUE, J. WILLIAMSON, B. BURTIS & K. HEILMAN. The Effects of Stimulus Proximity on Spatial Bias (Neglect) and Distractibility.
Objective: Patients with spatial neglect from hemispheric lesions often show an ipsilesional bias on the line bisection task (LBT). Normally, whereas the left hemisphere (LH) is biased to attend to stimuli in proximal- peripersonal space, the right hemisphere (RH) attends toward distal space. The purpose of this study was to learn the effect of distance (distal versus proximal) and distracting stimuli on the LBT.
Participants and Methods: A 70 year old, right-handed man, 4 years post left middle cerebral artery stroke was assessed with 60 line bisection tests presented proximally (30 cms) and distally (167cms). In both distance conditions there was a right (20 trials) or left (20 trials) lateral distracting stimulus.
Results: The patient deviated to the left (ipsilesional) across all conditions. Leftward deviation was greater in distal than proximal space ($p<.000$) and the patient deviated toward (approach) the distracting stimuli in proximal but not in distal space ($p<.014$).
Conclusions: Neglect on the LBT appears to be related to an imbalance in the hemispheric allocation of contralateral attention. In this patient with a LH injury, this leftward bias suggests that the RH had a greater influence in the spatial allocation than did the injured LH and, because it is the RH that primary attends to distal space, this leftward bias was enhanced in distal space. Since the LH normally attends to more proximal space, the increased distractibility may be related to injury, or independent of injury, proximal stimuli may be more likely to cause distraction
Correspondence: *Salsabil Haque, University of Florida, 4715 SW 18th Place, Cabana Beach Apt# 2433, Gainesville, FL 32607. E-mail: salohaque@ufl.edu*

K.E. KING, A. YONAS, S.L. CORROW & R.S. ZIEGLER. Developmental Prosopagnosia: A Pediatric Case Study.
Objective: While prosopagnosia is most often due to acquired damage to specific areas of the brain, some individuals exhibit an impaired ability to recognize faces without known neurological impairment. Developmental prosopagnosia, especially in children, is less understood, but as illustrated by this case study, undoubtedly presents with the same deficits as its acquired counterpart.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: A comprehensive neuropsychological evaluation was conducted with a 7-year-old, mixed-handed, Caucasian male performing over 3 standard deviations below the mean on the Cambridge Face Memory Test for Children and diagnosed with prosopagnosia. Areas assessed include: intelligence, expressive and receptive single-word vocabulary, pragmatic language, affect recognition, visual attention, visual memory, visual perceptual functioning, and fine motor dexterity.
Results: The child's intellectual functioning, single word expressive and receptive vocabulary, and pragmatic language are above average. He demonstrated intact visual perceptual skills and memory for visual spatial and paired verbal/visual information. His recall for detailed visual information and recognition of faces was a significant weakness, and on a pegboard task, his left hand was over 30 standard score points lower than his right hand.
Conclusions: This very intelligent, 7-year-old male demonstrated a circumscribed weakness for face recognition without accompanying deficits in object identification, visual perceptual information processing, or other visual recognition memory. Yet, despite these intact abilities, he experiences significant psychosocial impairment secondary to his poor memory for faces.
Correspondence: *Kelly E. King, Ph.D., University of Minnesota, 360 Spring St. #239, St. Paul, MN 55102. E-mail: kingx780@umn.edu*

Y. LEE, C.L. GRADY & M. MOSCOVITCH. Compromised face processing network in developmental prosopagnosia.
Objective: Previous studies demonstrated that individuals with developmental prosopagnosia (DP) showed normal activation and adaptation to faces in the ventral occipitotemporal cortex but functional and structural deficiencies in the extended face network. Here we present fMRI evidence for compromised face processing in DP.
Participants and Methods: Four female participants with DP (age 37-46) had face recognition impairment without any lesion. Two experiments (block-design) were conducted during a single session: localizer (faces, houses, objects, scrambled objects) and adaptation experiments (faces repeated in either identity or viewpoint, or both). The fusiform face area (FFA) was identified in each participant. We also analyzed whole-brain data using partial least squares to identify networks of brain regions whose activation covaried across stimulus conditions during the localizer scan.
Results: All DPs showed right FFA activation (three of them bilaterally) for faces vs houses; two of them exhibited normal adaptation to repeated facial identity in the same view and across viewpoints. Across the whole brain, however, DPs showed diverging patterns of activation from control participants. One pattern differentiated faces from all other stimuli in controls but not in DPs. A second pattern differentiated faces from houses in ventral areas (including fusiform) in both groups; however, this network also was more active for objects than faces only in DPs.
Conclusions: The results suggest that face processing networks are less specialized in DP despite robust activity for faces in FFA.
Correspondence: *Yunjo Lee, PhD, Rotman Research Institute, Baycrest Centre, 3560 Bathurst Street, Toronto, ON M6A 2E1, Canada. E-mail: yunjo.lee@utoronto.ca*

A. MCDERMOTT, A.K. TRAN, M. KANG & K. FUCHS. The Test of Visuospatial Construction: Continuing the Psychometric Evaluation of a Motor Free Test of Visuoconstruction.
Objective: The Test of Visuospatial Construction (TVSC) was developed as an easily administrated measure of visuoconstruction that does not rely on an upper extremity motor response. Research has shown that it can differentiate statistically between neurologically normal and brain injured patients (p <.0001). It has also been shown to have good construct validity. This project aimed to continue evaluating its psychometric properties by replicating previous findings.
Participants and Methods: This study involved 87 healthy volunteers and 168 individuals with known brain injury or neurological disease. ANOVA was performed to compare means. Pearson product-moment correlations were performed to determine validity. ROC curve analysis was used to determine optimal cutoffs.
Results: Analysis revealed significant differences between groups on the TVSC (p <.0001). It also demonstrated good construct validity. It correlated highest with Block Design (r =.64, p <.0001), Visual Puzzles (r = .61, p <.0001), and RCFT (r = .51, p <.0001). It also correlated with the Similarities (r =.43, p<.0001) and Information (r =.37, p =.001) subtests to a degree consistent with the correlations found between these two subtests and Block Design in the WAIS-III normative sample. The TVSC did not correlate with the Wechsler Test of Adult Reading; a theoretically dissimilar task (r = .13, p =.26).
Conclusions: These findings suggest that the TVSC is a valid measure that has the ability to distinguish between healthy volunteers and persons with known neurological disease/injury. It also continues to show good construct validity in terms of strength, direction, and consistency. Optimal cutoffs and future research endeavors are discussed.
Correspondence: *Adam McDermott, PsyD, Neuropsychology, University of Virginia, 933 Huntwood Ln, Charlottesville, VA 30080. E-mail: adam.t.mcdermott@gmail.com*

M. KANG, A. MCDERMOTT, A.K. TRAN & K. FUCHS. Evaluating the Efficacy of the Test of Visuospatial Construction (TVSC) in Clinical Populations: Can the TVSC Distinguish Between Various Neurological, Medical and Psychiatric Conditions?
Objective: Many disorders can cause visuospatial impairment and/or constructional deficits. However, with many of the neuropsychological tests available it is difficult to measure visuoconstruction without relying on an upper extremity motor response. Thus, the Test of Visuospatial Construction (TVSC) was developed as an easily administrated measure of visuoconstruction that does not rely on such as response. The TVSC has been shown to differentiate statistically between neurologically normal and brain injured patients (p<.0001). It has also been shown to have good convergent and discriminant validity. This project aimed to evaluate the ability of the TVSC to distinguish between healthy volunteers and specific clinical populations.
Participants and Methods: This research involved 87 healthy volunteers and 150 subjects with an assortment of neurological, medical and psychiatric diagnoses. Analysis of variance was performed to compare means.
Results: As hypothesized, the findings indicate that the TVSC can statistically differentiate between several clinical populations including Alzheimer's disease (p<.0001), multi-domain mild cognitive impairment (p<.0001), mood disorder (p<.0001), multiple sclerosis (p =.012), Parkinson's disease (p =.04), brain tumor (p =.025), and stroke (p <.0001). As was also expected, there was no difference between the neurologically normal group and those with amnestic MCI (p =.303) because of the absence of visuospatial dysfunction.
Conclusions: These findings show that the TVSC is effective at distinguishing between healthy volunteers and persons with a variety of neurological, medical and psychiatric diagnoses. Implications and future research endeavors are discussed.
Correspondence: *Adam McDermott, PsyD, Neuropsychology, University of Virginia, 933 Huntwood Ln, Charlottesville, VA 30080. E-mail: adam.t.mcdermott@gmail.com*

A.K. TRAN, A. MCDERMOTT, M. KANG & K. FUCHS. Mild Cognitive Impairment and Alzheimer's Disease: Can the Test of Visuospatial Construction Distinguish Between Groups and Help Track Possible Progression of Impairment?
Objective: Research has shown that individuals diagnosed with mild cognitive impairment have a higher risk of converting to a dementia process than the general population. As such, serial cognitive testing is beneficial in order to track for possible progression of cognitive impairments. One thinking skill that may be affected is visuospatial construction, particularly in those diagnosed with non-amnestic MCI and dementia. This project specifically aimed at evaluating the ability of the Test of Visuospatial Construction (TVSC) to differentiate between individuals diagnosed with amnestic MCI (aMCI), multi-domain MCI (mMCI), and Alzheimer's disease (AD).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: This study involved 87 healthy volunteers and 49 individuals diagnosed with mild cognitive impairment or Alzheimer's disease. Analysis of variance was performed to compare means.
Results: As hypothesized, analysis revealed significant differences between healthy volunteers and individuals diagnosed with mMCI ($p < .0001$) and AD ($p < .0001$). As was also expected, there was no difference between the neurologically normal group and the aMCI group because the aMCI group lacked visuospatial deficits. Group performances on this measure revealed a step-wise decrease in visuospatial dysfunction with the healthy sample scoring best, the mMCI group showing moderate deficits, and the AD group exhibiting the most severe impairments.
Conclusions: These findings show that the TVSC is able to differentiate between these groups and that performance on this task can help to evaluate and track for possible progression of visuospatial impairment over time. Performance specifics, implications, and future research endeavors are discussed.
Correspondence: *Adam McDermott, PsyD, Neuropsychology, University of Virginia, 933 Huntwood Ln, Charlottesville, VA 30080. E-mail: adam.t.mcdermott@gmail.com*

D.J. NORTON, T.M. LAUDATE & A. CRONIN-GOLOMB. Hemineglect in Left-Onset Parkinson's Disease is Independent of Visual Scanning Patterns.
Objective: Parkinson's disease (PD) patients with symptom onset on the left side of the body (LPD) often show mild left-sided visuospatial neglect consistent with right parietal dysfunction, whereas patients with onset on the right side (RPD) do not show neglect. The mechanisms underlying these observations are unclear. While perceptual processing and attention are likely involved, abnormal eye-scanning patterns may also be a factor, especially since exploratory eye movements in LPD are biased toward the right side of space. To isolate the role of eye movements, we employed a two-alternative forced-choice line-bisection task, using brief presentation to preclude strategic eye movement.
Participants and Methods: Participants were non-demented PD patients (8 LPD, 13 RPD) and neurologically normal controls (9 NC). A horizontal line was presented with an intersecting vertical hatchmark, positioned to the left or right of the line's midpoint by varying degrees. The task was to determine whether the hatchmark was to the left or the right of center.
Results: Despite the short presentation (83.3 msec), LPD were significantly biased toward perceiving the horizontal line's center to be right of the true center. NC were biased to perceive the line's center as being slightly left of true center (which is typical for neurologically healthy individuals), as were RPD. ANOVA revealed significant effects of group, hatch position, and a group by position interaction.
Conclusions: These results suggest that the mild yet consistent hemineglect seen in LPD is independent of eye-scanning patterns, and instead may reflect disrupted attention to or perception of space in the left visual hemifield.
Correspondence: *Daniel J. Norton, B.A., Boston University, 648 Beacon St, Boston, MA 02215. E-mail: djn@bu.edu*

U.S. SPRINGER, T.P. KUHN, M.S. OKUN, R.M. BAUER, H.H. FERNANDEZ & D. BOWERS. Paradoxical Visuospatial Cognition in Essential Tremor: a Case of Compensation?
Objective: Neuropsychological studies of essential tremor (ET) consistently describe mild deficits in fronto-executive functions; however, visuospatial functions have been characterized more variably. This prospective study tested the counterintuitive hypothesis that greater tremor severity in ET predicts better spatial cognition, based on hints from recent behavioral and structural neuroimaging studies.
Participants and Methods: Thirty-one non-demented individuals with upper-extremity ET were recruited from a medical center and the community, and then categorized into severe and mild tremor groups. These were compared with 33 healthy controls on a battery of traditional neuropsychological instruments and experimental, computerized tasks.
Results: ANOVAs revealed that while neither ET group outperformed the controls, and the severe ET group performed the most poorly on executive-functioning measures, the severe ET group performed at least as well as the mild ET group on all spatial measures, even outperforming this group in the mental rotation of hands and spatial memory/navigation. Follow-up hierarchical regressions found that tremor severity in ET predicted better performance on these spatial measures above and beyond other significant demographic, cognitive, and mood predictors (likely holding an inverse-U relationship).
Conclusions: The finding that more severe upper extremity tremor in ET is associated with better spatial cognition is counterintuitive but complementary to previous behavioral and neuroimaging findings. It is possible that ET patients compensate for severe intention tremor by more heavily relying on certain spatial abilities, as they need to accurately and efficiently recalculate trajectories, angles, and distances while reaching for, manipulating, and/or avoiding nearby objects during tremulous movement. A chronic and heavier reliance on spatial functions may at least partially counteract the deteriorative effects of ET-related disease processes.
Correspondence: *Utaka S. Springer, M.S., Mental Health, VA Northern California HCS, 150 Muir Road, Martinez, FL 94597. E-mail: uspringer@gmail.com*

P. CHAMARTHY, J. WILLIAMSON & H.M. KENNETH. Asymmetrical Distractibility in Mediating Focal Spatial Attention in Normal Subjects.
Objective: Attention is the means by which a person triages the allocation of resources to process afferent stimuli based their relevance to this person's goal oriented behavior. A distracting stimulus alters the allocation of these processing resources. When performing line quadrisection, a spatial task that requires both global and focal attention, a person who is distracted by a lateralized stimulus may focally shift their focal attention toward this distractor. Prior studies have found that focal attention is primarily mediated by the left hemisphere and global attention by the right hemisphere, thus lateral distractors on the right (verses left) side of a horizontal line might induce more focal right deviation than left sided distractor causes leftward deviation.
Participants and Methods: To assess this hypothesis, we administered right and left line the quadrisection tests with and without lateral distracters to12 young adults (4 men, mean age = 21.08; SD = .669). The subjects were given 240mm horizontal lines, without and with right and left lateral distracters and asked to quadrisect the line on the right or left side.
Results: Subjects were significantly ($p < 0.05$) affected by the distracting stimulus on the right when they were performing right sided bisections (deviated to the right end of the line), but not when the distractor was on the left or with left sided quadrisections.
Conclusions: That right sided distractors influence right sided quadrisection, may be related to the left hemisphere's dominance in mediating focal attention, or that the right hemisphere has a greater capacity to deal with distracting stimuli.
Correspondence: *John Williamson, Ph.D., Neurology, University of Florida, 8114 SW 53rd Place, Gainesville, FL 32608. E-mail: john.williamson@neurology.ufl.edu*

A. KABASAKALIAN, J. WILLIAMSON & K.M. HEILMAN. Ego and Allocentric Peripersonal Spatial Hypometria in Parkinson's Disease.
Objective: People with Parkinson's disease (PPD) who often demonstrate hypometric movements also demonstrate hypometric estimates of imagined actions, suggesting a conceptual hypometria. There are different methods of cognitively estimating distances and the purpose of this study was to learn if PPD demonstrate altered magnitude estimates of spatial distances using body part lengths (egocentric) versus standard units of measurement (allocentric).
Participants and Methods: 20 PPD, 12 with predominately right-sided and 8 with predominately left-sided signs, all on therapeutic doses of dopaminergic medications, and

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

13 healthy people (controls) served as participants.
Half of the trials started with the proximal shoulder adjacent to the wall and in the other half 5 feet from the wall. They were asked to move their body toward or away from the wall to a position where their shoulder was either an arm's length from the wall (egocentric) or 1, 2, or 3 feet from the wall (allocentric).
Results: Compared to controls, the PPD made both hypometric egocentric and allocentric errors ($p<.05$). There were no significant differences as a function of initial position or side of PD onset.
Conclusions: These results support the postulate that the hypometria associated with PD is not purely a motor deficit and is present whether egocentric (arm-length) or allocentric (standard measurement units-feet) references are used to estimate distances in peripersonal space.
Correspondence: *John Williamson, Ph.D., Neurology, University of Florida, 8114 SW 53rd Place, Gainesville, FL 32608. E-mail: john.williamson@neurology.ufl.edu*

J. WILLIAMSON, A. AL WAFAI, V. DRAGO, I.S. FISCHLER, J. AUSTIN & K.M. HEILMAN. The influence of meditation on creativity.
Objective: The term "meditate" comes from the Latin root that means to ponder; however, meditation refers to practicing one of several forms of attentional-awareness mental self-regulation. Since creativity may be influenced by attention, awareness and stress, the purpose of this study was to learn the effects of meditation on creativity (as assessed by convergent and divergent reasoning processes).
Participants and Methods: Five healthy normal subjects (mean age 41, 16 years of education) were administered the Torrance Tests of Creative Thinking (TTCT), a test of creative divergent and convergent reasoning in both visual and verbal domains, before and after an 8 week course of "Mindfulness Based Stress Reduction" (MBSR).
Results: A repeated measures ANOVA comparing overall verbal pre and post performances demonstrates a significant improvement in verbal creativity ($p=.002$) with a significant increase in flexibility ($p= .023$), but no significant change in non-verbal creativity.
Conclusions: MBSR uses focal attentional tasks to increase awareness and control of the direction of attention. There is suggestion in the literature that shifts occur from top down to bottom up processing. These data suggest that MBSR enhances verbal creativity and has no or a negative impact on nonverbal creativity. This alteration of creativity may be related to changes in attention, and stress, but further research will be needed to elucidate the cause of these changes.
Correspondence: *John Williamson, Ph.D., Neurology, University of Florida, 8114 SW 53rd Place, Gainesville, FL 32608. E-mail: john.williamson@neurology.ufl.edu*

T. ZINK, J. DEGUTIS, A. GROSSETETE, K. NAKAYAMA, R. MCGLINCHEY & W. MILBERG. A Modern Version of a Classic: Combining the Cross Copy Task with a Computerized Tablet Reveals Subtle Motoric Deficits in Hemispatial Neglect.
Objective: Hemispatial neglect is a debilitating disorder characterized by spatial and non-spatial deficits. There are many standard batteries for assessing the different aspects of neglect, typically including subtests measuring object-based, personal, representational, and intentional neglect. These batteries can be time-consuming and may not capture more subtle aspects of neglect. In an attempt to sensitively measure several aspects of neglect with one task, we used a computerized tablet with a classic 'cross copy' task in which participants copy a cross on paper with and without ink.
Participants and Methods: Our approach enabled us to measure whether the copied cross visually demonstrated neglect, but more importantly provided additional data about the precise length, velocity, initiation time, and curvature of each segment. Patients with neglect (N=4), stroke patients without neglect (N=2), and age-matched controls (N=4) performed 24 cross copy trials (12 with ink / 12 without ink).
Results: Though several neglect patients drew normal-looking crosses, a between-groups ANOVA of the tablet data showed that neglect patients had significantly longer initiation times for leftward movements and faster velocities for rightward movements than controls. Further, for neglect participants, a Pearson correlation revealed that initiation time and velocity effects were independent, suggesting that motor planning and execution may be dissociable deficits in neglect.
Conclusions: These results suggest that combining a computerized tablet with a classic neglect drawing assessment can provide new and clinically useful information, particularly with regard to motoric aspects of neglect. This could ultimately lead to the development of shorter, more sensitive, and more clinically relevant bedside assessments of neglect.
Correspondence: *Tyler Zink, M.A., Tyler Zink, Boston University, 77 Pond Ave., Apt. 1212, Brookline, MA 02445-7115. E-mail: tzink@bu.edu*

J.M. ZUKERMAN & S. MUSIL. Two Cases of Progressive Visuospatial Dysfunction Suggestive of Posterior Cortical Atrophy.
Objective: Progressive Visuospatial Dysfunction (PVD) is a rare form of dementia, most often caused by Alzheimer's Disease that starts, atypically, in the parietal lobes bilaterally. Early symptoms are often related to visual processing, but reading and writing can also be affected. Presented here are 2 patients with clinical profiles indicating parietal dysfunction but with symmetrical involvement: one with likely greater right hemisphere involvement and the other with likely greater left hemisphere involvement.
Participants and Methods: Patient 1 is a 54-year-old, right-handed, Caucasian woman with a 2 year history of progressive cognitive decline whose presenting complaints included not "recognizing" stop signs, trouble reading a clock, and problems with math. Patient 2 is a 66-year-old, right-handed Caucasian man with 3-4 years of progressive cognitive decline who presented with complaints of difficulty with mental math and spelling, as well as directional confusion and word-finding problems. Both patients were administered an individually tailored neuropsychological test battery to evaluate their specific cognitive complaints.
Results: On testing, both patients demonstrated simultanagnosia, as evidenced on a variety of measures, in particular, copying tasks. Patient 1 also demonstrated inattention to left hemispace, suggestive of greater right parietal involvement. In contrast, patient 2 demonstrated the complete tetrad of Gerstmann's syndrome, which suggested greater left parietal involvement. Executive dysfunction was observed in both patients but memory retention and language were well preserved.
Conclusions: These 2 cases provide insight into the early anatomical specificity of PVD. Data from the initial assessment, as well as follow-up data, will be presented in detail.
Correspondence: *Jill M. Zukerman, Ph.D., Department of Behavioral Sciences, Rush University Medical Center, 1645 W Jackson Blvd, Suite 400, Chicago, IL 60612. E-mail: jzukerman@gmail.com*

S. MUSIL & J.M. ZUKERMAN. Preserved Semantic Processing in Progressive Visuospatial Dysfunction: Influence on Visual Perception.
Objective: Bilateral parietal lobe dysfunction is often associated with simultanagnosia, whereas language and other cognitive functions can be preserved. The goal of this study was to investigate the role that preserved semantic processing might play in influencing visual integration in patients with simultanagnosia.
Participants and Methods: Two patients with simultanagnosia were shown the Poppelreuter figures, which are overlapping drawings of objects within the same semantic category. Based on their performance, it was suspected that the patients' perceptions might have been influenced by the fact that all drawings in each figure are from the same semantic category. For example, in the fruit drawing, one patient identified grapes and then the stem of an apple was a "worm". To test the hypothesis that preserved semantic processing could influence visual perception, we created a series of overlapping drawings of items from different semantic categories (e.g., Figure 1 contained overlapping drawings of pants, a pear, a woman, and a book).
Results: On this task, it was evident that partial perceptions could be influenced by the semantic category of the initial complete percept. For

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

example, when shown an overlapping drawing of fruit, one patient correctly identified grapes first. Part of a pear was identified as the "handle of a fruit basket". When shown figure 1, the patient correctly identified the woman first. However, in this figure, the pear was now identified as "someone's belly".

Conclusions: These case studies provide support for the hypothesis that preserved semantic processing can influence visual perception in patients with simultanagnosia.

Correspondence: *Jill M. Zukerman, Ph.D., Department of Behavioral Sciences, Rush University Medical Center, 1645 W Jackson Blvd, Suite 400, Chicago, IL 60612. E-mail: jzukerman@gmail.com*

Invited Symposium: The Study of Anosognosia

Chair: George Prigatano

10:15–11:45 a.m.

G. PRIGATANO. The Study of Anosognosia.

Symposium Description: Over the last 20 years, there has been increased interest in understanding anosognosia and less severe forms of impaired self-awareness in various brain disorders. Of particular interest has been the study of anosognosia for hemiplegia following cerebrovascular accidents. This symposium will focus on our recent understanding of anosognosia for hemiplegia. Presenters will highlight the complexity of the problem and consider recent findings suggesting possible neuroanatomical circuits responsible for this phenomenon. While right hemisphere lesions are often associated with anosognosia for hemiplegia, there is a growing appreciation that damage to the left hemisphere may also be important. Bilateral cerebral dysfunction may underlie certain forms of anosognosia. Recovery from anosognosia may be a result of improved cerebral functioning, not only in the affected, but the "unaffected" hemisphere as well.

Correspondence: *George Prigatano, Barrow Neurological Institute, Clinical Neuropsychology, 222 W. Thomas Rd STE 315, Phoenix, AZ 85013. E-mail: george.prigatano@chw.edu*

K.M. HEILMAN. Anosognosia and Anosodiaphoria of Hemiplegia: Signs, Symptoms and Possible Mechanisms.

Objective: Unawareness (anosognosia) and unconcern (anosodiaphoria) of hemiplegia are common disorders that may delay people from seeking medical attention for the onset of symptoms of a stroke and may also interfere with rehabilitation efforts. The purpose of this lecture will be to discuss the signs and symptoms of these disorders as well as the brain mechanisms that may account for these disorders.

Correspondence: *Kenneth M. Heilman, University of Florida, Gainesville, FL 32610. E-mail: heilman@neurology.ufl.edu*

K. KORTTE. Anosognosia for Hemiplegia: Evidence of an Underlying Neuroanatomic Circuit.

Objective: One type of anosognostic syndrome following stroke is anosognosia for hemiplegia (AHP). Awareness of motor functioning is most likely a complex process that requires integration of sensory, motor, and emotional information. In the current study, a neural circuit is proposed for AHP that captures the ability of the brain to integrate information regarding the body representation according to sensory-motor feedback and the emotional valence (meaning) for the individual's functioning. Eighteen individuals with right hemisphere stroke who presented to an urban medical center within 24 hours of symptom onset were included in the study (nine individuals with hemiplegia who exhibited AHP and nine individuals who exhibited hemiplegia without AHP). The findings provide evidence that dysfunctional tissue in precuneus region of the parietal lobe (Brodmann's area 7) and the frontal operculum (Brodmann's area 47) play a unique role in AHP. The data also provide support for other regions being part of the larger circuit, including the insular cortex. Overall, the current study suggests that a circuit involving the precuneus, insular cortex, and frontal operculum leads to a disconnection between emotional valence and sensory-motor information, which thwarts the ability of the brain to integrate sensory, motor, and emotional information.

Correspondence: *Kathleen Kortte, Johns Hopkins University, Baltimore, MD 21287. E-mail: kbechto1@jhmi.edu*

D. TRANEL. The insula and interoceptive awareness.

Objective: It has been suggested that the anterior insula in humans provides a neural platform for all subjective feelings from the body. We have conducted investigations in neurological patients with extensive bilateral insula damage that provide contrary evidence, as the patients display feelings and interoceptive awareness in a manner contradictory to the strong claim that the insula is required for such processes.

Correspondence: *Daniel Tranel, University of Iowa, Iowa City, IA 52242. E-mail: daniel-tranel@uiowa.edu*

G. COCCHINI. Does left brain damage play some role in anosognosia?

Objective: Anosognosia is a common occurrence after brain damage and manifests itself as a lack of awareness for motor, sensory or cognitive impairments. Different theories have been proposed to account for anosognosia, and contrasting data support different theoretical approaches. Within this quagmire of theoretical debate, the potential crucial role of left brain damaged patients may have been overlooked. A few studies have shown that the frequency of anosognosia, especially for hemiplegia, following lesions (or inactivity) of the left hemisphere is negligible, and recent studies have identified damage of specific areas in the right hemisphere as crucial for anosognosia. Hence, some theoretical approaches have been shaped around the assumption that damage to the right hemisphere plays a predominant role in anosognosia, while other theoretical models have been heavily criticised for failing to explain the prevalence of the right hemisphere for awareness. However, it has recently been suggested that unawareness following left brain damage may have been underestimated for methodological reasons. In this scenario, left brain damaged patients may offer the opportunity to explore some crucial aspects of anosognosia and contribute to the new and growing tendency of considering anosognosia as a multi-factorial phenomenon.

Correspondence: *Gianna Cocchini, Goldsmiths, University of London, London SE14 6NW, United Kingdom. E-mail: pss01gc@gold.ac.uk*

G. PRIGATANO. Reflections and suggestions.

Objective: Recent research on the study of anosognosia for hemiplegia in aphasic and non-aphasic patients has resulted in important insights concerning this disorder.

Large lesions of the brain are necessary to produce anosognosia. Second, cortical lesions are more common than subcortical lesions. Third, when there is a large stroke in the right hemisphere, there may well be bilateral signs of cerebral dysfunction. This is also true with left hemisphere stroke. It is not surprising, therefore, that there are signs of bilateral cerebral dysfunction when anosognosia for hemiplegia is presented.

In a recent case study, we demonstrated that a patient who has anosognosia, neglect, and awareness of complete cortical blindness showed behavioral signs of bilateral cerebral dysfunction as measured by simple speed of finger movement. Speed of finger movement in the right, unaffected hand substantially improved at the point that neglect improved. Equally interesting, the patient became aware of her anosognosia precisely at the time she could move her affected, left hand for the first time.

Correspondence: *George Prigatano, Barrow Neurological Institute, Phoenix, AZ 85013. E-mail: George.Prigatano@CHW.EDU*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Symposium 8: Space and Number in Neurodevelopmental Disorders: A Comparison of Spina Bifida Meningomyelocele (SBM) and Chromosome 22q11.2 Deletion Syndrome (22q11.2 DS)

Chair: Maureen Dennis

Discussant: Jack M. Fletcher

10:45 a.m.–12:15 p.m.

M. DENNIS, J.M. FLETCHER, M. BARNES, T. SIMON, J. JURANEK & S. SID. Space and Number in Neurodevelopmental Disorders: A Comparison of Spina Bifida Meningomyelocele (SBM) and Chromosome 22q11.2 Deletion Syndrome (22q11.2 DS).

Symposium Description: Neurodevelopmental disorders are different from each other. Some are different in obvious and dramatic ways, while others seem to have as many similarities as differences. When disorders appear similar, a comparison of neurocognitive function and brain imaging to delineate both similarities and differences is likely to be relatively informative of shared and unshared neurocognitive mechanisms. SBM and chromosome 22q11.2 deletion syndrome (22q11.2DS) have shared and unshared genes, brain, and cognition. In SBM, the evidence for genetic anomalies concerns the folate and homocysteine pathways. Three patients with sacral or lumbosacral meningomyeloceles and congenital heart defects associated with deletion or microdeletion in the DiGeorge critical region (22q11) and a clinical diagnosis. Both SBM and 22q11.2 DS have reduced cerebellar volumes. In 22q11.2DS, there is reduced cerebral and cerebellar volumes relative to controls, with vermal lobules VI–VII reduced in the midsagittal area. The scaling of cerebellum reduction in SBM is nonlinear; while total cerebellar volume is significantly reduced in the SBM group relative to controls, after correcting for total cerebellum volume, and relative to controls, the posterior lobe is significantly reduced in SBM, the corpus medullare is not different, and the anterior lobe is significantly enlarged. Cognitively, both SBM and 22q11.2DS have significant problems in processing time, space, and number.

This symposium brings together work from two laboratories – one studying SBM and the other studying 22q11.2 DS – to delineate similarities and differences in behavior (Barnes, Simon) and brain (Juranek, Srivastava) in these key neurodevelopmental disorders.

Correspondence: *Maureen Dennis, The Hospital for Sick Children, 555 University Avenue, Department of Psychology, Toronto, ON M5G1X8, Canada. E-mail: maureen.dennis@sickkids.ca*

M. BARNES, K. RAGHUBAR, H. TAYLOR, S.H. LANDRY & L. ENGLISH. Space and Number In Infants, Preschoolers, and School-Aged Children With Spina Bifida Meningomyelocele.

Objective: Individuals with spina bifida (SB) have particular difficulties with some types of spatial processing and attention, and in many aspects of mathematical cognition. The literature supports both strong links between spatial processing and aspects of mathematical cognition and overlap in the neural systems underlying attention orienting and math. These findings prompted us to ask questions about whether the mathematical difficulties of children with SB are related in a principled way to deficits in visual-spatial processing and attention.

Participants and Methods: We discuss findings from our studies with infants, preschoolers, and school age children with SB and their typically developing peers that investigate the following: whether level and growth in visual-spatial working memory in infancy and in the early preschool years predicts different mathematical abilities at ages 5 and 7; whether variability in attention orienting in infancy is related to these various mathematical abilities at ages 5 and 7; and whether distinct forms of visual-spatial processing are related to calculation and estimation in school-age children.

Results: The relations of general purpose neurocognitive processes and mathematical cognition in spina bifida and in typical development are dependent on the distinct aspects of visual spatial processing and attention being measured, the specific types of mathematical skills being predicted, and the points in development at which these neurocognitive and mathematical skills are assessed.

Conclusions: The findings across studies are discussed with reference to their implications for models of mathematical ability and disability and early and later interventions for mathematical difficulties in individuals with SB.

Correspondence: *Marcia Barnes, 7400 Fannin, Houston, TX 77030. E-mail: Marcia.Barnes@uth.tmc.edu*

T. SIMON. Space, Time and Number Processing in School-Aged children with Chromosome 22q11.2 Deletion (VCFS/DiGeorge) Syndrome.

Objective: Studies of healthy adults and children, individuals with neurodevelopmental disorders and individuals with acquired brain damage have established a strong link between spatial and temporal information processing and numerical cognitive function. Based on these findings, I have proposed that children with deletions of chromosome 22q11.2 experience early developmental changes in the structure and function of clearly delineated neural circuits for basic spatiotemporal cognition. This dysfunction creates a suboptimal neural substrate for the development of spatiotemporal processing circuitry. Resulting processing limitations cascade into impairments in basic magnitude and then numerical processes mediated in large part by limitations in specific aspects of attention system. An important part of this account is representational limitation that I have labeled "spatiotemporal hypergranularity", which describes an increase in grain size and thus reduction in resolution of mental representations of spatial and temporal information. This position will be explicated in the presentation.

Participants and Methods: Participants are children with deletions of chromosome 22q11.2 and methods involve administration of tasks of spatial and temporal information processing and numerical cognition.

Results: Findings in support of this hypothesis will be presented from a range of spatial, temporal and attentional processing experiments in children with deletions of chromosome 22q11.2.

Conclusions: The consequent atypical development of spatiotemporal processing produces the characteristic impairments in nonverbal cognitive domains that are a hallmark feature of chromosome 22q11.2 deletion syndrome. Implications of the findings for translation into targeted therapeutic interventions will also be discussed.

Correspondence: *Tony Simon, UC Davis M.I.N.D. Institute, 2825 50th St, Sacramento, CA 95817. E-mail: tjsimon@ucdavis.edu*

J. JURANEK, A. TREBLE & N. LAW. Imaging the Spina Bifida Brain For Cross-Disorder Comparisons: Spatial Patterns of Cortical Thickness and Thinning, Volumetrics of Subcortical Gray Matter, and Cerebellar Parcellations.

Objective: Findings from quantitative measures of anomalous development of the brain in children with spina bifida meningomyelocele (SBM) are presented and contrasted with what is known about regional brain development in 22q11DS.

Participants and Methods: In a large cohort of children with SBM and age- and gender-matched comparison children, we have quantitatively investigated spatial patterns of cortical thickness/thinning, volumetric increases/decreases in subcortical gray matter and cerebellar parcellations.

Results: In children with SBM, significantly increased cortical thickness is evident within frontal and occipital regions. Conversely, significantly reduced cortical thickness occurs in parietal and temporal regions in these children. In volumetric analyses of subcortical regions, individuals with SBM exhibit the following: the putamen is enlarged, the hippocampus is reduced, and the caudate, pallidum, and amygdala are not significantly different from controls. In volumetric analyses of the entire cerebellum, individuals with SBM demonstrate significantly larger anterior and reduced posterior subdivisions, with the corpus medullare not being significantly different from controls.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Some of these "bigger" regions in SBM spatially overlap with published reports of "bigger" regions in 22q11DS relative to controls (e.g. frontal areas). Other regions differ in opposite directions between disorders relative to controls (e.g. isthmus of the cingulate is "smaller" in SBM and "bigger" in 22q11DS). Finally, some regions provide characteristic information unique to each disorder. The extent to which structural anomalies common to each disorder correspond to common strengths or deficits in cognitive domains, and structural anomalies unique to each disorder differentiate between strengths or deficits characteristic of each disorder is largely unstudied.
Correspondence: *Jenifer Juranek, U of Texas health Science Center-Houston, 7400 Fannin, Houston, CA 77030. E-mail: Jenifer.Juranek@uth.tmc.edu*

S. SRIVASTAVA, Y. DENG, M. CABARAL, E. BEATON & T. SIMON. Atypicalities in the Neural Substrates Associated with Space, Time and Number Processing in School-Aged Children with Chromosome 22q11.2 Deletion (VCFS/DiGeorge) Syndrome.
Objective: Simon (2008) presented the view that anomalies in spatiotemporal information processing may provide a developmental explanation for numerical cognitive impairments commonly observed in children with chromosome 22q11.2 deletion syndrome (22q11.2DS). Investigations of neural connectivity in the brains of school-aged children with 22q11.2DS have revealed several atypicalities. At least two studies, (Barnea-Goraly et al, 2005; Simon et al. 2008) reported regions of altered connectivity in parietal regions that correlated with performance on impaired spatial attention and arithmetical performance in children with 22q11.2DS. The neuromechanical hypothesis of Van Essen (1997) postulates that cortico-cortico connectivity is an influential determinant of cortical complexity. This presentation will examine the neural basis of spatial, temporal and numerical impairments in 22q11.2DS.
Participants and Methods: Our recent cross-sectional study of these children ages 6-15 years reveals atypical developmental trajectory in cortical complexity as measured using a localized gyrification index. Functional imaging during a spatiotemporal attention task with a numerical component also shows atypical activation in children with 22q11.2DS.
Results: We present recent findings from a range of imaging studies in support of our hypothesis that spatiotemporal information processing anomalies, and their implementation in an atypical neural substrate may help to explain impaired numerical cognitive function in 22q11.2DS.
Conclusions: The relationship linking anatomical connectivity, cortical complexity, and neural activation anomalies with impaired task performance helps connects structure, function and behavior in 22q11.2DS.
Correspondence: *Siddharth Srivastava, UC Davis M.I.N.D. Institute, 2825 50th St, Sacramento, CA 95817. E-mail: sidsri@ucdavis.edu*

Symposium 9: Vascular Cognitive Aging: Mechanisms and Prevention

Chair: Angela L. Jefferson

Discussant: Robert Paul

10:45 a.m.–12:15 p.m.

A.L. JEFFERSON, S. WALDSTEIN, C. REYNOLDS, S. CRAFT & R. PAUL. Vascular Cognitive Aging: Mechanisms and Prevention.
Symposium Description: Several vascular states represent important risk factors for age-related cognitive changes, such as dementia. These factors, which include hypertension, hypercholesterolemia, diabetes mellitus, and heart disease, have also been associated with development of mild cognitive impairment (MCI) and conversion from MCI to dementia. The goal of this symposium is to highlight recent research advances in understanding how various vascular states negatively affect cognitive aging, including blood pressure, lipids, insulin resistance, and cardiac function. Dr. Shari Waldstein will address relations between blood pressure and cognitive functioning, including relevant vulnerability and resilience factors and underlying mechanisms for reported hypertension-cognitive relations. Dr. Chandra Reynolds will present experimental and epidemiological findings that suggest alterations in lipid homeostasis may impact neuronal health with implications for late life cognition. Dr. Suzanne Craft will summarize work on insulin resistance, its impact on pathological brain aging, mechanisms that modulate the effects of insulin resistance on cognition, and pilot therapeutic trials to test whether treatments aimed at improving insulin resistance may improve pathological cognitive aging. Dr. Angela Jefferson will focus on cardiac output and its potential to act as a risk factor for abnormal brain aging. All presentations will focus on the mechanism underlying the observed relations between vascular factors and abnormal cognitive aging. As symposium discussant, Dr. Robert Paul will provide conceptual insights on the interaction of these vascular risk factors for abnormal brain aging and preventive measures for minimizing the risk these variables confer for aging adults.
Correspondence: *Angela L. Jefferson, PhD, Boston University School of Medicine, 72 East Concord Street, B-7800, Boston, MA 02118. E-mail: angelaj@bu.edu*

S. WALDSTEIN. Hypertension and Cognitive Function: Blood Pressure and Beyond.
Objective: High blood pressure (BP), or hypertension, is a major risk factor for stroke, vascular dementia, and Alzheimer's disease. However, prior to such clinically evident outcomes, hypertension-related changes in the brain are detectable using neurocognitive assessment and neuroimaging.
Participants and Methods: This presentation will first describe briefly the relations of hypertension and BP levels to cognitive function, including performance in the domains of executive function, attention, memory, perceptuo-motor speed, visuospatial, and verbal abilities. Next, relevant vulnerability and resilience factors will be examined including age, education, sex, and co-morbidities. This will be followed by exploration of potential underlying biological mechanisms, including microvascular disease, brain atrophy, and cerebral perfusion. Complicating the study of hypertension-cognition relations, and described next, are the respective influences of correlated cardiovascular risk factors, BP responses to mental stress (i.e.., BP reactivity), and dimensions of subclinical vascular disease, including arterial stiffening and carotid intimal-medial thickening.
Results: Data from the Baltimore Longitudinal Study of Aging will be shown to illustrate the prospective relations of subclinical vascular disease to neurocognition.
Conclusions: It remains unclear the degree to which BP-related influences on neurocognitive function may be attributable to co-morbidities. It is possible that multiple treatment targets are needed in order to preserve brain and cognitive function among those with hypertension.
Correspondence: *Shari Waldstein, 1000 Hilltop Circle, Baltimore, MD 21250. E-mail: waldstei@umbc.edu*

C. REYNOLDS. The Association of Serum Lipids with Cognitive Aging.
Objective: While midlife serum lipid levels and subsequent declines in levels have been associated with late life cognition, the underlying mechanisms are not yet clear.
Participants and Methods: This presentation reviews experimental and epidemiological findings indicating that alterations in lipid homeostasis may be important predictors of cognitive aging.
Results: While cholesterol in the brain is predominantly endogenous and the blood-brain barrier essentially impermeable to plasma lipids, entry or efflux of small amounts across the blood-brain barrier may occur. Therefore, serum lipid levels may be, in part, indicative of lipid

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

homeostasis in the brain, or affect associated molecular processes. It has been hypothesized that alterations in the factors that promote cholesterol efflux in the brain (e.g., CYP46) may impact neuronal health, with implications for typical cognitive aging and dementia risk. We recently reported on the relationship between baseline serum lipid levels and longitudinal cognitive change in the Swedish Adoption/Twin Study of Aging (n=819 twins). In women, low triglycerides, low apoB and high HDL values predicted better-maintained cognition, including perceptual speed, memory, and verbal abilities. However, for men higher levels of apoB and total cholesterol were predictive of better cognition, particularly verbal ability and perceptual speed, until age 65. In twins discordant for dementia, higher baseline apoB and total cholesterol levels were observed in the affected twin.
Conclusions: The extent to which serum lipid levels contribute to, or predict, late life cognitive functioning may be moderated by age and sex. Potential mechanisms underlying serum lipids-cognitive aging associations will be discussed.
Correspondence: *Chandra Reynolds, 3302 PSYCHOLOGY BUILDING, University of California, Riverside, CA 92521. E-mail: chandra.reynolds@ucr.edu*

S. CRAFT. The Role of Insulin Resistance in Pathological Brain Aging.
Objective: Our knowledge of the multifaceted role of insulin in the brain has expanded rapidly in recent years. It is now apparent that perturbation of this role by insulin resistance can increase the risk for aging-related neurodegenerative disorders such as Alzheimer's disease (AD) and vascular cognitive impairment (VCI) through a number of mechanistic pathways.
Participants and Methods: We have investigated these pathways in humans using models of insulin resistance in studies modulating dietary intake of saturated fat and simple carbohydrates, and administering insulin directly to the brain via nose-to-brain pathways.
Results: We will present results suggesting that insulin resistance negatively impacts cognition, inflammation, cerebral glucose metabolism, and clearance of proteins such ≥-amyloid, all of which may increase the risk of AD and vascular dementia. Conversely, treatments aimed at improving insulin resistance may benefit patients with AD and VCI. We will review data testing this possibility in pilot therapeutic trials using intranasal insulin, exercise, and diet.
Correspondence: *Suzanne Craft, 1660 S. Columbian Way, (182B), Seattle, WA 98108. E-mail: scraft@u.washington.edu*

A.L. JEFFERSON. Cardiac Output and Abnormal Brain Aging.
Objective: In the absence of heart failure, little is known about how clinical or subclinical reductions in cardiac output (the amount of blood exiting the heart) relate to abnormal brain aging.
Participants and Methods: This presentation reviews a series of findings from clinical referral samples (n=72 patients with cardiovascular disease) and epidemiological data of community-dwelling adults free of clinical dementia or stroke (Framingham Heart Study Offspring participants, n=1504).
Results: Cognitive and neuroimaging data from cardiac outpatients suggests reduced cardiac output is associated with executive dysfunction and increased white matter hyperintensities. More recent epidemiological data suggests that lower cardiac index values (cardiac output adjusted for body size) are associated with smaller brain volumes (p=0.02). When total brain volume across cardiac index tertiles was compared, results indicated that individuals not only in the bottom tertile (values <2.54) but also in the middle tertile (values between 2.54 and 2.92) had significantly lower total brain volumes as compared to participants in the top tertile (values >2.92) equivalent to nearly two years of accelerated brain aging. Also, nearly one-third of the cohort had clinically low cardiac index values, even when individuals with prevalent cardiovascular disease were excluded from the sample.
Conclusions: Low levels of cardiac function (even in the normal range) may contribute to subclinical or clinical brain injury above and beyond traditional vascular risk factors. Potential mechanisms accounting for these clinical and epidemiological observations will be discussed, including animal and human cerebral perfusion data.
Correspondence: *Angela L. Jefferson, 72 East Concord Street, B7800, Boston, MA 02118. E-mail: angela@bu.edu*

Poster Symposium: Alcohol and Drug Use in College Students: Cognition and fMRI

10:45 a.m.–12:15 p.m.

Drug/Toxin-Related Disorders (Including Alcoholism)

S. RASKIN, G. PEARLSON, B. ANDERSON, D. GLAHN, D. DECUIR & R. ROSEN. Alcohol and Drug Use in College Students: Cognition and fMRI.
Symposium Description: Adolescence is a high-risk period for initiating alcohol use and engaging in high-risk drinking, yet the central nervous system consequences of substance involvement during adolescence and young adulthood have received limited attention. College students experience a rapid increase in heavy drinking over a relatively short time period (NIAAA College Drinking Website). It is unclear how such alcohol and drug use during influences neurocognition as individuals transition into young adult responsibilities, and as neuromaturational processes such as myelination and synaptic pruning continue into the 20's. However, available research examining the physiologic consequences of drinking suggests that underage and college-age drinkers may be at greater risk of neurotoxicity (expressed initially as subtle differences in cognitive ability and later as more harmful cognitive effects due to alcohol consumption), than those who initiate alcohol use later in life. This symposium will present findings from a large scale study at two colleges of college students. Students were given neuropsychological assessments, assessment of impulsivity, measures of mood, questionnaires of drinking behavior and familial drinking history. A subset of the larger sample also were analyzed with an fMRI paradigm.
Correspondence: *Sarah Raskin, Ph.D., Psychology, Trinity College, 300 Summit Street, Hartford, CT 06119. E-mail: sarah.raskin@trincoll.edu*

B. ANDERSON, M. STEVENS, M. GINLEY, S. RASKIN, H. TENNEN, C. AUSTAD, C.R. FALLAHI, R. WOOD & G. PEARLSON. The Effects of Family History and Alcohol Use on Alcohol Cue Reactivity: An fMRI Study.
Objective: The purpose of the study was to examine the effects of family history and personal history of alcohol consumption on fMRI alcohol cue reactivity (ACR).
Participants and Methods: An fMRI-ACR task in which participants viewed alcoholic beverages, non-alcoholic beverages, and scrambled images was administered to forty-nine college students: 31 females, 18 males; average age 19.1. Participants were divided by family history of alcoholism [family history positive (FHP) and negative (FHN)] and history of lifetime dysfunctional drinking [defined by the Semi-Structured Assessment for the Genetics of Alcoholism Interview score of <=10 (low) or > 10 (high)]. A 2x2 analysis of variance was conducted in SPM5.
Results: FHP participants' nucleus accumbens (NAcc) showed diminished response to alcohol cues in a pattern that pointed to a specific effect of alcohol-content, not simply a less responsive reward system. In contrast, participants with high dysfunctional drinking scores NAcc showed an enhanced response to alcohol cues. This may have resulted from less activation to alcohol images in light (or abstinent) drinkers.
Conclusions: There are differences in reward processing of alcohol cues in NAcc related to both alcoholism family history and degree of alcohol use. These results raise questions about the applicability of adult "craving" neurobiological models to the study of younger persons at- risk for alcoholism. The results also suggest that reward processing abnormalities in FHP may be complex and not explained simply by reward deficiency models.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Beth Anderson, Olin Neuropsychiatry Research Center, Hartford, CT 06106. E-mail: bmanderson@harthosp.org*

D. DECUIR, M. GINLEY, S. RASKIN, H. TENNEN, C. AUSTAD, C. FALLAHI, R. WOOD, D. GLAHN & G. PEARLSON. Effects of Drinking Patterns on Cognitive Functions in College Students.

Objective: This study administered measures of impulsivity, cognition, mood, and drinking patterns to 296 college students.

Participants and Methods: Binge drinking was defined as a pattern of drinking that brings estimated BAC to 0.08 gram-percent or above. All students were 18 to 21 years of age; 151 women and 145 men. Exclusion criteria: brain injury with loss of consciousness > 24 hrs., concussion with LOC within 30 days, other neurological disorder, or DSM –IV-TR Axis I psychotic disorders (Clinical interview-MINI). Measures administered: Beck II Depression Inventory, State-Trait Anxiety test, the Balloon Analogue Risk Task (BART), Groton Maze Learning Test (GMLT), N-Back, Continuous Paired Associate Learning (CPAL), Penn Conditional Exclusion Test (PCET), and Digit Symbol. Groups: never drank; drink but never binge; binged but not in last 30 days; and binged in last 30 days.

Results: When comparing binge categories, those who binge demonstrated significantly higher levels of both depression and anxiety. Those who drink but do not binge demonstrated the greatest impulsivity on the BART. On the one- and two-back, those who have binged showed significantly poorer performance than either non-binge drinkers or nondrinkers. On Groton Mazes those who binged in the last 30 days made significantly more errors than any other group. Nondrinkers, however, made more incorrect selections on the PCET than any other group. Participants who have binged in the last 30 days were significantly more impaired on the GMLT.

Conclusions: These data lend support to the notion that binge drinking is particularly detrimental to cognitive functions, particularly executive functions and spatial learning.

Correspondence: *Damien DeCuir, Trinity College, Neuroscience Program, CT 06106. E-mail: damien.decuir@trincoll.edu*

D. GLAHN, M. GINLEY, C. AUSTAD, H. TENNEN, S. RASKIN & G. PEARLSON. Risk Taking Measure Sensitive to Family History of Alcoholism.

Objective: Individuals with a family history of alcoholism (FH+) are four times more likely to develop alcohol-use disorders as those without (FH-). In addition, risk for alcoholism doubles in persons who have impulsivity or disinhibitory characteristics. Thus, individuals with both FH+ and impulsive or disinhibitory tendencies may be higher risk of developing an alcohol-use disorder. Identifying these individuals prior to the manifestation of the illness allows for potential prevention strategies. Prior research has shown that individuals with a FH+ often show increased levels of disinhibition and risk taking, as measured on behavioral questioners and on neuropsychological tests, compared to individuals without such a family history (FH-). However, most prior attempts to assess risk taking and disinhibition have focused on relatively small, heterogeneous samples.

Participants and Methods: We examined performance on behavioral and cognitive measures of impulsivity/disinhibition in 842 college students. Specifically, we compare performance on the Barratt Impulsiveness Scale and the computerized Balloon Analogue Risk Task (BART) between FH+ and FH- individuals.

Results: FH+ individuals had elevated Barratt impulsivity scores, particularly for the motor impulsivity subscale, when compared to FH- individuals. Similarly, FH+ subjects popped significantly more balloons than the FH- individuals. Of particular interest, subjects in the FH+ group failed to adjust their performance after popping balloons, suggesting difficulties learning from their prior failures. However, Barratt scores and BART measures were not significantly correlated.

Conclusions: These results suggest that impulsivity and risky behavior, as operationalized by self-report and experimental cognitive probes, respectively, are separable constructs that tap distinct aspects of the risk for alcoholism.

Correspondence: *David Glahn, Olin Neuropsychiatry Research Center, Hartford, CT 06106. E-mail: david.glahn@yale.edu*

R. ROSEN, R. JIANTONIO, S. MEDA, M. GINLEY, L. NOVAK, S. RASKIN, C. AUSTAD, H. TENNEN & G. PEARLSON. Collegiate Academic Performance in Relation to Alcohol Consumption and High School Standardized Test Scores.

Objective: SAT scores are highly predictive of college academic grades, specifically during the first year. There has been little focus on alcohol consumption after the first college year and effects of later alcohol use on college grades are unclear.

Participants and Methods: Subjects were a representative sample of college freshmen (N=200; 42.5% male). All scores were obtained from official school records. Drinking patterns were assessed by monthly web-based self-report surveys derived from an anonymous website over three academic terms, including for the prior month: N of days that the subject drank any alcohol, N of days engaged in heavy drinking, and maximum number of drinks consumed in a 24-hour period.

Results: Three linear regression models significantly predicted a given semester's GPA by combining SAT with all previous semester's GPA data. SAT scores were significant predictors of GPA for the first two semesters, showed a non-significant trend for the third and became a completely non-significant predictor by the end of the fourth semester. Alcohol use significantly lowered predicted GPA scores. For the first Spring semester, there was a significant negative correlation with binge drinking scores ($r=-0.16$; $p=0.035$), with a similar negative trend for the Fall semester regarding the number of days/semester alcohol was consumed ($r=-0.138$; $p=0.07$); this negative trend was absent in the subsequent Spring semester.

Conclusions: Consistent with previous literature, SAT scores predict college GPAs, specifically during the first year. Academic performance during the first year shows a strong negative correlation with alcohol consumption; subsequent semesters show a steady decline in this relationship, perhaps explained by either alcohol tolerance or moderation of drinking patterns.

Correspondence: *Rivkah Rosen, Olin Neuropsychiatry Research Center, Hartford, CT 06106. E-mail: rrosen@harthosp.org*

Poster Session 7: Adult Assessment, Cognition and Cancer, Cognitive Neuroscience, Electrophysiology, Drugs and Toxins

10:45 a.m.–12:15 p.m.

Assessment/Psychometrics/Methods (Adult)

M.J. BAEK, H.J. KIM, Y. CHANG & S. KIM. The Usefulness of the Korean Dementia Screening Questionnaire in Patients with Mild Cognitive Impairment and Alzheimer's Disease.

Objective: Dementia Screening Questionnaire is thought as a sensitive way to detect dementia patients and is not influenced by age and educational level. The Korean Dementia Screening Questionnaire (KDSQ) has recently been developed to screen among individuals with normal aging, mild cognitive impairment (MCI), and Alzheimer's disease (AD) by asking an informant regarding elderly person's everyday cognitive functions. The purpose of this study is to evaluate the usefulness of the KDSQ-C and its ability to discriminate between normal cognitive aging and patients with MCI or AD.

Participants and Methods: The KDSQ was administered to informants of 456 patients (206 patients with MCI and 250 patients with AD) and 36 healthy elderly adults participated in this study. The three groups were matched in terms of age, gender, and education level. The KDSQ was compared with the Korean version of the Mini Mental State Examination (K-MMSE), and the Instrumental Activities of Daily Living (I-ADL), and validated Samsung Dementia Questionnaire (SDQ).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The KDSQ was not influenced by educational level, age, or gender. The area under the curve for the KDSQ-C was 76% (S.E.=0.36). With respect to a diagnosis of dementia, the KDSQ-C (cut-off point 8) had a sensitivity of 81% and a specificity of 64%. Moreover, the KDSQ-C was well correlated with the K-MMSE (r=-0.73), the I-ADL (r=0.71), and the SDQ (r=0.82).
Conclusions: The KDSQ-C is a sensitive questionnaire for the diagnosis of patients with MCI or AD. It may be a useful tool for screening patients with MCI or AD.
Correspondence: *Min J. Baek, Master of Science, Neurology and Clinical Neuroscience Center, Seoul National University Bundang Hospital, 300 Gumi-dong, Bundang-gu, Seongnam-si,, Gyeonggi-do 463-707, Republic of Korea. E-mail: mjbaek1208@hanmail.net*

A.K. MILLER & A. POREH. Examining the Errors and Self-Corrected Errors on the Stroop Test.
Objective: The purpose of this study was to collect normative data for a computer-assisted version of the Comalli Stroop Test. Additionally, the study was aimed at investigating the self-corrected errors on the Stroop Test, which have not previously been accounted for on the traditional test versions.
Participants and Methods: Participants included 172 individuals from Cleveland, Ohio. Participants were administered computer-assisted versions of the Comalli Stroop Test and Trail Making Test. Errors, self-corrected errors, and time of completion for both tasks were recorded.
Results: The results of this study show that age and education both affected the quantity and location of errors and self-corrected errors on the Stroop Test. The Trail Making Test, which was used to validate the errors on the Stroop Test, showed a similar pattern of location of errors to the Stroop Test. Errors were frequently made in the middle to later portions of these tests, which are partially due to participants' limited cognitive resources as the tests progress. Self-corrections were frequently made in the earlier portions of the test.
Conclusions: The results of this study suggest that self-corrections are measuring a separate construct than errors on the Stroop Test. The ability to self-correct is a sign of mental health and ability to self-monitor. Utilizing the self-corrected errors on the Stroop Test gives test administrators an additional tool in detecting higher mental processes. Additionally, the results demonstrate that errors are measuring a separate construct than time of completion. The traditional approach to neuropsychological testing examines the total number of errors and time of completion for the entire task, rather than examining the critical parts of each task separately. When only examining composite scores significant increases in errors or time of completion from more difficult portions of the test are being averaged with better performance from the easier portions, yielding a score within normal limits.
Correspondence: *Ashley K. Miller, M.A., University of Tulsa, 203 Lawton Rd, Marietta, OH 45750. E-mail: ashley.kay.miller@gmail.com*

D. RITCHIE, A. ODLAND, A. STEVENS & W. MITTENBERG. Selection Criteria for Clinical Neuropsychology Internships.
Objective: Internship in clinical neuropsychology is an essential part of specialty training. This paper reports a survey of the applicant evaluation and selection criteria currently used at clinical neuropsychology internships.
Participants and Methods: Training sites were identified from listings published by INS, AITCN, APA Division 40, and APPIC. Internship information was reviewed for concordance with the Houston Conference and INS/APA Division 40 guidelines. Utilizing these criteria, 103 internships that offered a minimum of 50% of training devoted to clinical neuropsychology were identified. Supervising neuropsychologists were contacted and asked to complete a 10-item survey of candidate selection criteria used in a prior similar study.
Results: 72.8% (N=75) of sites responded to the survey. Clinical experience in neuropsychological assessment, specialization in neuropsychology during graduate school, the interpersonal skills of the applicant during the interview, and letters of recommendation from clinical neuropsychologists were reported as the most salient selection criteria. Applicants that had completed graduate school curricula that provided specialty education in neuropsychology, with clinical neuropsychologist faculty and supervisors were preferred. Internship supervisors valued prior practicum experience with neurological cases at university affiliated or V.A. medical centers, flexible assessment approaches, and supervision by neuropsychologists. Research experience was also viewed important by most internship sites.
Conclusions: Results indicate continued endorsement of the vertically integrated model of education and training outlined by the Houston Conference and INS/APA Division 40 guidelines for the didactic and experiential components of specialization in clinical neuropsychology. The number of neuropsychology internship sites has more than doubled during the past 10 years.
Correspondence: *Wiley Mittenberg, Ph.D., Center for Psychological Studies, Nova Southeastern University, 3301 College Ave, Ft Lauderdale, FL 33314. E-mail: wiley@nova.edu*

E. ESTEVIS, M.R. BASSO & C.C. CRANSTON. Effects of Practice on the Wechsler Adult Intelligence Scale-4th edition (WAIS-IV) Across 3- and 6-Month Intervals.
Objective: This study assessed the effects of repeated assessment on WAIS-IV performance across three- or six-month intervals. This study also assessed whether overall level of intelligence moderates the magnitude of practice effects.
Participants and Methods: Fifty-four participants (age M = 20.9; education M = 14.9) were administered the WAIS-IV. Half were randomly assigned to re-assessment three-months later, and half were re-tested six-months later.
Results: To assess whether the 3-month and 6-month groups displayed differential performance across time a 2 (testing condition: 3-month vs. 6 month group) x 2 (time: baseline vs. re-evaluation) x 6 (scales: FSIQ, PRI, VCI, WMI, PSI, and GAI) mixed factor ANOVA was conducted, with time and scales being repeated factors. Results showed that scores on the six WAIS-IV indices improved over time, but there was no effect of testing condition. Scores increased on average by 7, 5, 5, 4, 9, and 6 points on FSIQ, VCI, PRI, WMI, PSI, and GAI, respectively. A 2 (testing condition: 3-month vs. 6-month group) X 2 (IQ Group: above average vs. below average group) X 6 (Scale: FSIQ, VCI, PRI, WMI, PSI, GAI) univariate ANOVA was conducted in order to determine whether intelligence moderates changes in participants' FSIQ scores. Level of intelligence failed to moderate the level of improvement that occurred upon re-testing. Reliable change estimates are reported for each WAIS-IV Index.
Conclusions: These findings suggest that prior exposure to the WAIS-IV results in significant score increments upon re-examination. Although we evaluated a much longer-re-test interval (six months) than was reported in the WAIS-IV Technical Manual (only three months), score increments were equivalent. Therefore, when using the WAIS-IV for re-evaluations it is pertinent to be aware of practice effects that occur as a result of repeated administrations across these intervals.
Correspondence: *Eduardo Estevis, Master of Art, Clinical Psychology, University of Tulsa, 7759 South Memorial Dr. #7108, Tulsa, OK 74133. E-mail: eduardo-estevis@utulsa.edu*

T.H. TURNER, M.D. HORNER, K.K. VAN KIRK, P.W. TUERK & H. MYRICK. Clinical Neuropsychological Evaluation via Telemedicine: Preliminary Findings.
Objective: Many veterans live in rural areas distant from VA hospitals, and receive primary and other basic medical care from local community-based outpatient clinics (CBOC). These veterans often travel great distances to VA hospitals for neuropsychological evaluations. This results in access to care problems, travel reimbursement costs, fee-basis evaluations of uncontrolled quality, and driving safety concerns. Return-trips for feedback compound complications. Accordingly, we initiated a pilot program of neuropsychological evaluation and feedback via telemedicine.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants were veterans referred for neuropsychological evaluation from a CBOC about 115 miles from the regional hospital. Veterans were given the choice to undergo evaluation at the CBOC via telemedicine, or in-person at the regional hospital. Telemedicine equipment allowed presentation of digitized material with simultaneous patient observation, and remote control of camera position by provider. Testing materials were organized in numbered folders and given to veterans by CBOC clerks immediately prior to evaluation. Clerks returned completed materials via facsimile.
Results: In a 6-month period, 13 veterans from the CBOC were seen for neuropsychological evaluation. Seven chose evaluation via telemedicine. Groups based on evaluation modality appeared similar on demographics, referral basis, resulting neuropsychiatric diagnoses, and follow-through on recommendations. No significant technical difficulties were encountered, and veterans reported satisfaction with telemedicine evaluation. All 13 veterans requested feedback via telemedicine.
Conclusions: Neuropsychological evaluation via telemedicine appears comparable to in-person evaluation. Experiences thus far are encouraging, and in keeping with limited literature suggesting its application. Though not preclusive, test selection using telemedicine is limited.
Correspondence: *Travis H. Turner, Ph.D., Mental Health Service, Ralph H. Johnson VAMC, 109 Bee St., Charleston, SC 29401. E-mail: turnertr@musc.edu*

A. MUELLER, B. YOCHIM & D. SEGAL. Psychometric Properties of the Geriatric Anxiety Scale: Comparison to the Beck Anxiety Inventory and Geriatric Anxiety Inventory among Older Adults.
Objective: As anxiety symptoms are common in older adults and the accurate diagnosis of anxiety is critical in initiating appropriate treatment, tools for assessing anxiety among older adults have only recently been developed. This study explored the convergent and discriminant validity of the Geriatric Anxiety Scale (GAS), a new measure of anxiety symptoms for older adults. It contains 25 items and three subscales (Somatic, Affective, and Cognitive).
Participants and Methods: The GAS, Beck Anxiety Inventory (BAI), Geriatric Anxiety Inventory (GAI), Beck Depression Inventory, Second Edition (BDI-II), and Geriatric Depression Scale (GDS) were administered to 117 community-dwelling, predominantly European American, older adults (60.7% female; M age = 74.8 years, M years of education = 15.0).
Results: The GAS correlated highly with measures of anxiety and with measures of depression, establishing convergent validity, but not with unrelated measures of reading ability and processing speed, establishing divergent validity. The GAS correlated with the BAI and GAI more highly than the BAI and GAI correlated with each other. Additionally, participants with clinically significant anxiety, as defined by BAI scores, scored significantly higher on the GAS. Almost all items on the GAS correlated with both anxiety and depression measures.
Conclusions: Future studies should examine the validity of the GAS in clinical samples and include a wider range of ethnicities and education levels. Overall, the GAS possesses strong convergent and discriminant validity and shows promise as a measure of anxiety in older adults.
Correspondence: *Brian Yochim, Ph.D., ABPP, Psychology, University of Colorado at Colorado Springs, 1420 Austin Bluffs Parkway, Colorado Springs, CO 80918. E-mail: amuelle2@uccs.edu*

C.L. SALNAITIS, C.A. PIERCE, J. DAVIS, A. EGUIGURE, M. LLAMAS, M. RHOADS & K. SIMPSON. Testing the Equivalency of Three Recognition Formats of the Rey Auditory Verbal Learning Test.
Objective: A validation study of the recognition formats of the Rey Auditory Verbal Learning Test (RAVLT) was conducted in order to determine whether three different recognition formats were equivalent in difficulty and if a validity index developed for the RAVLT is equivalent across presentation formats.
Participants and Methods: The sample was comprised of 47 female and 4 male college students from a midsized university in the Rocky Mountain region. The mean age of the participants was 19.84 (SD = 2.58). All subjects were administered the Rey Auditory Verbal Learning Test with Raven's Progressive Matrixes was administered to fill the time during the 30-minute delay before administration of the recall trial of the RAVLT. The participants were randomly assigned to receive one of the three recognition formats: (1) orally presented list with distractors, (2) written list with distractors, or (3) target words embedded within a paragraph.
Results: Performance across the three recognition formats was significantly different, with superior performance in the oral list over the written list or paragraph. The overall effect size was large, although the real difference in performance was less than one word. The validity index did not significantly differ across presentation format.
Conclusions: Although performance on the recognition trial of the RAVLT was significantly different based on recognition format and the effect size was large, the real-world significance is unclear given that less than one word separated the groups. It appears that the validity index for the RAVLT may be equivalent across formats. Replication of these findings in a clinical sample is recommended.
Correspondence: *Christopher A. Pierce, Ph.D., OBHS, Denver Health Medical Center, 667 Bannock St., Mail Code 3450, Denver, CO 80204. E-mail: christopher.pierce@dhha.org*

J. SUBIRANA MIRETE, O. BRUNA RABASSA, M. PUYUELO SANCLEMENTE, C. VIRGILI TEJEDOR & S. SIGNO MIGUEL. Use of Processing Speed measures to assess Cognitive Impairment. Preliminar study.
Objective: The properties of processing speed measures have been of particular interest to many researchers. Easily described as the rate at which an individual is capable of performing a simple cognitive task, their changes associated to increasing age have always been a great challenge. Several studies have linked age-cognitive impairment with processing speed. This study attempts to determine the importance of processing speed theory which describes a slowing of this capacity when increasing age in subjects without cognitive impairment. It also tries to evaluate quantitatively this increase in order to calculate, for each age, a basal processing speed.
Participants and Methods: A total of 356 subjects without objective cognitive impairment were evaluated, aging between 18 and 85 years. Processing speed was measured using compounded simple and dual tasks.
Results: Results show a clear relation between simple tasks and age $F(6.21)=115.861$, $p<0.001$ ($R^2=0.396$) and between dual tasks and age $F(5.90)=99.968$, $p<0.001$ ($R^2=36.2\%$). This results demonstrate that processing speed increases .015 seconds per year in simple tasks and .028 seconds per year in dual tasks.
Conclusions: High significant relation was found between age and both studying variables. Thus, the increasing speed of information processing with age may be considered as a consistent measure of cognitive impairment in the aging process.
Correspondence: *Judit Subirana Mirete, MS, Psychology, Ramon Llull University, Cister, 34, Barcelona 08022, Spain. E-mail: juditsm@blanquerna.url.edu*

E. ANDRESEN, D. SCHMOLLER & D. OSMON. ADHD Simulators Perform Significantly Worse than Neurological Populations on the Gordon Diagnostic System.
Objective: Clinicians and researchers have recently become aware of the potential for individuals to feign attention problems in situations where secondary gain is present. Little work has been done investigating the effect of feigning attention symptoms on the Gordon Diagnostic System (GDS). This poster compares ADHD simulators to patients with neurological diagnoses.
Participants and Methods: Fifty-two college students without history of ADHD were randomly assigned to a high incentive group or an ADHD

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

simulator group. Participants took the GDS as part of a larger study investigating the feigning of attention problems. Study data were compared to data from three neurological groups found in the literature: Lyme encephalopathy, chemotherapy treated breast cancer, chemotherapy treated lymphoma, and carbon disulfide intoxication.
Results: When compared to the combined neurological groups, Welch's unpaired t tests revealed that simulators performed significantly worse on total correct ($t(26) = -10.38$, $p < .0001$) and had a slower reaction time ($t(31) = 2.31$, $p < .03$). Simulators made significantly more commission errors than the carbon disulfide group ($t(32) = 3.16$, $p < .01$). Controls demonstrated a significantly faster reaction time than the Lyme encephalopathy group ($t(39) = 2.11$, $p < .05$), while simulators' reaction time did not significantly differ from the Lyme encephalopathy group.
Conclusions: In this study, simulators performed significantly worse than individuals with various confirmed neurological diagnoses on all aspects of the GDS. More research with known groups would be useful to determine appropriate effort cutoffs.
Correspondence: *Elizabeth Andresen, M.S., Psychology, University of Wisconsin-Milwaukee, 3016 N Oakland Ave #117, Shorewood, WI 53211. E-mail: andrese2@uwm.edu*

E.S. BROWNING, L.M. SILVA, R.A. FLORES & R.E. JUNG. Sex Differences in Divergent Thinking.
Objective: Divergent thinking (DT) is the process by which one extrapolates many possible solutions to an initial stimulus or target data set; it is thought to be a measure of creativity (Guilford, 1967). Sex differences in DT are uncommon (cf., Strauss, Sherman, & Spreen, 2006) and, when detected, men produce more alternative solutions on DT tests (e.g., Fink & Neubauer, 2006; Furnham & Nederstrom, 2010; Harter, 1999).
Participants and Methods: We investigated sex differences in DT in 61 subjects (34 male) who were young (mean = 23.7 years) and of high-average IQ, as measured by the Wechsler Abbreviated Scale of Intelligence (mean Full-Scale IQ: males = 118, females = 117, $F = .13$, ns).
Results: Sexes did not differ on the Creative Achievement Questionnaire ($F = .32$, ns), Uses of Objects Test ($F = .69$, ns), Controlled Oral Word Association Test ($F = 2.1$, ns), or Raven's Progressive Matrices ($F = 1.5$, ns). Additionally, sexes did not differ on the NEO-Five Factor Inventory measures of Openness to Experience ($F = .67$, ns) and Extraversion ($F = .16$, ns), which have been correlated with creativity (for a review, see Feist, 1998). However, we found significant differences on both subtests of the Design Fluency Test, a measure of non-verbal DT: the Free Condition ($F = 8.8$, $p = .004$), and the Four-Line Condition ($F = 6.7$, $p = .012$).
Conclusions: In a large, well-matched, high-average IQ sample of young adults, our study is the first to suggest females have better non-verbal DT ability than males.
Correspondence: *Elizabeth S. Browning, M.S. Psychology, Department of Psychology, University of New Mexico, 1 University of New Mexico, MSC03 2220, Albuquerque, NM 87131-1161. E-mail: ebrowni@unm.edu*

P. BREWSTER, H. TUOKKO & S. MACDONALD. Measurement Equivalence of the Neuropsychological Test Battery of the Canadian Study of Health and Aging Across Two Levels of Educational Attainment.
Objective: To determine the configural and metric measurement equivalence of a battery of neuropsychological tests when administered to older adults with lower vs. higher levels of education. If the conceptual and quantitative association between individual tests and their corresponding latent constructs are not invariant across levels of education then their use in studies that group participants by education may be problematic.
Participants and Methods: Participants were cognitively intact English-speaking older adults who completed the neuropsychological battery of the Canadian Study of Health and Aging (CSHA) in 1995-96. Those with Λ8 years of education (n=120) comprised the lower-educated (LE) sample. Those with □9 years (n=385) comprised the higher-educated (HE) sample. Confirmatory factor analysis was used to confirm the three latent constructs (verbal ability, visuospatial ability, long-term retention; Tuokko et al., 2009) measured by the 12 tests in the CSHA battery. Measurement equivalence across HE and LE samples was evaluated using invariance analysis. Model fit was assessed using Chi-square goodness-of-fit, comparative fit index (CFI), root mean square error of approximation (RMSEA) and a parsimony index ($\alpha 2/df$).
Results: Fit between the three-factor model and the observed indicators was good (Parsimony=2.36; CFI=0.93; RMSEA=0.05). Invariance testing revealed a loss of model fit following constraint of the factor loadings ($\alpha 2(8)=25.89$, $p=0.001$), but when constraints on the verbal ability factor were released, this effect was no longer significant ($\alpha 2(4)=4.89$, $p=0.30$). Specifically, verbal ability factor loadings for animal fluency ($\alpha 2(1)=5.24$, $p=0.02$) and the token test ($\alpha 2(1)=7.20$, $p=0.01$) could not be constrained equal across the HE and LE samples.
Conclusions: Two measures of verbal ability (Token Test, Animal Fluency) were not invariant across HE and LE samples of older adults, suggesting that cognitive processes underlying performance on these tests may vary as a function of educational attainment.
Correspondence: *Paul Brewster, Psychology and Centre on Aging, University of Victoria, 450 Dallas Rd, Apt 704, Victoria, BC V8V 1B1, Canada. E-mail: pbrew@uvic.ca*

X. SHENG, A. JOINER-HILL, D.N. HARRIS & L.A. BIELIAUSKAS. PPVT-I Rules Significantly Shorten PPVT-III/IV Administration.
Objective: The Peabody Picture Vocabulary Test- Third/Fourth Edition (PPVT-III/IV) is a useful measure for the estimate of premorbid intelligence. Compared to PPVT-III/IV, PPVT-I has less stringent basal and ceiling criteria, potentially resulting in less administration time. This study examined whether using the PPVT-I rules yield similar estimates of premorbid intelligence and result in fewer test item administration.
Participants and Methods: Data were retrospectively collected from 120 adult VA inpatients who completed a routine neuropsychological screen. The screen included measures on overall mental status, estimated premorbid intelligence, and current cognitive function. Patients were selected for the current study if they completed either the PPVT-III (n=80) or PPVT-IV (n=40). The PPVTs were re-scored using the PPVT-I basal and ceiling rules. Number of items administered using PPVT-III/IV and PPVT-I scoring criteria were calculated. Data from PPVT-III and IV were combined for analysis since they are similar in administration and scoring and the patients did not differ on demographic variables such as age (M=65, SD=11), education (M=12, SD=2), gender (95.8% male), and overall mental status (MMSE, M=26, SD=3).
Results: Paired-samples T-test revealed that PPVT-III/IV raw scores (M=187, SD=17) were not significantly different from PPVT-I criteria raw scores (M=187, SD=18; $p > .05$). There was a significant difference between the PPVT-III/IV and PPVT-I standard scores, but the difference was less than 7 points in 95% of cases. The standard error of estimate for predicting premorbid intelligence from raw scores using the PPVT-I scoring rule (SEE=6.04) is similar to that of PPVT-III/IV scoring rule (SEE=7.59). More importantly, 15 fewer items were administered using the PPVT-I administration rules, saving significant time.
Conclusions: Results demonstrated that PPVT-I rules for test-item administration yield similar estimates of premorbid intelligence as PPVT-III/IV, leading to shorter administration time.
Correspondence: *Xi Sheng, George Washington University, 2011 ST. NE, Apt. #914, Washington, DC 20002. E-mail: sheng@gwmail.gwu.edu*

L.G. UMFLEET, J.J. RYAN, S. GONTKOVSKY & J. MORRIS. Estimating WAIS-IV Indexes in Brain Damaged and Medical Samples: Proration versus Linear Scaling.
Objective: In situations that call for the estimation of the WAIS-IV VCI and/or PRI, practitioners can either use proration or linear scaling. Prorated scores are obtained by multiplying the sum of scaled scores of

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

two subtests by 3/2 and using the respective WAIS-IV sum of scaled scores to standard score conversion tables. Tellegen and Briggs (1967) recommend using the linear equating procedure instead of proration for estimating Wechsler composites because proration ignores subtest reliability and may increase the standard deviation.
The purpose of this study is to assess the accuracy of proration and linear scaling for estimating separately the VCI and PRI composites and to compare the two methods in terms of their predictive accuracies in two clinical samples.
Participants and Methods: Samples comprised of 104 patients with documented brain damage and 37 medical disorders with no known neurological impairment were administered the WAIS-IV. Proration and linear scaling were compared for estimating the VCI and PRI from all possible two subtest combinations.
Results: Actual VCI and PRI scores were highly correlated with estimated Index scores based on proration and linear scaling (all rs > .90). In the brain impaired and medical samples, respectively, significant mean score differences between the actual and estimated composites were found in five and three comparisons. All differences were less than three points.
Conclusions: Overall, findings demonstrate that proration and linear scaling methods are reasonably good when estimating actual Indexes in a clinical sample. There was no apparent advantage of one computational method over the other.
Correspondence: *Laura G. Umfleet, M.S., Roosevelt University, 2600 W Logan Blvd, Apt 3i, Chicago, IL 60647. E-mail: lglass@mail.roosevelt.edu*

S.A. VAN DYKE, B.N. AXELROD & C. SCHUTTE. Test-Retest Reliability of the Traumatic Brain Injury Screening Instrument.
Objective: The Traumatic Brain Injury screening instrument (TBISI) was implemented in Veterans Affairs medical facilities in an attempt to identify Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) veterans with possible mild TBI. Despite its widespread implementation, the reliability and validity of the screening tool has not yet been established.
Participants and Methods: Participants consisted of 44 OEF/OIF veterans referred for a neuropsychological evaluation after screening positively on the TBISI. For each individual referred from the second level evaluation, original responses to the positive TBI screen were obtained from the VHA electronic medical record system. As part of the neuropsychological assessment, the TBISI was re-administered.
Results: Of the 21 Qualifying Events and subsequent symptoms, 15 were unreliable and failed to meet minimal test-retest criteria. Only 6 items extracted from the four TBISI sections fell within the Good/Fair range. They ranged across the questions assessing Qualifying Event: blast wound, Immediate Symptoms: concussion, and Post-event Symptoms: memory problems. Of the six Current Symptoms, three demonstrated adequate reliability: memory problems, headaches and light sensitivity. Most interesting, the factual events of what might have constituted an injury were not reliably reported according to this measure.
Conclusions: Results suggest overall poor test-retest reliability of the TBISI with regard to type of event, injuries sustained, and resulting sequelae. Considering its overall poor test-retest reliability, we cannot be confident that we are providing services to veterans who will find them beneficial. These preliminary findings highlight the necessity and urgency of further investigation of the reliability of the TBISI.
Correspondence: *Sarah A. Van Dyke, M.A., Clinical Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI 48202. E-mail: svandyke@wayne.edu*

S.A. VAN DYKE, B.N. AXELROD & C. SCHUTTE. The Utility of the Postconcussive Symptom Questionnaire.
Objective: The Postconcussive Symptom Questionnaire (PCSQ) and its short forms (PCS-19 and PCS-NIM) were evaluated to determine their utility in measuring symptom validity as brief self-report measures in comparison to other well validated measures.
Participants and Methods: Participants consisted of 112 individuals referred for a neuropsychological evaluation at an urban Department of Veterans Affairs Medical Center. First, the relationships between the PCSQ forms and measures of cognitive performance (WAIS-IV FSIQ, CVLT-II Trials 1-5 Total T-score, Trails B, FAS), general distress (MMPI-2 M8), and self-report symptom validity (MMPI-2 FBS and RBS) were investigated to determine convergent validity. Second, ROC curve analyses were conducted to determine the ability of the PCSQ forms to detect over reporting on the FBS and RBS in addition to establishing optimal cutoff scores.
Results: In multiple regression analyses, cognitive performance did not predict significant variance, whereas measures of self-report symptom validity explained the greatest amount of variance. Based on the proposed cutoff scores, sensitivity, specificity, positive predictive power (PPP), negative predictive power (NPP), and hit rates were calculated.
Conclusions: Overall, the study provides promising evidence that the PCSQ and its short forms perform well as brief measures of self-report symptom validity. These data support convergent validity of other self-report symptom validity measures with the PCSQ forms. Similar classification rates between indices indicated that no one index stands out as superior, suggesting that the short forms perform well in comparison to the PCSQ Total with the benefit of having 19 items in comparison to 44.
Correspondence: *Sarah A. Van Dyke, M.A., Clinical Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI 48202. E-mail: svandyke@wayne.edu*

S. MACKINNON, M.E. O'CONNELL, M. CROSSLEY & D. MORGAN. Completion of Executive Functioning Tasks in a Memory Clinic Dementia Sample.
Objective: The objective of the present study was to determine completion rates on two executive function tasks in a predominantly early-stage sample of individuals diagnosed with dementia.
Participants and Methods: This study analyzed data from 119 patients diagnosed with dementia after interdisciplinary assessment from neurology, neuropsychology, nursing, physical therapy, and medical examination of recent blood work and CT head scan. This sample (65% female; M age = 74.60, SD = 9.20, range = 44-89; M years education= 10.24, SD= 3.10, range = 1-19) was predominantly early-stage: over half the sample's MMSE scores were greater than 22 and only a quarter had scores below 20. The sample was separated based on MMSE scores into those with mild dementia (n = 79; MMSE M = 24.77, SD = 2.331, MMSE range = 21-30) and those with moderate dementia (n = 40, M = 17.50, SD = 2.40, MMSE range = 11-20, but skewed to higher scores with 58% of scores between 18-20). Completion rates were defined as the proportion of patients who completed the Trail-Making Test Part B (TMT-B) and the incongruent trial on the Stroop Color-Word test. Incompletion was based on discontinuation of the task, for example, continually unable to inhibit the pre-potent response on the Stroop, errors on TMT-B, or excessive time on TMT-B, or inability to complete the sample).
Results: Incompletion rates for the Stroop were high: 44% of patients with mild and 83% with moderate dementia could not complete the incongruent trial of the Stroop. Completion rates for the TMT-B were higher (96% mild and 68% moderate completed).
Conclusions: Although incompletion can provide good qualitative information regarding impairment of executive function, quantitative measurement is ideal for measuring change over time. Many patients in this predominantly early-stage sample were unable to complete these tasks, thus simpler measures of executive function are required.
Correspondence: *Megan E. O'Connell, PhD, Psychology, University of Saskatchewan, Arts Building Rm 154, 9 Campus Drive, USask, Saskatoon, SK S7N 5A5, Canada. E-mail: megan.oconnell@usask.ca*

R.J. SPENCER, H. TREE, P.H. PANGILINAN, J.A. SUHR & L.A. BIELIAUSKAS. A new measure of suggestibility as measured by endorsement of urban myths.
Objective: Sources of healthcare information, although abundant, vary considerably regarding veracity. Less accurate sources of information

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

may mislead some healthcare consumers, particularly those who are prone to uncritically accept factually unsupported information at face value. This investigation explores the psychometric characteristics of the Michigan Odd Belief Scale (MOBS) a brief measure of suggestibility as measured by endorsement of urban myths.
Participants and Methods: The MOBS consists of 25 statements that are largely unsupported by evidence, but have persisted in popular culture (i.e., "urban myths"). The MOBS was administered to 115 undergraduate students (57% female, mean age = 20.3 years [SD = 4.5]) who responded to items as either being "true" or "false." The 25 items were examined for internal consistency and four discrepant items were removed.
Results: The final 21-item MOBS had a mean endorsement of 6.4 items (SD = 3.3), with endorsement of greater than nine myths occurring in less than 25% of the sample and endorsement of greater than ten and 12 myths occurring in less than ten and five percent of participants, respectively. The MOBS had moderate internal consistency, with a Chronbach's alpha of .67 after discrepant items were removed.
Conclusions: The MOBS has promise as a measure of an individual's propensity to believe unsupported claims and may have potential applications as a measure of health beliefs.
Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

L.A. BIELIAUSKAS, R.J. SPENCER, H. TREE, P.H. PANGILINAN & J.A. SUHR. Reliability and validity of a scale of "need for cognition"
Objective: Need for cognition (Ncog) refers to the desire to seek out and/or enjoy mentally challenging tasks. An individual who is high in Ncog may gravitate toward challenges and mentally complex situations, while those low in Ncog may avoid those situations, or endure them. This investigation explores the psychometric characteristics of a brief measure of Ncog by Cacioppo, Petty, and Kao (1984).
Participants and Methods: The Ncog scale consists of 18 statements that participants' rate on a 4-point scale, with response options ranging from "completely false" to "completely true." The Ncog was administered to 115 undergraduate students (57% female, mean age = 20.3 years [SD = 4.5]). Items were examined for internal consistency and correspondence with scales from the NEO-Five-Factor Inventory (NEO-FFI).
Results: The Ncog had a mean score of 50.2 (SD = 8.3), with higher scores indicating greater propensity to gravitate toward cognitive complexity. Scores less than 38 occurred in less than 10% of the sample. The Ncog had strong internal consistency, with a Chronbach's alpha of .90. Ncog scores were significantly correlated with two personality dimensions on the NEO-FFI, Openness to Experience ($r=.58$, $p<.001$) and Conscientiousness ($r=.25$, $p=.008$).
Conclusions: These results indicate that the Ncog scale offers a brief, reliable method for assessing need for cognition. Those high in Ncog tend to be open, curious, organized and responsible. Individuals who are low in Ncog tend to prefer simple, if often inaccurate, explanations to complex problems. This personality dimension may be useful in tailoring educational and other therapeutic interventions to patients.
Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

C.D. CARPENTER, R.J. SPENCER, H. TREE, P.H. PANGILINAN, L.L. DRAG & L.A. BIELIAUSKAS. Valid incidental learning measures derived from the WAIS-IV Vocabulary and Similarities subtests.
Objective: Embedded memory tests offer an efficient way to measure memory. Unfortunately, few such measures have been validated. In the present study, the validity of incidental learning measures, derived from the Vocabulary and Similarities subtests of the Wechsler Adult Intelligence Scale—Fourth Edition (WAIS – IV), were examined.
Participants and Methods: Incidental learning measures were created from the Vocabulary and Similarities subtests of the WAIS-IV. The vocabulary incidental learning task involved a "yes/no" recognition format, and the similarities incidental learning task involved a grading cueing paradigm. Forty-seven consecutive veterans undergoing evaluation for possible traumatic brain injury were administered the California Verbal Learning Test - 2 (CVLT-2) and the Brief Visuospatial Memory Test - Revised (BVMT- R). Data from 10 patients were excluded because of poor effort. Data from the remaining 37 veterans were analyzed using correlational and regression techniques. Vocabulary and Similarities incidental learning scores were added together to produce a single incidental learning index.
Results: Age was correlated with incidental learning performance at $r=-.37$ ($p=.03$). After controlling for age, incidental learning was significantly correlated with six of the seven performance measures from the CVLT-2 and the BVMT-R. Partial correlation coefficients ranged from $r=.30$ to $r=.53$.
Conclusions: Information that is encoded at a semantic level (such as in vocabulary and similarities) is well-suited for incidental learning tasks. These results indicate that such procedures are valid and provide an efficient way of assessing memory with little additional administration time.
Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

C. JOHNSON & M. HISCOCK. Does the Spatial Position of Card Decks Influence Selections on Iowa Gambling Task?
Objective: Previous studies have found that many normal young adults perform poorly on the Iowa Gambling Task (GT). We observed that university students often begin the task by making selections from the decks on the left (Decks A and B), which are categorized as disadvantageous. The present study was designed to determine whether there is a positional bias that could be rectified by counterbalancing the relative positions of the four decks.
Participants and Methods: Undergraduates from psychology classes in a large university volunteered for a study that entailed completing the GT (Version 2.0, 2002). On each of 100 trials, the subject used a computer mouse to select a card from one of four decks depicted on the screen. Subjects were assigned randomly to one of four conditions. In condition 1, the decks were arranged in the standard configuration, ABCD, from left to right. In conditions 2, 3, and 4, the decks were reordered, from left to right, as follows: DCBA, ADCB, DABC. Standard instructions were given to subjects irrespective of condition.
Results: The 100 subjects (71 female, 29 male) made advantageous choices on 53.5% of the trials. A position-related selection bias was found for the very first trial ($p < .025$), but that bias had dissipated by the end of the first block. Neither the number of advantageous choices, nor the proportion of subjects making predominantly advantageous choices, varied significantly across experimental conditions, $p > .10$. A Condition x Trial Block ANOVA showed a significant linear increase in the number of advantageous deck selections over trials 21-100 but no interaction between condition and trial block.
Conclusions: Even though the spatial arrangement of the four card decks influenced the initial choice of decks, no persistent biasing effect was found. As in previous studies with university students, overall performance on the GT was remarkably poor. Nonetheless, repositioning the advantageous and disadvantageous decks did not alter outcomes to a significant degree.
Correspondence: *Merrill Hiscock, Ph.D., Psychology & Center for Neuro-Engineering and Cognitive Science, University of Houston, Heyne Bldg, Room 126, Houston, TX 77204-5022. E-mail: mhiscock@uh.edu*

M. KRAYBILL, G. CHELUNE & Y. SUCHY. Test operating characteristics of a motor programming task used in the prediction of cognitive decline.
Objective: Age-related changes in motor programming have been shown to be associated with global cognitive functioning. However, it can be

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

difficult to apply such group level findings to an individual, especially for relatively high-functioning individuals. The purpose of this study was to demonstrate an evidence-based approach to using a motor programming (MP) task for the prediction of future decrements in cognitive functioning.
Participants and Methods: In a prospective cohort study of 50 community-dwelling older adults (age 60 to 87), a battery of neuropsychological tests was administered at two time points separated by approximately one year. Volunteers expressed an interest in, or concern about their cognitive functioning and testing included a computerized MP task as well as the Mattis Dementia Rating Scale (DRS-2). Test operating characteristics for the MP task were calculated using a decline in DRS raw scores (7 points) as the condition of interest (COI).
Results: MP could classify participants into decliners and non-decliners with 67% sensitivity, 80% specificity, and 43% positive predictive power. The baserate of the COI was 18%. The Odds Ratio was 8.25, Likelihood Ratio was 3.42, and Risk Ratio was 5.14. Pre-Test Odds = .22 and Post-Test Odds = .75.
Conclusions: The results of this study demonstrate how MP performances can be used to classify individuals at risk for developing future cognitive changes. Utilizing empirically derived cut-points and evaluating test operating characteristics may be a useful method of assessing outcomes in evidence-based research and clinical practice (Chelune, 2010).
Correspondence: *Matthew Kraybill, Ph.D., Psychology, San Francisco VA, 4150 Clement Street, San Francisco, CA 94121. E-mail: mkraybill@gmail.com*

Cancer

J.M. ASHFORD, K.L. NETSON, T.N. SKINNER, M.F. MCCOOL, T.E. MERCHANT, V.M. SANTANA, S. WU, X. XIONG & H.M. CONKLIN. Adaptive Functioning of Childhood Brain Tumor Survivors following Radiation Therapy as Measured by Parent Report and Examiner Interview.
Objective: Adaptive functioning is not often examined in childhood brain tumor (BT) survivors, with investigations relying almost solely on examiner interviews. Parent rater measures may provide similar information without the same time and expertise burden. The current study examined adaptive behaviors in BT survivors relative to healthy peer and cancer survivorship groups and explored the validity of a parent questionnaire in relation to an examiner administered interview.
Participants and Methods: Participants were BT survivors (n=50) treated with conformal radiation therapy (CRT; 5.77±2.27 years since CRT), healthy siblings of BT survivors (n=39) and solid tumor (ST) survivors who did not receive CNS-directed therapy (n=40). The sample was 13.11±2.98 years at the time of assessment and groups were balanced with respect to gender and socioeconomic status. Parents completed the Adaptive Behavior Assessment System–2nd Edition (ABAS-II). For a subset of the BT cohort (n=32), examiners administered the Vineland Adaptive Behavior Scales (VABS) to parents within 12 months, as part of an institutional CRT protocol.
Results: Groups differed significantly on each of the ABAS-II indices (Conceptual, Social, Practical) and the general adaptive composite ($p<.05$). Post-hoc tests revealed the BT group scoring lower than the sibling group across indices ($p<.05$) and lower than the ST group across indices ($p<.01$) with the exception of Social composite ($p=.07$). VABS scores (Communication, Daily Living, Socialization and Composite) were correlated with ABAS-II scores on nearly all indices ($p<.05$).
Conclusions: BT survivors showed significantly lower adaptive functioning when compared to siblings and ST survivors. The ABAS-II questionnaire proved sensitive to these behavioral limitations and was consistent with scores on the VABS interview. The use of a parent questionnaire to assess adaptive functioning enhances survivorship investigations by increasing flexibility of assessment, decreasing examiner burden and facilitating multi-site trials.
Correspondence: *Jason M. Ashford, MS, Psychology, St Jude Children's Research Hospital, 262 Danny Thomas Place, Memphis, TN 38105. E-mail: jason.ashford@stjude.org*

K.L. NETSON, H.M. CONKLIN, S. WU, X. XIONG & T.E. MERCHANT. The Impact of Conformal Radiation Therapy on Adaptive Functioning in Children Treated for Localized Ependymoma.
Objective: Conformal and intensity-modulated radiation therapy for pediatric ependymoma has shown potential for preserving cognitive outcomes relative to conventional radiotherapy; however, functional outcomes including adaptive behaviors have not been thoroughly investigated in this population. This longitudinal investigation prospectively examined IQ and adaptive functioning during the first five years following radiation therapy.
Participants and Methods: Participants were 123 children diagnosed with intracranial ependymoma. The study cohort was 4.60 ± 4.26 years of age at irradiation and balanced with respect to gender. Serial neurocognitive examinations, including an age-appropriate IQ measure and the Vineland Adaptive Behavior Scales (VABS), were completed at pre-irradiation baseline, six months post-irradiation, and annually for five years.
Results: Baseline IQ and VABS indices were below normative means ($p < .05$), although not outside the average range. Linear mixed models revealed stability in IQ and VABS scores over the five-year follow-up period with the exception of the VABS Communication Index, which declined significantly ($p = .015$) at a rate of .90 standard score points per year. Pearson correlations revealed that annual change in IQ (-.04 points) did not correlate significantly with annual change in any VABS index (-.90 to +.44 points). Clinical factors associated ($p < .05$) with poor baseline performance included receipt of pre-irradiation chemotherapy, shunt placement, multiple surgical resections, lesser extent of surgical resection, and younger age at treatment. No clinical or demographic factors significantly impacted the rate of change in scores.
Conclusions: Newer methods of focal irradiation offer relative sparing of cognitive and functional outcomes including IQ and adaptive behaviors, even in children treated at a young age. Communication skills remain vulnerable and should continue to be targeted with preventive and rehabilitative interventions.
Correspondence: *Kelli L. Netson, PhD, Psychology, St. Jude Children's Research Hospital, 262 Danny Thomas Place, MS 740, Memphis, TN 38105. E-mail: KLNetson@gmail.com*

K.E. KING, J.M. FLETCHER, R.S. HERBST & C.A. MEYERS. Neurocognitive Effects Associated with TNP-470 Administration in Patients with Advanced Adenocarcinoma of the Prostate.
Objective: The objective of this study is to investigate the neuropsychological correlates of a specific antiangiogenic agent (TNP-470) by utilizing archival data collected during a Phase II clinical trial.
Participants and Methods: In the original study from which the archival data was collected, otherwise healthy participants with locally advanced adenocarcinoma of the prostate received TNP-470 while preparing for prostatectomy. Pre and post-treatment, patients were administered a short battery of neuropsychological measures. The pre-treatment scores were compared to post-treatment scores using the reliable change index (Jacobson & Truax, 1991). TNP-470 was predicted to be associated with neurocognitive side effects including problems with fine motor dexterity, attention, and executive functioning, when administered in isolation. Self-perceived quality of life was also expected to decline across testing.
Results: A high rate of baseline impairment was discovered. Consistent with hypotheses, 50% of the participants showed significant declines on a task assessing attention, executive functioning, and cognitive flexibility and on a task of fine motor dexterity. Additionally, 50% of the participants declined on a measure of learning and memory. No significant declines were found in self-perceived quality of life.
Conclusions: These results are consistent with previous studies suggesting frontal subcortical dysfunction associated with TNP-470 ad-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ministration. Although this and other studies suggest a correlation between TNP-470 infusions and neuropsychological side effects, other research has not found evidence that these neurocognitive changes persist; thus, antiangiogenics may still be a useful alternative to cancer treatments that are associated with long-term alterations in cognition.
Correspondence: *Kelly E. King, Ph.D., University of Minnesota, 360 Spring St. #239, St. Paul, MN 55102. E-mail: kingx780@umn.edu*

A.L. WONG, L. MARIAM, M. DOEDEN, M. SMITH, C. KINJO, C. KEILTY & S.K. PATEL. Pre-Surgery Neurocognitive Functioning in Post-Menopausal Women Newly Diagnosed With Breast Cancer.

Objective: Cancer related cognitive dysfunctions have been attributed to the effects of chemotherapy; however, recent studies suggest these symptoms may be present even prior to adjuvant treatments, possibly caused by immunologic changes activated by the tumor itself. To best evaluate this hypothesis, we evaluated newly diagnosed cancer patients prior to any treatment.

Participants and Methods: The current sample consisted of 100 participants (breast cancer patients and healthy controls). In this ongoing study, a neurocognitive/behavioral assessment and blood draw is conducted with each patient prior to any treatment, including surgery. The same assessments are performed with a healthy comparison group. Blood is processed and stored for cytokine assays.

Results: ANOVA results found significant differences in select measures of cognitive functioning between breast cancer patients and healthy controls (HC). The breast cancer group was further separated into those who would eventually go on to receive chemotherapy ("chemo") and those whose treatment would not include chemotherapy ("no chemo"). Even at the pre-treatment baseline when participants were not aware of their treatment course, women in the chemo group showed significantly lowered performance on verbal memory and attention, as well as greater self-report of cognitive dysfunction, compared to the no chemo and HC groups.

Conclusions: At pre-treatment, there is higher prevalence of self-reported cognitive dysfunction and lowered scores on objective attention and memory tests in newly diagnosed post-menopausal breast cancer patients who eventually receive chemotherapy compared to patients who do not get chemotherapy. This suggests that cognitive functioning may be worse in those with more invasive cancer (i.e. requiring chemotherapy).
Correspondence: *Andrew L. Wong, M.A., Clinical Psychology, Fuller Theological Seminary, 1501 S. Fifth Avenue, Arcadia, CA 91006. E-mail: alwong83@gmail.com*

B.C. BAUGHMAN, M.M. HUDSON, C. LI, D.K. SRIVASTAVA, L.L. ROBISON & K.R. KRULL. Construct Validity of the Childhood Cancer Survivor Study Neurocognitive Questionnaire.

Objective: Long-term survivors of childhood cancer are at risk for neurocognitive impairment. However, routine screening of survivors in adulthood is often impractical. This study reports on the construct validity of the recently developed Childhood Cancer Survivor Study Neurocognitive Questionnaire (CCSS-NCQ).

Participants and Methods: Construct validity of the four factors of the CCSS-NCQ (Task Efficiency, Memory, Emotional Regulation, and Organization) was examined in 530 adult survivors of childhood cancer (mean [range] current age = 34.6 yrs [20.4–54.9], age at diagnosis = 6.9 yrs [0.1–20.3]; 51.3% female). All participants completed the self-report CCSS-NCQ and a comprehensive battery of standardized neuropsychological tests, including measures of general cognitive abilities (GCA), attention, memory, processing speed, and executive function. Correspondence between self-ratings and direct performance measures was examined.

Results: The CCSS-NCQ Task Efficiency factor was significantly correlated with measures of GCA, attention, processing speed, memory and executive function (all p's < 0.0001). The CCSS-NCQ Memory factor correlated most strongly to measures of memory ($p<0.0001$), with modest correlations to other performance-based measures. The Organization factor from the CCSS-NCQ correlated modestly only with measures of attention and processing speed. The Emotional Regulation factor from the CCSS-NCQ demonstrated significant correlations with GCA, memory, attention, and processing speed, with weaker associations to measures of executive function.

Conclusions: Results support the CCSS-NCQ as a sensitive and specific indicator of neurocognitive status. The Task Efficiency factor is related to multiple neurocognitive processes, while the Memory factor appears specific to memory functioning. Furthermore, deficits in attention and processing speed appear to influence self-report of multiple neurocognitive constructs.
Correspondence: *Kevin R. Krull, PhD, Epidemiology & Cancer Control, St. Jude Children's Research Hospital, 262 Danny Thomas Place, MS 735, Memphis, TN 38105-3678. E-mail: kevin.krull@stjude.org*

N. JAIN, M.M. HUDSON, N. SABIN, D.K. SRIVASTAVA, M. METZGER, L.L. ROBISON & K.R. KRULL. Neurocognitive Outcomes in Adult Survivors of Childhood Hodgkin Lymphoma.

Objective: Although children diagnosed with Hodgkin Lymphoma (HL) do not receive neurotoxic chemotherapy or cranial radiation, adult survivors are at increased risk for cardiac morbidity. This study examines the role of cardiotoxic treatment on neurocognitive dysfunction in adult survivors of childhood HL.

Participants and Methods: Neurocognitive performance was examined in 62 adult survivors of childhood HL (mean [SD] current age = 42.2 [4.77] yrs, age at diagnosis = 15.3 yrs [3.49] yrs). Survivors were treated with either high-dose chest radiation (n=34) or anthracycline chemotherapy combined with lower dose chest radiation (n=28). Cardiac imaging and brain MRI's were conducted.

Results: Compared to normative values, survivors demonstrated average intellect (100.7 [14.87]), though slower processing speed ($p<0.001$), poorer sustained attention ($p<0.009$), reduced verbal fluency ($p<0.01$), and poorer working memory ($p<0.006$) and verbal memory ($p<0.002$). Survivors treated with anthracycline demonstrated poorer verbal memory ($p<0.05$), while those treated with higher chest radiation displayed reduced interference control ($p<0.03$) and a trend for poorer sustained attention ($p<0.06$). Higher chest radiation was associated with trends for lower cardiac ejection fraction ($p<0.07$), and increased rates of leukoencephalopathy on brain MRI ($p<0.10$). Cerebral volume loss was identified on MRI in 30% of survivors treated with high dose chest radiation and 24% of those treated with anthracycline, and was significantly associated with poorer sustained attention ($p<0.01$) and self-report of working memory problems ($p<0.001$).

Conclusions: Adult survivors of childhood Hodgkin Lymphoma demonstrate increased rates of brain impairment, reflected through neurocognitive assessment and neuroimaging studies. Given the sample size, these findings should be interpreted with caution, but do support the need for larger prospective investigations in this population.
Correspondence: *Kevin R. Krull, PhD, Epidemiology & Cancer Control, St. Jude Children's Research Hospital, 262 Danny Thomas Place, MS 735, Memphis, TN 38105-3678. E-mail: kevin.krull@stjude.org*

K.M. SMITH, T.Z. KING, R. MORRIS & N. KRAWIECKI. Cognitive Contributions to Reading Ability in Long-term Survivors of Childhood Brain Tumors and Healthy Young Adults.

Objective: Survivors of childhood brain tumors are at risk for cognitive and academic achievement difficulties. To learn more about factors that contribute to reading ability in survivors and healthy controls, core cognitive functions of working memory and information processing speed were examined.

Participants and Methods: Participants included 26 adult survivors of childhood brain tumors, and 26 demographically matched healthy undergraduates (Mean age=24.5, SD=6.22; 50% female; mean education=13.21, SD=1.61; 73% Caucasian). Survivors were an average of 21.85 (SD=11.91) years since diagnosis. Reading was measured with

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

letter-word identification (LWID) and passage comprehension (PC), untimed subtests of the WJ-III, Symbol Digit Modalities Test Oral version was used to measure information processing speed, and Auditory Consonant Trigrams for working memory. Group based regression analyses were conducted with processing speed and working memory as predictors of reading.
Results: In survivors, for both reading measures, processing speed but not working memory contributed significant individual variance to reading (LWID: ≥=.544, p=.009, R^2 =.50; PC: ≥=.545, p=.011, R^2=.48). In controls, neither speed nor working memory explained individual variance in word decoding (LWID; R^2 =.07, p=.16), or reading comprehension (PC; R^2 =-.05, p=.69).
Conclusions: Consistent with the Palmer (2008) model, processing speed is a significant predictor of reading skills in brain tumor survivors. Core cognitive skills are more strongly related to reading in survivors, accounting for 48-50% of the variance in reading, versus a nonsignificant portion of the variance in controls. Future research will investigate if cognitive skills, particularly processing speed, may be more integral to reading in survivors due to an effect of structural brain changes.
Correspondence: *Kristen M. Smith, B.A., Psychology, Georgia State University, 140 Decatur Street, Atlanta, GA 30303. E-mail: kristensmith27@gmail.com*

R. BREWSTER, T.Z. KING, R. MORRIS & N.S. KRAWIECKI. Processing Speed Fully Mediates the Relationship Between Group Membership and Intelligence in Adult Survivors of Childhood Brain Tumors and Neurotypical Adults.
Objective: Cognitive weaknesses are a particular concern for long-term survivors of childhood brain tumors. We examined processing speed as a mediator both in the relationship between group membership and fluid intelligence, and the relationship between group membership and crystallized intelligence in survivors of childhood brain tumors and controls.
Participants and Methods: Fluid intelligence (Matrix Reasoning of WASI; MR), crystallized intelligence (Vocabulary of WASI; V), and processing speed (Oral Symbol Digit Modalities Test; O-SDMT) were obtained on 24 survivors and 24 demographically matched controls (mean age=25.27, SD=5.92; mean education=13.35, SD=1.68; 46% female; 77% Caucasian). Survivors averaged 20.53 (SD=10.70) years post-diagnosis. Hierarchical regression analyses and a bootstrapping macro (Preacher & Hayes, 2008) tested total and indirect effects of both mediation models.
Results: Group was a significant predictor of MR (≥=-4.27, p=.002, R^2=.18). When processing speed was included, group decreased to insignificance and additional variance in MR was explained by the model (≥=.535, p<.001, R^2=.41). The indirect path between group membership, processing speed, and fluid intelligence was confirmed as a significant complete mediation through a bootstrapping macro syntax (B=-.38, CI.95=-.817, -.100). Group was not a significant predictor of Vocabulary, and mean scores were not significantly different between groups (Survivors=10.06, SD=3.9, Neurotypicals=11.42, SD=2.2).
Conclusions: Consistent with Palmer's model (2008), processing speed mediates the relationship between group membership and fluid intelligence. However, processing speed does not mediate the relationship between group membership and crystallized intelligence. Notably, processing speed emerges as an important factor in fluid intelligence but not crystallized intelligence for survivors treated with radiation.
Correspondence: *Ryan Brewster, Psychology, Georgia State University, 3781 Mill Creek Court, Atlanta, GA 30341. E-mail: rbrewst@gmail.com*

A.D. KOHL, T.Z. KING, R. MORRIS & N. KRAWIECKI. Recognition Memory False Positive Error Rates in Long-Term Survivors of Childhood Brain Tumors.
Objective: The use of radiotherapy (RT) is associated with memory impairments in survivors of childhood brain tumors however it is not known whether recognition deficits exist. The present study examined group performance on measures of the CVLT recognition hits and recognition false positives.
Participants and Methods: Participants were 34 survivors (23 RT, 11 noRT) and 34 controls. On average survivors were 19.1 years post-diagnosis (SD=4.3; mean age at diagnosis=6 years, SD=4.1). Both survivor groups (RT, noRT) and controls did not differ significantly on gender (53% female), age at examination (M=24), years of education (M=13), and ethnicity (65% Caucasian). Recognition performance was examined by hits and false positive rates. The three groups (controls, RT, noRT) were compared using one-way ANOVAs and t-tests.
Results: CVLT recognition hits were not significantly different among the three groups and on average each group performed within normal limits. However, ANOVA revealed significant differences in false positive rates by group (F(2, 65)=7.37, p=.001). The RT group (z=-.98) endorsed significantly more false positive items compared to controls (z=.00, p=.001) but RT was not significantly different from noRT (z =.09, p=.07). The noRT and control groups were not significantly different.
Conclusions: Survivors who received RT endorsed a comparable level of target words as the other two groups. Compared to controls, however, only the RT group endorsed a higher false positive rate, suggesting reduced overall accuracy in recognition performance. The overall accuracy involving semantically-related and novel recognition items will be discussed within the context of learning and memory performance.
Correspondence: *Alexander D. Kohl, M.S., Georgia State University, P.O. Box 5010, Atlanta, GA 30302-5010. E-mail: akohl628@gmail.com*

M. IVANISEVIC, T.Z. KING, PH.D., R. MORRIS, PH.D. & N. KRAWIECKI, M.D.. Planning Skills During A Complex Drawing Task Predicts Adaptive Functioning Of Long-term Survivors Of Childhood Brain Tumor.
Objective: Adaptive functioning is an individual's ability to independently perform daily tasks and effectively interact with others at an age appropriate level. We hypothesized that planning skills as measured by the Boston Qualitative Scoring System of the Rey-Osterrieth Complex Figure (ROCF) Copy would be predictive of stronger adaptive functioning.
Participants and Methods: Fifty-two caregivers were administered the Scales of Independent Behavior-Revised (SIB-R). The ROCF and Finger Tapping (FTT) were administered to 26 survivors of childhood brain tumor (12 females) and 26 neurotypical young adult control participants (23 females). Survivors were on average 18 years (SD=4.98) since time of diagnosis. Groups had a similar level of education (Mean=13.23, SD=.99) and socioeconomic status (Mean=2.38, SD=1.13). However, survivors were significantly older (24.65 years; SD=5.28); t(36)= -3.56, p=.00); Control mean=20.58 years; SD=2.50).
Results: The survivor group was significantly lower on independent living skills (SIB-R=80.92, SD=19.50) compared to the control group (Mean=103.38, SD= 21.03; t(50)=3.99, p=.00). In addition, survivors scored significantly lower on planning skills (t(43) =2.59, p=.013). Linear regression illustrated that when controlling for basic motor skills (12% variance; ≥=.35, p=.02), planning skills accounted for 8% of the variance of overall adaptive functioning (≥=.32, p=.024).
Conclusions: These data suggest that planning, as measured by performance on the ROCF-BQSS, is related to adaptive outcomes even after controlling for motor skills on the FTT. The role of planning skills as a predictor of adaptive functioning subdomains (motor skills, social interaction and communication skills, personal living skills, and community living skills) will be discussed.
Correspondence: *Mirjana Ivanisevic, BS in psychology, Psychology, Georgia State University, 1424 Camelot Lane, Tucker, GA 30084. E-mail: mirjana.ivanisevic@gmail.com*

L. CARTY, K.L. NETSON, T.N. SKINNER, J.M. ASHFORD, M.F. MCCOOL, T.E. MERCHANT, S. WU, X. XIONG & H.M. CONKLIN. Investigating the Relationship between IQ, Executive Functioning and Health Related Quality of Life, among Childhood Brain Tumor Survivors Treated with Conformal Radiation Therapy.
Objective: Childhood brain tumor (BT) survivors treated with cranial irradiation have increased risk for cognitive late effects (e.g., reduced

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

IQ, executive dysfunction) and lower health-related quality of life (HRQoL). Conformal or intensity-modulated radiation therapy (CRT/IMRT) spares normal tissue and has potential to improve functional outcomes. No studies have explored the relationships between IQ, executive functioning and HRQoL following CRT/IMRT. The current study investigated the relationship of IQ and executive functioning with HRQoL in CRT treated, BT survivors.

Participants and Methods: Forty-five children (age 12.68 ± 2.56 years; 21 males) treated with CRT/IMRT for ependymoma (n=21), low-grade astrocytoma (n=9), or craniopharyngioma (n=15) participated in this cross-sectional investigation. Measures included the Wechsler Abbreviated Scale of Intelligence (WASI) and the Behavior Rating Inventory of Executive Function (BRIEF). HRQoL was measured using Parent and Child versions of the KINDL, where mean scores are approximately 70-80.

Results: Mean IQ (98.64 ± 14.23) and BRIEF T-scores (Range 49-56) were within average range. Mean KINDL Total scores (Parent 74.84 ± 12.15; Child 64.38 ± 13.45) were lower than available norms. Pearson correlations revealed no significant relationship between the KINDL Total Score and IQ (Parent r=.17, p=.27; Child r=.11, p=.49). Parent KINDL subscales correlated significantly across BRIEF subscales (r=-.15 to -.73; p<.05). Fewer significant correlations between Child KINDL and BRIEF subscales were identified. Hierarchical regression revealed that the BRIEF Metacognitive Index (MI) independently accounted for 45.65% (p<.001) of the variance in parent-rated HRQoL after accounting for age at study, gender and IQ.

Conclusions: Executive functioning was strongly linked to HRQoL, and children's metacognitive deficits in particular were associated with parent perceptions of HRQoL. Investigating whether executive function-directed interventions improve HRQoL in BT survivors will be critical.

Correspondence: *Lynne Carty, psychology, Behavioral Medicine, St Jude Children's Research Hospital, St Jude Childrens Research Hospital, 262 Danny Thomas Place, Memphis, TN 38105. E-mail: lynnecarty@gmail.com*

J. BERNABEU, A. CAÑETE, J. SUAREZ, G. ALMERICH, C. FOURNIER & V. CASTEL. Relationship between clinical and neuropsychological variables in pediatric cancers: Two-dimensional representation with CATPCA analysis.

Objective: The influence of different variables on neuropsychological deficits is well-known.The intensity and direction of focal and diffuse brain damage due to illness or treatment are related to age and brain maturation stages,sex...Our objective has been to explore the complex relations between clinical and neuropsychological variables.

Participants and Methods: 118 children (mean age:7 years) were assessed:65% CNS tumor,35% leukemia.44% irradiated (RT).Clinical variables: pathology,RT,age at diagnosis,time since diagnosis and sex.The same neuropsychological protocol was performed,including 54 cognitive measures,psychopathology and CPT-II.SPSS 17.0 statistical package was used.

Results: Results from two dimensional representation with CATPCA:
Dimension 1:negative relation between time elapsed and cognitive variables,positive relation between CPT and time elapsed.Group distribution (from more to less deficit):BT-RT,L-RT,BT and L.Older age at diagnose,better cognitive functioning.
Dimension 2:Worse non-verbal deficit in BT RT,and more verbal problems in the other groups.More time elapsed affects non verbal functions.
1.BT:generalized deficit related to longer time elapsed and early age at diagnosis,RT more affected.
2.LLA:focal deficit in VIQ,receptive language,working memory and attention related to: early age at diagnosis,longer time elapsed and female.
3.LLA RT:as LLA with worse scores.Mild difficulties in receptive language,working memory and attention.

Conclusions: 1.LLA PATIENTS show a tendency to mild focal difficulties in language processing,memory and attention affecting academic achievement and posterior social and career integration.
2.Learning difficulties might be attributed to parental overprotection or school-absenteeism.Nonetheless,neuropsychological studies allow us to dismiss wrong attributions.
3.Older age at diagnosis is not a global deficit protector in leukemia patients,unlike pediatric brain damage patients.
4.Brain maturation,sex and age at diagnosis may explain some deficits in these populations.

Correspondence: *Jordi Bernabeu, PhD, University Hospital La Fe, Pediatric Oncology Unit, Avgda. Campanar, 21, Valencia 46009, Spain. E-mail: jordi.bernabeu@uv.es*

C. ANDREOTTI, K.E. ROBINSON, M.M. REISING, J.E. CHAMPION, L.K. CAMPBELL, J. POTTS, K. HAKER & B.E. COMPAS. Cognitive and Executive Functioning in Childhood Survivors of Acute Lymphocytic Leukemia: Correspondence Between Assessment Data and Parent Perceptions.

Objective: Previous research has found long-term neurocognitive sequelae of treatment for pediatric acute lymphocytic leukemia (ALL; Campbell et al., 2007; Peterson et al., 2008). The current study further assessed the specific domains of cognitive functioning most affected in this population. In addition, since the majority of referrals for neuropsychological testing for ALL survivors are made by a parent or teacher, we examined the relationship between parent perceptions of current executive functioning and performance on standardized measures.

Participants and Methods: Forty-three survivors of childhood ALL (22 females, mean age = 14.05 years, sd = 2.89) completed measures of cognitive and executive functioning from the Wechsler Intelligence Scale for Children 4th Edition (WISC-IV) and Delis-Kaplan Executive Functioning System (DKEFS). Parents completed the Parent Version of the Behavioral Rating Inventory of Executive Functioning (BRIEF).

Results: Significantly below average performance on the WISC-IV was noted in domains of processing speed (t=-3.4, p<.001) and working memory (t=-2.5, p<.05). Parent ratings of executive functioning on the BRIEF did not indicate below average abilities in any measured domain of executive functioning, and the working memory and processing speed indices of the WISC-IV were not significantly correlated with the Metacognition Index on the BRIEF, which includes items related to working memory, complex problem solving, and producing goal-directed behavior.

Conclusions: These findings provide further evidence of cognitive deficits in domains of processing speed and working memory. In addition, parent perceptions of cognitive functioning may be unreliable, and extensive neuropsychological testing in this population may be beneficial for enhanced identification of children requiring services.

Correspondence: *Charissa Andreotti, MA, Psychology, Vanderbilt University, 1803 Broadway, 110, Nashville, TN 37203. E-mail: charissa.andreotti@vanderbilt.edu*

S. GLASS, S. ROECKEMAN, P. LEO, M. DICKINSON & D. SABSEVITZ. Exploring the Relationship Between Quality of Life and Cognitive Functioning in Primary Brain Tumors.

Objective: Quality of life (QOL) has been identified as an important outcome variable in brain tumor patients. Previous research has shown that factors such as fatigue and mood can affect QOL; however, relatively few studies have examined the impact of cognitive factors on this domain. The current study seeks to expand upon this literature by examining the impact of subjective cognitive symptoms and objective neuropsychological test performance on QOL in a primary brain tumor population.

Participants and Methods: 90 adult primary brain tumor patients, 65 WHO grade 3-4 (high grade, HG) and 25 WHO grade 1-2 (low grade, LG), completed comprehensive post-surgical neuropsychological testing, prior to any other treatment. QOL was assessed with the FACT. Perceived cognitive functioning was assessed by cognitive specific questions from the Brain module of the FACT.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Perceived cognitive functioning was significantly correlated with both Total QOL on the FACT (r= .66, p < .001) and with performance on objective cognitive measures such that greater subjective cognitive difficulties were associated with both objective cognitive problems and poorer overall QOL . There were no differences in total QOL or perceived cognitive functioning between the LG and HG patients.
Conclusions: The presence of both perceived and actual (i.e., objective) cognitive problems on neuropsychological testing are related to poorer QOL. Tumor grade does not appear to affect QOL on its own. By understanding the factors that influence quality of life, research can ultimately help to inform interventions (i.e., cognitive, emotional) and treatment approaches so as to maximize QOL.
Correspondence: *Samantha Glass, PhD, Neurology, Medical College of Wisconsin, 9200 W Wisconsin Avenue, Milwaukee, WI 53226. E-mail: sglass@mcw.edu*

K. ROBINSON, C.F. ANDREOTTI, M. REISING, J.E. CHAMPION, L.K. CAMPBELL, J. POTTS, K. HAKER & B.E. COMPAS. Neurocogntiive Deficits in Survivors of Pediatric ALL: Implications for Long-Term Coping and Emotion Regulation.
Objective: Research on late effects of pediatric acute lymphocytic leukemia (ALL) has found that a significant number of survivors experience long-term psychosocial and neurocognitive deficits (Campbell et al., 2006). Possible associations between these areas may contribute to understanding the behavioral and emotional functioning of these children and their ability to cope with stress, but these associations have not been studied.
Participants and Methods: We assessed neurocognitive functioning of 46 survivors of ALL (22 females, mean age = 14.05 years, SD = 2.89) using the Working Memory (WMI) and Processing Speed (PSI) Indices of the WISC-IV and the Metacognition Index of the BRIEF. Survivors and parents completed the Responses to Stress Questionnaire, a measure of survivors' coping and emotion regulation.
Results: Greater deficits in executive functioning on the BRIEF were associated with decreased use of secondary control coping (e.g., cognitive reappraisal; r = -.46, p = .002) according to survivors' self-report, and were associated with decreased use of primary control (e.g., problem solving; r = -.55, p < .001) and secondary control coping (r = -.33, p = .034) and increased use of disengagement coping (r = .36, p = .020) according to parent report. Higher scores on the WMI were associated with greater use of primary control coping (r = .42, p = .007) according to parent report.
Conclusions: These findings suggest that survivors experiencing executive function deficits may be less likely to use adaptive coping strategies when facing stress, and suggest broader implications for the cognitive and potential neurobiological substrates of coping and emotion regulation.
Correspondence: *Kristen Robinson, M.S., Psychology & Human Development, Vanderbilt University, 0552 Peabody, 230 Appleton Place, Nashville, TN 37203. E-mail: kristen.e.robinson@vanderbilt.edu*

C. RONCADIN, J. HITZLER, C. ALYMAN, A. DOWNIE, I. MONTOUR-PROULX & B. SPIEGLER. Neurocognitive Late Effects of Treatment for Acute Lymphoblastic Leukemia in Children with Down Syndrome.
Objective: Children with Down syndrome (DS) have a 10- to 20-fold increased risk of developing leukemia, but little is known about the impact of CNS-directed therapy on their neurocognitive outcome. This multi-site study investigated neurocognitive outcome in children with DS treated two or more years earlier for Acute Lymphoblastic Leukemia (ALL) compared to children with DS but no history of cancer. We hypothesized that the ALL group would perform more poorly than the control group because CNS-directed treatment over a prolonged period of time likely affects brain development and function beyond the effects of having DS.
Participants and Methods: Participants were 4 to 17 years of age at testing. Between-group differences in performance on standardized measures of intelligence, language, academic achievement, fine-motor skills, and adaptive behavior were evaluated using Mann–Whitney U tests.
Results: The ALL group (N = 14) performed significantly more poorly than the control group (N = 21) in the areas of verbal intelligence, expressive language, reading, spelling, and independence with daily living skills.
Conclusions: The results indicated that DS patients develop a pattern of neurocognitive late effects after treatment for ALL that partially overlaps with that of non-DS patients. Furthermore, verbal functions are preferentially affected. DS patients also fare poorly in their level of independence with daily living skills, reflecting a lower quality of life after treatment for ALL in addition to neurocognitive sequelae.
Correspondence: *Caroline Roncadin, Psychology, Peel Children's Centre, 85A Aventura Court, Mississauga, ON L5T 2Y6, Canada. E-mail: croncadin@peelcc.org*

A. SLONAKER, L. PASS, S. FARROW, J. BLASIK & N. COMOLESKO. Neuropsychological Functioning Following a Medulloblastoma: A Case Study.
Objective: Although childhood cancer is rare, medulloblastomas are the most common type of brain tumors in children. A medulloblastoma is an infratentorial tumor and can spread from the brain to the spinal cord or other parts of the body. Treatment, including chemotherapy, and recovery are dependent on the type, size, and location of the tumor in the brain as well as the child's age and health status. This case study will present an overview of medulloblastomas in children, specifically with regard to neurobehavioral functioning following chemotherapy treatment. In particular, the neuropsychological presentation of a student with a medulloblastoma will be discussed as he presented in elementary school and then progressed through high school.
Participants and Methods: This case presentation will discuss the longitudinal progress of a male diagnosed with a medulloblastoma when he was 5 years of age. Following surgical resection and chemotherapy treatment, the child's neurobehavioral functioning was evaluated and monitored from elementary school through graduation from high school. The presentation will include specific information regarding the neuropsychological presentation of this student at each time of evaluation.
Results: Results from subsequent neuropsychological evaluations indicated general improvement in neurobehavioral functioning with no observed decline in basic skills. However, evaluation results indicated the student continued to exhibit deficits in language arts, processing abilities, attention and concentration, and memory abilities.
Conclusions: This case study details the longitudinal progress of a student diagnosed with a medulloblastoma and will discuss the educational implications for students with the diagnosis.
Correspondence: *Amanda Slonaker, Psychological Services, Virginia Beach City Public Schools, 1413 Laskin Road, Virginia Beach, VA 23451. E-mail: Amanda.Slonaker@vbschools.com*

S.Y. PATWARDHAN, C. STRANGE & J.S. WEFEL. Impact of Frontal and Temporal Lobe Tumors on Verbal Learning and Memory Performance.
Objective: Verbal learning and memory (VLM) is subserved by a widely distributed network of brain regions. This study investigated the nature of VLM deficits associated with tumors in the frontal (FL) and temporal lobes (TL). We hypothesized that FL patients would exhibit greater impairments on Hopkins Verbal Learning Test-Revised total (TOTAL) and delayed (DR) recall compared to delayed recognition (RECOG); TL patients would exhibit relatively equivalent impairment across subtests; and FL and TL patients would evidence similar rates of impaired TOTAL, but TL patients would show greater DR and RECOG impairments.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: We assessed VLM of untreated primary FL (n=123, age=43.89±14.50, education=14.87±2.58, GBM=30.1%) and TL (n=106, age=48.0±15.85, education=14.75±2.79, GBM=45.3%) brain tumor patients. Impairment was defined as performance -1.5 SDs from the normative mean. Frequency analyses and independent sample t-tests were performed.
Results: FL patients evidenced more frequent impairment on TOTAL (33.3%) and DR (32.8%) compared to RECOG (8.6%). Impairment was more common on all subtests for TL patients, but TOTAL (47.2%) and DR (52.8%) were more frequently impaired than RECOG (26.8%). Standardized scores on TOTAL, DR, and RECOG were significantly better for FL patients ($p<0.05$).
Conclusions: FL patients evidence greater rates of encoding and retrieval deficits with relatively intact consolidation. A similar subtest pattern is seen in TL patients, but they have greater incidence of consolidation deficits. Encoding was more frequently affected in TL compared to FL patients, although this was the weakest between-group difference. Tumors outside of the temporal lobe adversely impact VLM; though classic VLM profiles appear to be largely maintained.
Correspondence: *Surabhi Y. Patwardhan, MA, Department of Psychology, University of Houston, 126, Heyne Building, University of Houston, Houston, TX 77204. E-mail: sypatwardhan@uh.edu*

K.M. FITZGERALD, S. PATWARDHAN & C.A. MEYERS. Disease-Related Changes in Cognitive Functioning in Primary Central Nervous System Lymphoma: A Comparative Study.
Objective: In primary CNS cancers, neurocognitive functioning (NCF) is particularly affected by disease and treatment-related factors. While baseline profiles of NCF have been explored for glial-based tumors, less is known of baseline NCF profiles for Primary Central Nervous System Lymphoma (PCNSL). The present study investigated differences in NCF, between pre-treatment patients with PCNSL, Low Grade Glioma (LGG), and Glioblastoma Multiforme (GBM).
Participants and Methods: Various aspects of cognition were assessed using specific subtests (Digit Span, Digit Symbol) from the Wechsler Adult Intelligence Scale – Third edition, Trail Making Test, and the Hopkin's Verbal Learning Test. Participants included fifty one patients (17 PCNSL;17 LGG; 17 GBM) matched in terms of tumor location and surgery status. Groups did not differ significantly based on demographics, with the exception of age. Univariate ANOVAs were performed, with age as a covariate.
Results: Preliminary analyses suggest PCNSL is associated with relatively worse performance on tasks involving processing speed than LGG or GBM. PCNSL patients performed significantly worse than LGG patients on a task of graphomotor speed, and significantly worse than both LGG and GBM patients on a task of visual-motor scanning. No group differences were found in performance on measures of verbal memory or auditory attention.
Conclusions: Pre-treatment PCNSL patients appear to perform worse on some tasks relying heavily on processing speed relative to LGG and GBM counterparts. Given pre-treatment status, this likely reflects differences in neurobiological disease factors. Further investigation of differences in tumor size and potential ocular involvement in the PCNSL patients may help elucidate nature of these findings.
Correspondence: *Kara M. Fitzgerald, M.A., University of Houston, 8181 El Mundo, #3906, Houston, TX 77054. E-mail: karamfitzgerald@gmail.com*

M. IAMPIETRO & C.L. ARMSTRONG. Differential Neuropsychological Deficits in Children with Cerebellar Brain Tumors.
Objective: While it is now known that cerebellar injury causes cognitive dysfunction and functional impairment in children, the localization of functions in the cerebellum remains poorly understood. The present study explored relations between location of cerebellar injury and neuropsychological functioning.
Participants and Methods: 24 children with cerebellar brain tumors (Mage=10.63±3.35; 54.2% female) completed measures of motor control, attention and executive function, visual/spatial construction, and declarative memory as part of a comprehensive clinical neuropsychological evaluation. MRIs of the brain were reviewed, and tumor location was classified according to cerebellar hemisphere(s) (left/right/bilateral) and cerebellar vermis injury.
Results: There were no significant differences in neuropsychological performance in children with injury to the left versus right cerebellum. Children with injury to the cerebellar vermis (n=5) when compared to children with tumors in other locations of the cerebellum (n=19) performed significantly worse (mildly impaired range v. average range) on measures of long-term visual memory consolidation (ROCFT delay; t=-2.29, p=.03) and auditory language comprehension (Token Test; t=-2.41, p=.03). The opposite pattern was noted on a test of fine motor control (t = 2.91, p = .01), as children with vermis injury performed in the average range bilaterally (Grooved pegboard; MDominant; z =.35, MNon-dominant; z = -.20). Children with lateral cerebellar tumors demonstrated impaired bilateral performance (MDominant; z = -1.85, MNon-dominant; z = -2.92).
Conclusions: Children with injury to the cerebellar vermis may demonstrate a unique neuropsychological profile characterized by relatively spared fine motor dexterity and speed but impairment in processes typically associated with temporal cortex (e.g., long-term visual memory consolidation and auditory comprehension of syntax and grammar (i.e., processes typically associated with temporal cortex).
Correspondence: *Mary Iampietro, Psychology, Temple University, Weiss Hall, 6th Floor, 1701 N. 13th St., Philadelphia, PA 19122. E-mail: mary.iampietro@temple.edu*

Cognitive Neuroscience

A. ITO, N. ABE, T. FUJII, A. UENO, Y. KOSEKI, R. HASHIMOTO, S. MUGIKURA, S. TAKAHASHI & E. MORI. The role of dorsolateral prefrontal cortex in deception for emotional and neutral events.
Objective: Recent studies suggest that the dorsolateral prefrontal cortex plays a critical role in deception. However, evidence for how the dorsolateral prefrontal cortex contributes to different types of deception is limited. In this functional magnetic resonance imaging (fMRI) study, we focused on two types of deception that have yet to be elucidated: deception for the memory of neutral events and deception for the memory of emotional events.
Participants and Methods: Thirty-two healthy volunteers (16 males, age range 20-31, mean age 21.8 years) were paid for their participation in this study. Before fMRI, subjects were presented with a series of 144 pictures (72 neutral and 72 emotional pictures) and were asked to rate each picture for arousal. During 3.0-tesla fMRI, subjects were presented with 144 studied and 72 nonstudied pictures (36 neutral and 36 emotional pictures) and were asked to make an honest recognition judgment in response to the half of the pictures and a dishonest response to the remaining half. Data preprocessing and statistical analyses were performed using SPM8 (Wellcome Department of Imaging Neuroscience, London, UK).
Results: We found that deception for the memory of neutral pictures was associated with increased activity in the left dorsolateral and ventrolateral prefrontal cortex. We also found that deception for the memory of emotional pictures was associated with increased activity in the bilateral dorsolateral prefrontal cortex. Moreover, overlapping activation between the two types of deception was found in the left dorsolateral prefrontal cortex.
Conclusions: Our results indicate that the pattern of prefrontal activity differs depending on whether or not contents of memory are emotional and that the left dorsolateral prefrontal cortex is associated with executive aspects of deception, regardless of the emotional valence of memory content.
Correspondence: *Ayahito Ito, 1st grade of doctoral student, Tohoku University Graduate School of Medicine, 2-1, Seiryo-machi, Aobaku, Sendai 980-8575, Japan. E-mail: aitou@m.tains.tohoku.ac.jp*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A.R. HARRELL, A. DUDLEY, A.S. ROMAN, N. PRATT, V.J. MOLFESE & D.L. MOLFESE. Impact Of Minor Sleep Loss On Speech Perception In 6-yr Old Children: Electrophysiological Effects.

Objective: Interest has increased in recent years regarding the effects of sleep loss in children. Despite reports that children are sleep deprived, little research has investigated the effects of minor sleep loss. The current study recorded Event-Related Brain Potentials (ERPs) during a speech perception task from children experiencing minor sleep loss.

Participants and Methods: Forty-seven children (25 females), 6-years of age, wore actigraphs while parents recorded daily sleep-wake times over 2 consecutive weeks. During week 1, children maintained their normal sleep schedule. In week 2 children were randomly assigned to a control (CO) or a 1-hour sleep restriction (SR) group. The latter slept 1 hour less a night for 1 week. ERPs were recorded to speech syllables at the end of each week. Analyses compared ERPs between groups at the end of week 2.

Results: A temporal principal components analysis indentified 5 ERP regions that accounted for 87% of total variance. Factor 2 (peak = 352 ms) reflected a significant Sleep X Week X Hemisphere interaction, $F(1, 44) = 6.77$, $p<.025$, observed power = .721. Posthoc analyses noted hemisphere differences in the sleep reduction group, $t(20)=4.890$, $p<.001$, that differed from the control group, $t(25)=2.250$, $p<.05$. Factor 4 identified a significant Syllable X Week X Hemisphere interaction for both groups, $F(1,45)=13.552$, $p<.001$. Posthoc analyses noted differences during syllable processing (/ba/ vs. /ga/) in both groups during week 2 over right hemisphere electrode sites, $t(46)=2.96$, $p<.005$.

Conclusions: Results supported our hypothesis that neural processing of speech syllables was altered if sleep was reduced by 1 hour.

Correspondence: *Dennis L. Molfese, Ph.D., Psychology, University of Nebraska-Lincoln, 238 Burnett Hall, Lincoln, NE 68588-0308. E-mail: dlmolfese@mac.com*

N.R. DAVID, B.M. JAMES, K. GARROD, R. WAFFORD, V.J. MOLFESE & D.L. MOLFESE. The Effects Of Minor Sleep Loss And Simulated Space Weightlessness On Speech Processing.

Objective: There are many serious threats confronting astronauts in space, including sleep loss and weightlessness on speech processing. This study examined the neural effects of mild sleep loss and microgravity utilizing the head-down-tilt (HDT) microgravity simulation procedure. Both HDT and sleep loss were hypothesized to alter brain responses to speech.

Participants and Methods: Ninety-one adults (47 females), ages 30-45 years, followed their normal sleep-schedule for 1 week, after which their auditory event-related potentials (ERPs) were recorded. They were then randomly assigned to 1 of 3 sleep conditions (0-, 1-, or 3- hour sleep loss per night for 7 consecutive days). A second ERP test occurred at the end of the next week. High-density 256-electrode electrode nets with Ag/AgCl electrodes recorded ERPs in response to consonant-vowel speech syllables. Participants completed the task both in the upright and -6 degree HDT positions.

Results: Analyses of ERP data employed a temporal principal component analysis (PCA), which identified 5 factors accounting for 82.847% of the total variance. Each factor was analyzed using an 8-factorial ANOVA with Greenhouse-Geisser correction. A significant Week X Position X Sleep interaction $F(2,87) = 4.238$, $p<.018$, observed power = .728, indicated that participants in the 3 hour loss group showed significant changes during speech processing following their sleep loss, $t(29) = 2.83$, $p<.008$. Sleep restriction effects were more pronounced in the HDT compared to the upright position, $t(29) = 3.524$, $p<.001$.

Conclusions: Sleep loss altered speech processing, especially in simulated low gravity conditions.

Correspondence: *Dennis L. Molfese, Ph.D., Psychology, University of Nebraska-Lincoln, 238 Burnett Hall, Lincoln, NE 68588-0308. E-mail: dlmolfese@mac.com*

A. DUDLEY, A.R. HARRELL, A. ROMAN, N.L. PRATT, V.J. MOLFESE & D.L. MOLFESE. One-Hour Per Night Sleep Loss Impacts Hemisphere Processing In 6-Year Old Children: Electrophysiological Correlates.

Objective: Recent reports suggest sleep impacts memory, attention, learning, and behavior. Unfortunately, few sleep studies include children, work needed to better understand the impact of sleep on emerging cognitive functions. This study recorded event-related potentials (ERP), to investigate the effects of minor sleep loss on speech processing in children.

Participants and Methods: Forty-seven children (25 females), six years of age without chronic sleep disturbances, wore actigraphs while parents maintained nightly sleep logs over 2 consecutive weeks. After 1 week where children maintained normal sleep schedules, they were randomly assigned to control (CO) or one-hour sleep loss (SR) groups for week 2. ERPs were recorded at the end of each week.

Results: A 1-hour sleep loss altered children's left (LH) and right hemisphere (RH) responses to speech sounds. A significant Week X Hemisphere X Sleep interaction occurred, $F(4.944, 44)=4.613$, $p<.037$, observed power =.556. Posthoc analyses indicated that normal sleep LH responses changed between weeks 1 and 2, $t(25)=2.27$, $p<.035$. $t(1,45)=4.613$, $p<.037$, as did RH responses, $t(25)=2.25$, $p<.034$. RH responses differed between weeks 1 and 2, $t(25) = 2.284$, $p<.031$. In contrast the SR group only exhibited a RH difference between weeks 1 and 2, $t(20)=4.89$, $p<.0001$. The effects occurred later in the brainwave, suggesting slower processing in the SR group. Sex X Hemisphere differences occurred later in the brainwave, $F(1,44)=8.292$, $p<.006$, observed power=.804.

Conclusions: Analyses identified neural processing differences related to sleep loss, reinforcing the view that adequate sleep is important for school-age children.

Correspondence: *Dennis L. Molfese, Ph.D., Psychology, University of Nebraska-Lincoln, 238 Burnett Hall, Lincoln, NE 68588-0308. E-mail: dlmolfese@mac.com*

B.M. JAMES, N.R. DAVID, K. GARROD, N. PRATT, V.J. MOLFESE & D.L. MOLFESE. The Effects Of Minor Sleep Loss On Speech Processing In Adults.

Objective: Little information exists on the effects that only a small amount of sleep restriction has on cognitive processing. To illuminate this scarcity, this study examined neurophysiologic changes that occurred after 1 hour and 3 hours of sleep loss per night for one week.

Participants and Methods: Each participant's baseline sleep schedule was recorded during week 1 using sleep logs and actigraphs. Participants were then randomly assigned to maintain their baseline sleep or reduce sleep by 1 or 3 hours in week 2. Event-related potentials (ERPs) were recorded in response to a series of speech syllables at the end of each week.

Results: ERP data were analyzed using a temporal principal components analysis. Five factors were identified that accounted for 86.236% of total variance. A Week x Consonant x Sleep Group interaction occurred between the 3-hour sleep restriction week and their baseline sleep week 1 for consonant sounds, $F(2, 169.545) = 3.582$, $p < 0.008$, power = 0.865, $t(29) = 2.215$, $p < .035$. A Week x Vowel x Sleep Group interaction for /a/ was found within the same groupings, $F(2, 85) = 4.636$, $p < 0.012$, power = .768, Student's $t(29) = 3.342$, $p < .002$. Source analyses indicated increased medial frontal gyrus activation in the 3-hour sleep reduction week, versus their baseline week.

Conclusions: Increased frontal activation and changes in consonant and vowel discrimination indicate that minimal sleep loss impacts speech perception. Such effects appear to mimic certain neurophysiologic aspects of Attention Deficit Hyperactivity Disorder (Schweitzer, et. al., 2000).

Correspondence: *Dennis L. Molfese, Ph.D., Psychology, University of Nebraska-Lincoln, 238 Burnett Hall, Lincoln, NE 68588-0308. E-mail: dlmolfese@mac.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. CLAWSON, P.E. CLAYSON, M. SOUTH & M.J. LARSON. Sex Differences in Cognitive Control: Electrophysiological Indices of Conflict Detection.

Objective: A growing body of literature suggests sex differences in neural activation underlying cognitive control. The purpose of this study was to investigate sex differences in the cognitive control task of conflict detection as measured by the stimulus-locked N2 component of the event-related potential (ERP).

Participants and Methods: High-density ERPs were obtained from 126 neurotypical individuals (67 female, 59 male) while completing a modified Eriksen flanker task. Behavioral indices [response times (RTs), accuracy] and electrophysiological data were analyzed separately using 2-Sex x 2-Congruency (congruent, incongruent) mixed-model ANOVAs.

Results: Results of the ANOVA for RTs showed significant main effects of congruency and sex, with longer RTs to incongruent trials and longer RTs in females, but no Sex x Congruency interaction. For accuracy, there was only a significant main effect of congruency, indicating sexes performed similarly. For N2 amplitude, there were significant main effects of congruency and sex, with increased amplitude to incongruent trials and decreased amplitudes in females relative to males. There was also a significant Sex x Congruency interaction, with males showing significantly larger incongruent N2 amplitudes than females. Sex differences in N2 amplitude remained in a subgroup analysis of participants matched for RTs.

Conclusions: Results indicate sex differences in brain activation specific to the processing of conflict. Findings may be explained by competing possibilities: (1) females require less neural activation than males for similar cognitive performance, as evidenced N2 amplitudes in a subsample matched for behavioral performance, or (2) females display deficits in conflict monitoring, suggested by decreased N2 amplitudes and longer RTs in females.

Correspondence: *Ann Clawson, Brigham Young University, 6575 S. 2475 E., Salt Lake City, UT 84121. E-mail: clawson.ann@gmail.com*

P.E. CLAYSON, M. SOUTH & M.J. LARSON. Sex Differences in Cognitive Control: Error-Related Performance Monitoring.

Objective: Recent research suggests sex differences in the cognitive control process of performance monitoring as evidenced by differential activation of the anterior cingulate cortex; however, it remains unclear whether males or females may exhibit increased levels of performance-monitoring-related neural activity. We tested competing hypotheses for sex differences in two putative measures of performance monitoring: the error-related negativity (ERN) and the post-error positivity (Pe) components of the event related potential (ERP).

Participants and Methods: High-density ERPs and behavioral data (accuracy, reaction times) were acquired while 198 neurologically-normal individuals (100 female, 98 male) completed a modified Eriksen flanker task. Participants also completed the Digit Span task as a measure of attention and measures of affective functioning. Groups were well matched for age, education, and Digit Span score; females showed increased levels of negative affect.

Results: Males and females did not differ in accuracy or level of post-error slowing, although females showed longer overall reaction times. Males demonstrated increased amplitude ERN and Pe components relative to females; sexes did not differ for correct-trial ERPs. Results remained when measures of negative affect were controlled. Attention abilities, as measured by the Digit Span task, significantly predicted ERN amplitude and the Sex x Digit Span interaction predicted ERN amplitude at trend level.

Conclusions: Results suggest sex differences in performance monitoring functions that may be influenced by attention abilities. Furthermore, results indicate participant sex should be considered when investigating the cognitive control function of performance monitoring and provide a framework for future studies of sex differences in cognitive control functions.

Correspondence: *Peter E. Clayson, Brigham Young University, 244 TLRB, Brigham Young University, Provo, UT 84602. E-mail: peter.clayson@gmail.com*

F. CONSTANTINIDOU & M. CHRISTODOULOU. Semantic Organization Across the Lifespan: Evidence for a Taxonomic-Semantic Shift.

Objective: This study investigated semantic-conceptual organization using a free description task in participants ages 3-82 years of age. It was hypothesized that younger children will use fewer features (as compared to older children and adults) when describing objects and will organize their knowledge based on functional properties.

Participants and Methods: This cross-sectional study incorporated 81 participants in five age groups: 3-5 years (n = 15); 6-8 years (n = 15); 9-11 years (n = 15); 19-54 years (n = 15); 60-82 years (n = 11).
The study implemented 20 living and non-living high and low frequency objects and participants were asked to spontaneously describe them. Their productions were coded according to eight features: color, shape, construction, size, weight, texture, detail, and function.

Results: Mixed model MANOVA revealed a significant group effect on the number of features provided $F(4, 66) = 23.99$, $p < .001$. Post-hoc univariate comparisons indicated that the youngest group gave significantly fewer features than any of the other groups, followed by the 6-8 group, $p < .001$. MANOVA on the type of features used revealed a significant multivariate main effect for groups, $F(4, 219) = 7.488$, $p<0.00$. Post hoc comparisons revealed that the two younger groups differed significantly in their feature descriptions as compared to the 19-54 age group, $p<0.001$.

Conclusions: Results indicate qualitative and quantitative changes in conceptual organization that shift developmentally from functional/thematic to categorical/taxonomic. Implications for neuropsychological rehabilitation will be discussed.

Correspondence: *Fofi Constantinidou, Ph.D., 75 Kallipoleos, University of Cyprus, 1678, Nicosia 1678, Cyprus. E-mail: fofic@ucy.ac.cy*

Y.I. CABRERA & L. DELANO-WOOD. Stroke Risk and Qualitative Neuropsychological Performance: Differentiating Subtypes of Mild Cognitive Impairment.

Objective: We investigated whether there were group differences by stroke risk as well as qualitative differences in neuropsychological performance (error analysis) across clinically-diagnosed MCI subtypes.

Participants and Methods: Fifty-seven nondemented participants were divided into demographically-comparable groups based on cognitive status (Amnestic MCI [A-MCI]: n=37; Nonamnestic MCI [NA-MCI]: n=20). Stroke risk was derived from the Hachinski Ischemia Scale (HIS) and cognitive tasks (Digit Span and Verbal Fluency [FAS and Animals]) were examined qualitatively.

Results: The NA-MCI subgroup demonstrated significantly higher HIS scores ($t=-3.06$, $p=.003$) than the A-MCI subgroup. There were no quantitative differences by MCI subgroup, however, the NA-MCI subgroup produced significantly more Intrusion and Between-Trial Capture errors (p-values<.025) while the A-MCI subgroup committed significantly more Perseverative and Out-of-Set Errors (p-values< .03).

Conclusions: Findings showed that the NA-MCI subgroup demonstrated significantly higher levels of stroke risk when compared to the A-MCI subgroup. Additionally, consistent with a frontal-subcortical profile of dementia, the NA-MCI subgroup produced more errors reflective of executive dysfunction while the A-MCI subgroup produced a qualitative profile consistent with a degenerative dementia such as Alzheimer's disease.

Correspondence: *Yuliana I. Cabrera, Psychology, San Diego State University, 4057 Sundance Ln, Norco, CA 92860. E-mail: yulicabrera@gmail.com*

H. DIAL & M. HISCOCK. Dichotic Listening Ear Asymmetry with Frequency-Filtered Words.

Objective: In a recent test of Ivry and Robertson's (1999) Double Filtering by Frequency (DFF) theory, Lachner and Hiscock (2010) found that, contrary to predictions, noise had comparable effects on dichotic

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

listening asymmetry irrespective of whether the noise was high-pass (hp) or low-pass (lp) filtered. In the present experiment, we apply hp and lp filtering directly to the dichotic stimuli. The prediction, from the DFF model, is that hp filtering will favor the right ear whereas lp filtering will favor the left ear.
Participants and Methods: Forty-eight right-handed university undergraduates (36 females and 12 males) with normal hearing were presented 90 dichotic word pairs in each of four stimulus conditions: (1) standard, (2) hp filtered at 2500 Hz, (3) lp filtered at 625 Hz, and (4) notch-filtered (np) at 1250 Hz. Within each stimulus condition, subjects were instructed to: (1) choose the word heard most clearly for 30 trials, (2) attend to the left ear for 30 trials, and attend to the right ear for 30 trials. Stimuli were digitized words from the Halwes Fused Dichotic Words Test (FDWT).
Results: A robust right-ear advantage REA was found across the four stimulus conditions, $p < .0001$. A main effect for stimulus condition indicated better performance with hp filtering than with lp filtering, $p < .0005$, but the Condition x Ear interaction was nonsignificant, $F < 1$. Likewise, attention instructions had the expected effect on ear asymmetry, $p < .0001$, but attention did not interact with stimulus condition, $F < 1$.
Conclusions: Even though digital hp and lp filtering of fused dichotic words produced a significant difference in overall performance, the REA remained constant across conditions. Similarly, even though selective attention instructions altered ear asymmetry in predictable ways, the attention effects were additive across stimulus conditions. The results provide no support for the hypothesis that the left hemisphere is specialized for processing relatively high auditory frequencies.
Correspondence: *Merrill Hiscock, Ph.D., Psychology & Center for Neuro-Engineering and Cognitive Science, University of Houston, Heyne Bldg, Room 126, Houston, TX 77204-5022. E-mail: mhiscock@uh.edu*

N.I. LANDRØ, M. AKER, A. HOEL, K. FOSS HAUG, R. GRIMHOLT, R. JONASSEN, T.C. STILES, P. LYCHE, V.Ø. HAALAND & A. NEUMEISTER. Serotonin transporter polymorphisms influence inhibitory executive control.
Objective: The serotonin transporter (5-HTTLPR) short allele has reduced transcriptional efficiency compared to the long allele, and individuals carrying the short allele tend to have incresed risk for depression. Serotonin is also related to impulsivity. However, systematic studies relating 5-HTTLPR to objective laboratory measures of executive control functions are lacking. The aim was to investigate possible links between 5-HTTLPR and main dimensions of executive control.
Participants and Methods: Eighty-seven healthy adults, screened for psychopathology applying SCID 1 and SCID 2, were included as part of a larger study on serotonin neurotransmission, mood and cognitive control. A triallelic classification was reclassified into a biallelic model based on the level of 5-HTT gene expression. Three basic dimensions of executive control function were measured applying three subtests from CANTAB: Intra-Extra Dimensional Set Shifting (IED), Spatial Working Memory (SWM)and Stop Signal Task (SST).
Results: Analyses of variance showed a statistically significant effect of genotype on the SST task. Subjects carrying the low expressive alleles (s and lg) were slower to complete the process of inhibiting a preprogrammed response than subjects with the two long (l) alleles. There were no significant effects of genotypes on the IED and SWM tasks.
There were no statistically significant effects of genotype on measures of intelligence, depressive symptoms severity or personality trait neuroticism.
Conclusions: These results suggest that the s and lg alleles constitute a specific vulnerability for impaired inhibition, forming a possible cognitive endophenotype for impulsivity and mood disorders.
Correspondence: *Nils I. Landro, phd, Dep of Psychology, University of Oslo, Box 1094, Oslo 0317, Norway. E-mail: n.i.landro@psykologi.uio.no*

B.S. ADAMS & M.J. LARSON. The Influence of Positive Affect on Cognitive Control.
Objective: Research suggests that positive affect improves most cognitive abilities; however, recent studies report that positive affect also fosters increased distractibility, impairing the context maintenance function of cognitive control. Context maintenance refers to the ability to hold a task instruction in mind in order to improve performance. Given competing findings from previous studies, the purpose of this project was to gain a better understanding of the influence of positive affect on context maintenance.
Participants and Methods: Thirty-six healthy undergraduate students completed a modified cued version of the Stroop task. The task included the following four experimental manipulations: 1) pleasant, neutral, or unpleasant pictures from the International Affective Picture System randomly presented for 50ms, 2) word reading and color naming tasks, 3) long and short task instruction-stimulus delay (1s and 5s, respectively), and 4) congruent and incongruent color-word stimulus presentation.
Results: Repeated measures ANOVA revealed that accuracy was higher during the long delay than short delay condition, while response times showed no significant change across delay or valence conditions. As expected, error rates were higher and response times were longer for incongruent trials than for congruent trials. For the valence manipulation, accuracy was decreased following presentation of pleasant or neutral stimuli relative to unpleasant stimuli across task and delay conditions.
Conclusions: Findings indicate improved accuracy following presentation of unpleasant pictures, rather than an impairing effect of pleasant pictures. Results suggest that positive affect does not increase distractibility per se, but that induced negative affect may improve context maintenance abilities.
Correspondence: *Brenna S. Adams, Brigham Young University, 603 N 100 W #15, Provo, UT 84601. E-mail: adams.brenna@gmail.com*

Electrophysiology/EEG/ERP

J.G. UNDERHILL. Heart Rate Variability associated with Beck Depression Inventory Scores But Not Beck Anxiety Scores in a Post Traumatic Stress Disorder Population.
Objective: Heart Rate Variability (HRV) is a measure of parasympathetic and sympathetic activity. HRV is a state dependent marker. Dysregulation in HRV has been associated with depression and anxiety. Successful treatment has been associated with HRV normalization. PTSD is a complex psychiatric disorder presenting with comorbid anxiety and depression. Patient with PTSD often present with significant neurocognitive findings, and hippocampal volume reduction. The mechanism involved may implicate stress hormones. These levels are related to anxiety states and reflected in HRV. We hypothesized that BDI and BAI scores would be positively correlated with HRV.
Participants and Methods: Twenty patients diagnosed with Post Traumatic Stress Disorder were given the BDI and BAI prior to acquisition of EKG data. HRV was calculated per patient using Biosignal's HRV Analysis program. Summary scores were analyzed with SPSS 11.5.
Results: No significant correlations were found between patient's BAI scores and HRV. A significant negative correlation at the p=.001 level was found between BDI scores and patient's parasympathetic activity (r= -.629). One way ANOVA was then computed between BDI scores and patient parasympathetic activity (F=68.136; p=.003).
Conclusions: The hypothesis was not supported. However, significant correlations were found such that BDI scores appear to be associated with individual's parasympathetic cardiac activity, which is associated with health states. BAI scores do not appear to be related to HRV activity. It is possible that this may reflect the existence of subpopulations of PTSD symptom presentation wherein anxiety or depressive features predominate. This study points towards comprehensive assessment of depressive symptoms prior to comprehensive neuropsychological evaluation.
Correspondence: *James G. Underhill, Psy.D., N/A, P.O. Box 204181, Austin, TX 78720. E-mail: underhill.james@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

D.A. GOOD, J. FAIR & M. LARSON. The Relationship Between Satisfaction with Life, Positive Personality Traits, and Performance Monitoring.

Objective: Multiple studies report a link between performance monitoring and measures of negative affective, but little is known about the relationship between positive personality traits and electrophysiological indices of performance monitoring. Performance monitoring can be measured using post-error reaction time slowing, the error-related negativity (ERN), and the post-error positivity (Pe) components of the event-related potential (ERP). The purpose of this study was to investigate the relationship between ERN and Pe amplitude and self-report measures of satisfaction with life, dispositional optimism, and general positive affect.

Participants and Methods: Forty-five healthy participants completed an Eriksen Flanker Task while ERPs were collected and three self-report measures: the Satisfaction with Life Scale, the Life Orientation Test-Revised Version, and the Positive and Negative Affect Schedule. Zero-order correlations and multiple regression analyses were used to test the relationship between performance-monitoring indices and self-report measures.

Results: Increased satisfaction with life was associated with decreased (i.e., less negative) ERN amplitude. Dispositional optimism and positive affect were not related with ERN amplitude. The results remained consistent when negative affect and measures of positive personality were accounted for using multiple regression. There were no relationships between positive personality measures and the post-error positivity (Pe) or behavioral indices.

Conclusions: Findings are consistent with hypotheses that positive affect can influence performance monitoring, with errors potentially being less meaningful for individuals with higher satisfaction with life. That is, individuals with greater life satisfaction may view errors as less threatening, aversive, or motivationally-relevant due to their relative comfort with their life circumstances.

Correspondence: *Daniel A. Good, Brigham Young University, 372 E 400 N, Orem, UT 84062. E-mail: dag1978@hotmail.com*

J. FAIR, P. CLAYSON & M. LARSON. Sex Differences in Cognitive Control: The Interaction Between Sex and Empathy during Error Observation.

Objective: Recent research suggests that empathy is associated with anterior cingulate cortex (ACC) activation during the cognitive control function of performance monitoring. A similar predictive relationship may be demonstrated while individuals observe others' performance on cognitive control tasks. Given demonstrated sex differences in empathy, we hypothesized that females high in empathy would show a disproportionately larger observational error-related negativity (oERN) component of the event related potential (ERP) than their male counterparts.

Participants and Methods: Healthy young adults completed the Empathy Quotient (EQ), a self-report measure of empathy. They then completed a modified Eriksen Flanker Task while high-density ERPs were recorded. Following task completion, participants observed another student complete the same task and tracked correct and error responses on a keyboard. Multiple regression with the dependent variable of oERN amplitude and the independent variables of Sex, EQ score, and a Sex x EQ interaction was used to test the study hypothesis.

Results: The regression model predicted 28% of the variance in oERN amplitude and was trend-level significant ($p=.083$). Sex significantly predicted oERN amplitude ($\geq=3.082$; $p=.03$), as did the Sex x EQ interaction ($\geq=3.023$; $p=.03$), with females higher in empathy showing a disproportionate increase in oERN waveform amplitude.

Conclusions: Findings indicate that ACC-mediated observation mechanisms differ between sexes as a function of empathy levels and provide support for a neural basis in empathy-related sex differences. Such activity may be related to research suggesting men are more action oriented (problem solving) and women are more expressive (affective) in their reactions to others' difficulties.

Correspondence: *Joseph Fair, M.S., BYU, 244 TLRB, Provo, UT 84602. E-mail: jfair03@gmail.com*

M. SAYEUR, K. LAVOIE, R. BÉLAND, D. ELLEMBERG, C. PERCHET, M. LASSONDE & M. MCKERRAL. Electrophysiological Evidence against the Magnocellular Deficit Theory in Dyslexia.

Objective: Over the last two decades, the hypothesis of a magnocellular deficit in dyslexia has prompted considerable interest and controversy. In order to further explore the existence of such a deficit, two experiments were realized.

Participants and Methods: First, using an electrophysiological procedure (visual evoked potentials, VEP), we compared magnocellular and parvocellular contrast- and spatial frequency-response functions in phonological dyslexics (n=16) and in good readers (n=12) of the same age and socio-economic background. Second, we investigated the same groups in a binaural sound localization task, which has been identified as one of the main functions subserved by the magnocellular auditory pathway. Subjects were asked to localize broad band noise bursts (BBNBs) of fixed intensity in the horizontal plane in an anechoic chamber. BBNBs were delivered through 16 randomly-selected loudspeakers. Listeners had to report the apparent stimulus location by pointing to or naming its perceived position on a graduated perimeter.

Results: In the first experiment, no significant differences between the amplitude of the VEP components associated with either magnocellular or parvocellular responses were found between the two groups. However, topographic analyses revealed a different pattern of amplitude distribution in right frontal and left temporal regions of the cortex for the dyslexic children compared to the good readers. These results suggest a deficit in the higher-level cortical regions involved in phonological and/or linguistic processing. In the second experiment, our data indicate that dyslexics were as accurate as good readers in this sound localization task.

Conclusions: The results obtained in both of these studies question the hypothesis of a magnocellular involvement in developmental dyslexia.

Correspondence: *Melissa Sue Sayeur, Bachelor, Psychology, University of Montreal, 5881 St-Hubert, Montreal, QC H2S 2L8, Canada. E-mail: melissa.sue.sayeur@umontreal.ca*

P. MOLFESE. Do Parents Of Children With Dyslexia Show ERP Differences Compared To Controls?

Objective: Neuroimaging studies have successfully identified children with dyslexia (Molfese, In Preparation), as well as children who are at-risk for developing dyslexia (Molfese, 2000). Behavioral testing has found evidence of a genetic basis for dyslexia, including multiple longitudinal samples showing that dyslexia is both familial and heritable (Pennington et al., 1991). The current study investigated whether normal reading parents of children with dyslexia show differential ERPs compared to parents of children without dyslexia.

Participants and Methods: Eighteen parents and their children participated in this study. The parents comprised 2 groups of 9: 1) parents of children with significant reading problems at 8-years of age, and 2) parents of children performing at a normal reading level. Parents did not differ on IQ, reading, or memory tasks. Children differed only on reading scores. Stimuli were four auditory stimuli that began with an initial consonant transition, 50 ms in duration that was followed by a 250 ms steady state vowel. Two speech syllables, /bae/, /gae/, and 2 non-speech analogues presented in 36 block random orders. EEG recordings were made using six AG/AgCl electrodes placed at frontal, temporal, and parietal scalp locations with linked-ears reference.

Results: The averaged ERPs of the parents were submitted to a PCA-ANOVA. The PCA identified a 5-factor solution that accounted for 86% of total variance. Group differences were found in Factors 3 (0-130ms, 560-700ms), 4 (50-70ms, 170-300ms), and 5 (90-180ms) as part of a four-way interaction involving speech stimuli, point of articulation, electrode, and group. Factor 5 also identified a significant interaction of group, consonant, and hemisphere.

Conclusions: Results support our hypothesis that parents of children with dyslexia show different ERP responses than parents of children who are typically developing. This finding is particularly interesting as parents of children with dyslexia, did not suffer from dyslexia themselves.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Peter Molfese, Ph.D., Yale Child Study Center, 1184 Chapel Street #8, New Haven, CT 06511. E-mail: peter.molfese@yale.edu*

L. NAHUM, J. PIGNAT, A. GUGGISBERG, A. WAHLEN, D. GABRIEL & A. SCHNIDER. Neural Correlate of Anterograde Amnesia in Wernicke–Korsakoff Syndrome.

Objective: The neural correlate of anterograde amnesia in Wernicke–Korsakoff syndrome is still debated. While the capacity to learn new information has been associated with integrity of the medial temporal lobe, previous studies indicated that the Wernicke–Korsakoff syndrome is associated with diencephalic lesions, mainly in the mammillary bodies and anterior or dorsomedial thalamic nuclei. The aim of the present study was to test the hypothesis that amnesia in Wernicke–Korsakoff syndrome is associated with a disrupted neural circuit between diencephalic and hippocampal structures.

Participants and Methods: High-density evoked potentials were recorded in 3 severely amnesic patients with chronic Wernicke–Korsakoff syndrome and in 8 age matched controls. Subjects performed a continuous recognition task of pictures in which each item was repeated either immediately or after intervening items. Immediate picture repetition has been shown to induce early activation of the left medial temporal lobe (MTL; James et al, Hippocampus 2009; 19: 371-8; Nahum et al, Hippocampus 2010, in press). In addition, Diffusion Tensor Imaging (DTI) was performed with a 3 tesla unit.

Results: Recognition of delayed repetition was severely impaired in all patients. Electrophysiologically, patients showed absence of the early, left MTL dependent positive potential (P2) between 250 and 350 ms following immediate picture repetitions. DTI indicated disruption of the anterior inferior fornix, which connects diencephalic and hippocampal structures.

Conclusions: The findings support an interpretation of anterograde amnesia in Wernicke–Korsakoff syndrome as a consequence of a disconnexion between diencephalic and hippocampal structures with deficient contribution of the medial temporal lobe to rapid consolidation.

Correspondence: *Louis Nahum, Geneva University Hospitals, 26 Avenue de Beau-Séjour, Geneva 1211, Switzerland. E-mail: louis.nahum@hcuge.ch*

B. NARAYANAN, R. ROSEN & G. PEARLSON. Spectral Analysis of Resting State Electroencephalogram (EEG) in Subjects With and Without Family Histories of Alcoholism.

Objective: We explored the behavior of power spectral measures derived from resting state EEG in first year college students, relative to family history of alcoholism and examined the interaction between current alcohol dependence and family history status.

Participants and Methods: EEG data were collected using Neuroscan from 8 channel locations along the midline with eyes open in the resting state. The study sample consisted of 170 subjects, 50% of whom were family history positive (FHP: i.e. had one parent plus other family members with alcoholism) and others were family history negative (FHN: with no alcoholic relatives). The subjects were group matched for age (mean = 18.8, std = 1.05) and sex (68% female). The study sample was further divided into two groups: social and heavy drinkers and alcohol dependent. EEG data were preprocessed using EEGLAB. Data were segmented into 2 sec epochs. Absolute power was computed within the Delta, Theta, Alpha, Beta and Gamma bands and analyzed for group differences using ANOVA in SPSS.

Results: No bands mean power showed a significant group difference between FHP and FHN groups. Power measures failed to identify differences between alcohol dependent and non-dependent groups. Absolute Theta power in the Fcz channel showed a significant ($p<0.04$) group difference between FHP and FHN subjects. There were no significant interactions between family history and alcohol dependence.

Conclusions: Augmented Theta power was observed in FHP subjects. This confirms prior similar studies and suggests possible impairment of information processing in FHP subjects. Increased Theta power might also indicate a state of "hyperexcitability" in the FHP subjects.

Correspondence: *Balaji Narayanan, Doctor of Philosophy, Olin Neuropsychiatry Research Center, Institute of Living, 200 Retreat Ave, Hartford, CT 06106. E-mail: bnarayanan@harthosp.org*

G.A. STEFANATOS, A.T. DEMARCO, P. HEARONS & A. PARSONS. Specialized Neural Responses to Onset Features of Auditory Objects.

Objective: Despite their importance for understanding speech, the neural processes mediating the processing of rapid frequency changes in sound remain poorly understood. We examined attentional effects on the neural responses generated by rapidly occurring pulses of frequency modulation.

Participants and Methods: Using a steady-state evoked response paradigm, we recorded brain electrical activity while subjects listened to a 1kHz pure tone carrier whose frequency was modulated four times a second by a 50 millisecond up-going cosine pulse. Interspersed among these "standard" pulsed frequency-modulations (PFMs) were brief (1.5 second) trains of "deviant" PFMs that differed in the direction of the frequency modulation. During an attend condition, subjects silently counted the randomly distributed deviant clusters, while in a non-attend condition, they focused on counting deviant visual stimuli presented in a visual continuous performance task.

Results: Steady-state responses to standard PFMs did not differ between conditions, suggesting they are pre-attentive responses. Responses to deviant PFMs did not differ in magnitude from standards and there was no effect of condition. However, responses to standards lagged in phase relative to responses to deviant PFMs. This effect appeared mainly due to a superimposed transient potential which occurred at the onset but not at the offset of the deviant PFM sequence. This potential, which has not been previously described, was most prominent at central and parietal leads and was substantially reduced in the non-attend condition.

Conclusions: These results suggest that specialized neural mechanisms are activated to the onset of stimulation of new auditory afferents. The implications of these findings for speech processing are discussed.

Correspondence: *Gerry A. Stefanatos, D. Phil., Communication Sciences and Disorders, Temple University, Weiss Hall, 1701 N. 13th St. (Rm 110), Philadelphia, PA 19122. E-mail: stefang@temple.edu*

J.S. ROBINSON & C. LARSON. Frontal Asymmetry in Initial Response to Affective Pictures Predicts Time Course of Recovery Following Offset of Unpleasant Pictures.

Objective: A growing body of work suggests that individuals who show sustained responses to negative stimuli in the first few seconds following stimulus offset are more likely to be anxious or depressed. Sustained negative affect has also been linked with relative right-frontal resting EEG asymmetry, a pattern linked with both anxiety and depression. In the present study we sought to examine whether EEG asymmetry during affective challenge is associated with sustained negative affect.

Participants and Methods: 99 students completed a picture viewing paradigm during which both EEG and emotion-modulated startle blink data were recorded. Visual stimuli consisted of 126 IAPS pictures, 42 each of positive, negative, and neutral images. Acoustic startle probes were presented at four time points: 1.5, 4.5, 7.5, and 9 s post-stimulus onset. Images were presented for 6 s, with the final two probes presented after picture offset.

Results: Frontal asymmetry during the first three seconds of both unpleasant and pleasant pictures was associated with sustained blink potentiation following the offset of negative pictures. Specifically, individuals who showed stronger potentiation to negative pictures at both 7 and 9 seconds following picture offset (compared to both of the mid-picture probes) exhibited more relative right frontal EEG activation (less right-sided alpha power) at a number of frontal sites, most strongly F7-F8 (r's -.198 to -.262).

Conclusions: These data indicate that frontal asymmetry during initial reactivity to affective stimuli is linked with prolonged maintenance of negative emotion.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Jordan S. Robinson, M.A., Clinical Psychology, University of Wisconsin-Milwaukee, 2441 E.Hartford Ave, Psychology, Milwaukee, WI 53211. E-mail: robin247@uwm.edu*

L. KILLEEN & D. TETI. Prefrontal Cortical EEG Activity and Emotional Reactivity in the Parenting Context.

Objective: Parenting is widely regarded as a major contributor to child mental health, yet little is known about the processes that underlie parenting behaviors. Investigation of parents' in-the-moment ("online") emotional experiences in response to signals from their children may provide a window into the processes that facilitate or undermine competent parenting. This study draws from the literature on prefrontal cortical (PFC) EEG activity as an index of online emotional reactivity, which demonstrates that left-frontal activation is associated with approach emotions (i.e. joy), and right-frontal activation is associated with withdrawal emotions (i.e. sadness; Davidson 2004).

Participants and Methods: Twenty-seven mothers of 6-9 month-olds viewed 10-second videos of their own infants exhibiting joy, distress, and neutral interest. The links between PFC EEG alpha asymmetry during baseline (trait measure) and infant video (state measure) conditions were examined. Maternal responsiveness was assessed with self-reported experienced emotions in response to infant emotions, self-reported internalizing symptoms, and observed emotional availability during blindly rated mother-infant play interactions.

Results: Mothers demonstrated greater relative right-frontal activation to all infant emotion videos ($F(2, 25)=2.32$, $p<.01$), and limited relations emerged between frontal EEG activation during infant videos and maternal responsiveness. However, a shift toward greater relative right frontal activation (from baseline to videos) was associated with negative maternal emotions to infant distress ($r's(25)=-.45$ to $-.53$, $p<.05$). This shift was also associated with lower anxiety ($r's(25)=.39$ to $.41$, $p<.05$) and more emotionally available parenting ($r's(25)=-.40$ to $-.48$, $p<.05$).

Conclusions: These findings suggest that mothers' capacity/flexibility for emotional responding, from an EEG perspective, may be a promising marker of "online" maternal responsiveness, and aid the identification of risk within the parenting context.

Correspondence: *Lauren Killeen, Ph.D., Department of Psychiatry, Massachusetts General Hospital, Learning and Emotional Assessment Program, 151 Merrimac St., 5th Floor, Boston, MA 02114. E-mail: lauren.killeen@gmail.com*

Drug/Toxin-Related Disorders (Including Alcoholism)

G. MARTÍNEZ, A. GONZÁLEZ, A. GUTIERREZ & F. GÓMEZ. Early Detection of Neurophysiological Damage In-Utero Exposure Drug.

WITHDRAWN

Objective: To study the amplitude and latency of the Mismatch Negativity (MMN) component during the binaural presentation of pure tones to children intrauterine-exposed to a combination of drugs (at minimum doses) versus a control group.

Participants and Methods: 13 new-born aged from 3 to 21 days (extrauterine life) were evaluated. Children were exposed during pregnancy to a combination of 2 or 3 of the following drugs: cocaine, tobacco and alcohol. A control group matched according to age, weight and sex were also evaluated. With the new-borns asleep, EEG was recorded while a sequence of tones (1300 and 1000 Hertz respectively; pattern: 20/80) were binaurally presented. MMN was obtained and compared between conditions and groups.

Results: In general, subjects previously exposed to drugs showed a significant decrease of MMN latency, along with a tendency to reach greater voltage amplitudes with respect to the control group. Besides, an additive effect due to the amount of drugs employed was also observed, given the significantly greater MMN latency in the group exposed to 3 drugs with respect to those exposed to 2 drugs

Conclusions: The automatic process underlying early auditory information update and its associated electrophysiological component (MMN) seem to be sensitive to intrauterine drug exposure, probably constituting an early biological marker of a neurodevelopmental disturbance

WITHDRAWN

Correspondence: *Gerardo Martínez, Doctorate, Neuroscience, University of Guadalajara, Venustiano Carranza 188, Guadalajara 44100, Mexico. E-mail: jmartine@cucs.udg.mx*

M.K. DAHLGREN, K.A. SAGAR, M.T. RACINE & S.A. GRUBER. Marijuana and Impulsivity Affect Performance on the Wisconsin Card Sorting Task.

Objective: Marijuana (MJ) remains one of the most popular illicit drugs in the US. Despite evidence that MJ negatively affects cognitive processing, recent studies indicate a decline in public disapproval, which may result in increased use. We hypothesized that MJ smokers would exhibit poorer performance on the Wisconsin Card Sorting Task (WCST), a measure of cognitive flexibility and set shifting, when compared to control subjects, and that higher impulsivity and earlier age of MJ onset would be associated with increased impairment.

Participants and Methods: We analyzed data from 35 chronic MJ smokers and 29 control subjects who completed neurocognitive and clinical measures including the WCST and the Barratt Impulsivity Scale (BIS). In order to assess the impact of age of MJ onset, separate analyses were run with the MJ subjects categorized into early (MJ use prior to age 16) and late (MJ use after age 16) onset groups.

Results: Compared to controls, MJ smokers made significantly more total perseverative errors ($p=0.01$) and had more losses of set ($p=0.02$) during the WCST. MJ smokers also scored significantly higher than control subjects on all measures of the BIS, and correlation analyses revealed a significant relationship between higher impulsivity scores and fewer categories achieved ($r=-.344$, $p=0.04$) and increased loss of set ($r=.519$, $p=0.00$). A significant association was also detected between total grams of MJ used per week and increased levels of behavioral impulsivity ($r=.303$, $p=0.05$). Age of onset analyses revealed that early onset smokers performed worse than late onset smokers, achieving fewer categories ($p=0.05$) and making more perseverative errors ($p=0.01$).

Conclusions: These data suggest that MJ use is associated with a reduced ability to utilize feedback and maintain cognitive set, which may be related to higher levels of behavioral impulsivity. In addition, onset of MJ use prior to age 16 appears to further compromise executive function, which underscores the importance of early intervention and education.

Correspondence: *Mary K. Dahlgren, Brain Imaging Center, McLean Hospital, 115 Mill Street, Mail Stop: 204, Belmont, MA 02478. E-mail: dahlgren@mclean.harvard.edu*

M.T. RACINE, M.K. DAHLGREN, K.A. SAGAR & S.A. GRUBER. Marijuana Use and Impulsivity Affect Verbal Learning Strategies.

Objective: Marijuana (MJ) is the most commonly abused illicit drug in the United States with higher rates of use over the last several decades. Cognitive deficits have been reported in MJ smokers, and controversy has increased surrounding the safety of MJ amidst the potential for legalization. In order to assess the potential impact of MJ use on verbal learning, we administered the California Verbal Learning Test (CVLT), which assesses serial list learning and semantic encoding strategies, to MJ smokers and control subjects.

Participants and Methods: As part of a larger study, 30 chronic, heavy MJ smokers and 26 non-MJ smoking control subjects completed the standard CVLT in order to examine overall learning and encoding strategies. Subjects also completed the Barratt Impulsivity Scale 11 (BIS-11) in order to assess their level of behavioral impulsivity.

Results: Our analyses focused on variables related to learning, specifically Trials 1-5 correct, as well as semantic clusters and perseverations. Although no significant difference between MJ smokers and controls were found for total number of words recalled on Trials 1-5, MJ

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

smokers made significantly more perseverations (p=0.02) and had fewer semantic clusters (p=0.05) than controls. In addition, scores on the BIS-11 were significantly higher in MJ smokers relative to controls (p= 0.01), which were inversely correlated with total semantic clusters (p=0.02) for Trials 1-5 in the MJ smokers only.
Conclusions: Findings from this study suggest that while overall learning was not different between MJ smokers and controls, encoding strategies differed between the groups. MJ smokers made significantly more repetitive, incorrect responses and had fewer semantic clusters, suggesting that they do not organize information as efficiently. Additionally, it appears that impulsivity further hinders the ability to utilize semantic strategies in MJ smokers. These data underscore the importance of assessing qualitative differences in MJ smokers which may clarify issues related to drug use.
Correspondence: *Megan T. Racine, McLean Hospital, 115 Mill St, Belmont, MA 02478. E-mail: mracine@mclean.harvard.edu*

K.L. MEDINA & J. PRICE. Marijuana Use, Body Mass Index, and Gender Predict Cognitive Functioning in Adolescents and Young Adults.
Objective: Neuropsychological deficits in psychomotor speed, sequencing, complex attention and story memory were reported in adolescent marijuana (MJ) users (Medina et al., 2007). This study sought to replicate these findings in a new sample of MJ-using adolescents and young adults (ages 18-28) and to investigate whether gender or body mass index (BMI) moderated these effects.
Participants and Methods: Data were collected from 59 young adult MJ users (n=23, 56% female) and controls (n=35, 50% female) aged 18-28 (M= 21 years). Exclusionary criteria included independent Axis I disorders (besides substance use disorders), major medical and neurologic disorders, learning disorders, and current psychiatric medications.
Results: After controlling for reading ability, gender, BMI, depressive symptoms, and alcohol and other drug use, increased MJ use was associated with slower psychomotor speed (p<.02) and increased cognitive inhibition errors (p<.03). Gender significantly moderated the effects of MJ on psychomotor speed (p<.001), sustained attention (p<.04), and cognitive inhibition (p<.05); in all cases males had a more robust relationship between MJ use and poor cognitive performance. Finally, greater BMI was robustly related to cognitive disinhibition (p<.001) and increased inhibition errors (p<.002); BMI also interacted with MJ use in predicting poorer sustained attention (p < .05).
Conclusions: The current study demonstrated that MJ exposure during late adolescence and young adulthood was associated with poorer psychomotor speed and sequencing ability, sustained attention and cognitive inhibition in a dose-dependent fashion in young adults. Gender and BMI also had an impact on these cognitive domains. Future studies are needed to further examine the neural substrates underlying with these cognitive deficits.
Correspondence: *Krista L. Medina, Ph.D., Psychology, University of Cincinnati, 4150I Edwards One, Cincinnati, OH 45221. E-mail: krista.medina@gmail.com*

J. CATTIE, S.P. WOODS, C. POSADA & I. GRANT. Elevated Behavioral Symptoms of Frontal Systems Dysfunction in Methamphetamine Dependence.
Objective: A growing body of evidence suggests that chronic methamphetamine use is associated with neural injury and cognitive deficits, particularly in frontostriatally-mediated functions. The present study extends this literature by examining the nature and correlates of self-report behavioral symptoms of frontal systems dysfunction in individuals with methamphetamine dependence.
Participants and Methods: In this investigation, 81 individuals with histories of methamphetamine dependence and 119 demographically matched comparison participants with comparable risk histories but no history of methamphetamine use were administered the Frontal Systems Behavioral Scale (FrSBe) as part of a comprehensive neurocognitive, psychiatric, and medical research evaluation.
Results: The methamphetamine group had significantly higher T-scores on FrSBe total, as well as its disinhibition and executive subscales (ps<.001). A multiple regression analysis indicated that these differences were not better explained by other substance-related diagnoses (e.g., alcohol abuse or dependence), Profile of Mood States total affective distress, or hepatitis C infection. Odds ratios revealed that methamphetamine dependence was associated with a twofold risk of clinical elevations on the FrSBe (i.e., T-scores > 64). Of note, clinically elevated total FrSBe T-scores were independently predictive of instrumental activities of daily living (IADL) decline severity in the methamphetamine dependent group.
Conclusions: These findings support the hypothesis that methamphetamine affects behavioral aspects of frontal systems functioning, most notably impulsivity and executive control. Future studies may identify the relationship between these behavioral symptoms and structural and functional brain abnormalities, as well as other biomarkers of methamphetamine-related neural injury (e.g., vasculopathy and inflammation).
Correspondence: *Jordan Cattie, B.S., SDSU/UCSD Joint Doctoral Program in Clinical Psychology, 220 Dickinson St, San Diego, CA 92103. E-mail: jcattie@ucsd.edu*

L.A. SCHAEFER, D. BLOCK & D. HUREMOVIC. A Case of Neuropsychological Functioning in an 18-year-old Adolescent Following Ethylene Glycol Ingestion.
Objective: Several case reports have described neurological and neuroradiological findings after ethylene glycol ingestion; only one (Freilich et al., 2007) was found describing neuropsychological sequelae. That case identified impairments in attention, processing speed, constructional ability, language, and memory retrieval 3-4 weeks after ingestion in an adult. No cases, however, have described cognitive functioning post-ethylene glycol toxicity in a patient <20 years old. We present the neuropsychological profile of a case of acute ethylene glycol ingestion in an 18-year-old.
Participants and Methods: The patient is an 18-year-old male college student who attempted suicide by ingesting a half-gallon of antifreeze. Ethylene glycol level was detected to be 79 mg/dl (highly toxic). As a consequence of crystalline deposits, he suffered acute renal failure (requiring dialysis), ocular damage, and cranial nerves palsies. Brain CT and MRI were unremarkable. The patient underwent a neuropsychological evaluation four weeks after ingestion. He was on an inpatient psychiatric unit, and was taking antidepressants at the time.
Results: Cognitively, he showed a significant deficit in processing speed and a mild impairment in complex visual attention. All other tests were average, with the exception of low average verbal retrieval, visual recognition, and executive functioning (i.e., impulsivity). Behaviorally, he exhibited concreteness. He did not meet criteria for depression on self-report inventory. He was discharged seven weeks following ingestion, and continued to be followed by renal and ophthalmology.
Conclusions: Compared to Freilich et al.'s adult case (2007), this case describes relatively mild cognitive sequelae in an adolescent following acute ethylene glycol toxicity, despite resultant renal and ophthalmologic dysfunction.
Correspondence: *Lynn A. Schaefer, Ph.D., Department of Physical Medicine and Rehabilitation, Nassau University Medical Center, 2201 Hempstead Turnpike, Box 31, East Meadow, NY 11554. E-mail: lschaefe@numc.edu*

K.A. SAGAR, M.K. DAHLGREN, M.T. RACINE & S.A. GRUBER. Marijuana Use Impairs Performance on the Trail Making Test.
Objective: Over 3 million people aged twelve and older use marijuana (MJ) daily and despite reports of cognitive impairments related to MJ use, the current deliberations over the legalization of MJ may reduce concern regarding the potential negative impact of MJ on cognition. This study was designed to evaluate the effects of MJ on executive function using the Trail Making Test (TMT).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: We administered the TMT, parts A and B, to 27 non-MJ smoking healthy controls and 33 chronic, heavy MJ smokers. While Trails A primarily assesses psychomotor function, Trails B uses an alternating set demand to measure cognitive flexibility and set shifting.
Results: Despite similar task performance on Trails A, MJ smokers took significantly longer to complete Trails B (p=0.03) and had significantly longer derived interference (Trails B-A) time relative to controls (p=0.05), indicating that MJ users do not have difficulty with the psychomotor component of Trails A, but struggle with the demands of Trails B. Interestingly, grams of MJ used per week was positively correlated with B time (r=.342, p=0.03) and errors (r=.424, p=0.01). To assess the potential impact of age of onset of MJ use, smokers were divided into early (MJ use before age 16) and late (MJ use at age 16 or later) onset groups. Early onset smokers reported using 2.5 times more grams of MJ per week than late onset smokers (p=0.04) and made significantly more errors on Trails B (p=0.05).
Conclusions: Taken together, these findings suggest that MJ use impacts cognitive processing and in particular, that both a higher magnitude and earlier onset of MJ use is related to greater executive function impairment. Earlier onset of use was significantly associated with higher MJ use and increased errors, thus highlighting the importance of early intervention and education regarding the potential negative outcomes associated with heavy MJ use.
Correspondence: *Kelly A. Sagar, McLean Hospital, 115 Mill Street, Brain Imaging Center, Belmont, MA 02478. E-mail: ksagar@mclean.harvard.edu*

S.A. GRUBER, M.K. DAHLGREN, W.D. KILLGORE, K.A. SAGAR & M.T. RACINE. Age of Onset of Marijuana Use Impacts Executive Function and Brain Activation.
Objective: Marijuana (MJ) remains the most widely used illicit substance in the US, with more than 3 million daily users. Studies of chronic, heavy MJ smokers have demonstrated alterations on cognitive tasks and patterns of cortical activity using functional magnetic resonance imaging (fMRI), yet few have examined the potential neurobiologic impact of age of onset of MJ use.
Participants and Methods: Thirty four chronic, heavy MJ smokers and 29 control subjects completed clinical and neurocognitive measures, including the Barratt Impulsivity Scale (BIS-11) and an fMRI protocol which included the Stroop Color Word Test. MJ smokers were divided into early (MJ use prior to age 16) and late onset groups to assess potential onset related differences in the groups.
Results: Despite similar performance between MJ smokers and controls on the interference condition, early onset smokers had significantly lower accuracy scores (p = .04) and higher commission errors (p= .04) relative to late onset smokers, both of which were significantly correlated with BIS-11 (p = .009; p = .02) in early smokers. Correlation analyses for the entire MJ group revealed significant associations for both percent accuracy and commission errors with MJ onset (p = .01), smokes per week (p = .01) and grams of MJ per week (p = .02). FMRI contrasts of early > late MJ smokers revealed a more midcingulate pattern of activity (p = .05) while late > early smokers had smaller, more posterior cingulate activation during the task (p = .05).
Conclusions: Data from this study underscore the importance of examining age of MJ onset, as the neural circuitry that facilitates the completion of complex inhibitory tasks may be differentially impacted by early MJ use. Recent discussions regarding the legalization and medical uses of MJ may serve to reduce overall concern about MJ, yet findings from this study suggest that early MJ use alters brain function as well as the ability to perform complex inhibitory tasks, which may be related to increased behavioral impulsivity.
Correspondence: *Staci A. Gruber, Ph.D., Cognitive and Clinical Neuroimaging Core, McLean Hospital/Harvard Medical School, Brain Imaging Center, 115 Mill Street C 148, Belmont, MA 02478. E-mail: gruber@mclean.harvard.edu*

K. DINGWALL. Measuring Cognitive Recovery following Inhalant Abuse.
Objective: To assess and monitor cognitive changes associated with abstinence from chronic gasoline sniffing among Aboriginal Australians attending treatment.
Participants and Methods: Participants were 38 Aboriginal Australians who met DSM-IV criteria for inhalant abuse and 40 healthy Aboriginal Australians aged between 11 and 25 years from the Northern Territory of Australia. Participants were assessed using computerised and culturally appropriate tests of visual motor, attention, learning, memory and executive functions at baseline (upon entry to treatment), then again at two weeks, four weeks and six weeks whilst in treatment. Healthy controls were also assessed at the same time intervals. Forty-six participants were also reassessed on their home community an average of 12 months following their baseline assessment.
Results: Baseline tests revealed significant deficits in visual motor, learning, memory, paired associate learning and executive functions for gasoline sniffers compared to controls. Repeated assessments revealed resolution of some learning and memory functions within six weeks of abstinence. Impairments in visual motor and executive function speed persisted throughout and beyond treatment for gasoline sniffers.
Conclusions: Significant cognitive impairments exist for gasoline sniffers upon entry to treatment. While impairments in memory and learning may begin to resolve within as little as two weeks of treatment and fully resolve within six weeks, deficits in speed of processing for visual motor and executive functions may take months or even years to resolve.
Correspondence: *Kylie Dingwall, Menzies School of Health Research, PO Box 4066, Alice Springs, NT 0870, Australia. E-mail: kylie.dingwall@menzies.edu.au*

E. CYR & A. STIPANICIC. Evolution of the Cognitive Profile of Children Exposed to Alcohol During Pregnancy.
Objective: The purpose of this review was to describe the evolution of the cognitive profile of children with fetal alcohol spectrum disorders (FASD).
Participants and Methods: Since 1994, both longitudinal and experimental studies were sought using databases including Medline, PsychInfo and Scopus. Five cognitive domains were investigated (intellectual functioning, attention/working memory, executive functioning, visuospatial processing, and memory). To dress the evolution of the profile, results are presented according to Piaget's stages of development, from sensorimotor (0-2 years old) to formal-operational (11-15 years old).
Results: Alcohol exposure affects a broad range of cognitive skills. While some deficits persist in time, others seem to appear later in life. Alcohol exposure has an effect on general intellectual functioning. However, it is still unclear whether it is the verbal or the non-verbal side that is affected the most. In younger children, the link between alcohol exposure and sustain attention is unclear while it becomes stronger in older children and adolescents. As for executive functioning, individuals with FASD show persistent inhibition and flexibility deficits. Many aspects of visuo-spatial processing and memory are linked to alcohol across various stages of development.
Conclusions: Despite the growing understanding of the broad impairments, a clear cognitive profile of FASD has not yet emerged in the literature. Individual patterns of cognitive strengths and weaknesses should be considered.
Correspondence: *Emilie Cyr, Psychology, UQTR, 7400 rue Bayard, Trois-Rivières, QC G8Y 2E2, Canada. E-mail: emilie.cyr@uqtr.ca*

L. BUTTON, A. BASIL, A. FRANKS, A. WEST, M. HATFIELD-ELDRED, S. LEININGER & R. SKEEL. Behavioral Risk-Taking and Alcohol Attitudes Uniquely Predict Alcohol Consumption.
Objective: Research has suggested a combination of self-report and behaviorally-based risk-taking measures provide increased utility when predicting alcohol use. While personality characteristics have shown some relationship to alcohol consumption, more specific questionnaires

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

concerning attitudes toward alcohol have also been shown to predict alcohol consumption. This study examined relative and combined predictive ability of behavioral risk-taking, a self-report measure of rash behavior, and alcohol attitudes to predict alcohol consumption. It was hypothesized increased behavioral risk-taking, a propensity to act rashly when in a good mood, and positive attitudes toward alcohol would predict increased alcohol consumption.
Participants and Methods: Forty-five college-aged participants completed the Angling Risk Tasks (ART), the UPPS+P measure of behavioral urgency, and a measure of attitudes toward alcohol (AA). Participants reported alcohol use on a daily basis for two weeks.
Results: Results showed associations between alcohol consumption and both ART performance ($r = .39$, $p < .05$) and AA ($r = .42$, $p < .05$), without significant correlations between the ART, AA, and UPPS+P. Regression analyses were significant (R2 Total Model = .27, $p < .01$) and both AA (Delta R-squared = .18, $p < .05$) and ART (Delta R-squared = .14, $p < .05$) uniquely predicted alcohol consumption. Urgency was not related to alcohol consumption.
Conclusions: Results suggest domain specific attitudinal measures may provide additional information beyond general personality traits and behavioral risk measures in the prediction of alcohol consumption. Results provide additional support for the interaction between cognitive and associative beliefs with regard to substance use.
Correspondence: *Reid Skeel, Ph.D., Psychology, Central Michigan University, 136 Sloan Hall, Mt. Pleasant, MI 48859. E-mail: reid.skeel@cmich.edu*

J. BURCIAGA, P.K. SHEAR, W. WEBER & M.P. DELBELLO. Marijuana Craving and Memory in Bipolar Disorder.
Objective: Individuals with bipolar disorder (BD) display deficits in multiple cognitive domains. Additionally, BD is highly comorbid with marijuana abuse/dependence. While the effects of BD on cognition have been well established, research has yet to examine the interaction between drug use or craving and memory for marijuana related stimuli. Given the documented increase in attentional bias for drug-related stimuli in drug using participants, it was hypothesized that increased craving would increase recognition of marijuana-related images on a recognition task.
Participants and Methods: The current study examined recognition memory in 7 healthy controls, 6 marijuana abusing/dependent adolescents without an Axis I mood disorder, 11 bipolar adolescents and 17 bipolar adolescents with comorbid marijuana abuse/dependence. As part of a larger study, participants were administered the Wechsler Abbreviated Scale of Intelligence (WASI), the Marijuana Craving Questionnaire (MCQ), a marijuana-specific cue-reactivity task consisting of neutral and marijuana-related images, and a recognition memory task (MT) based on the cue-reactivity task.
Results: Bivariate correlations determined the WASI was significantly correlated with MT performance; this variable was included as a covariate in subsequent analyses. Despite a significantly higher level of craving in both marijuana-using groups compared to controls and bipolar adolescents, no significant group MT differences were present, nor were craving or past month marijuana intake significantly related to recognition memory performance.
Conclusions: It is possible, however, that the results were affected in part by intellectual differences between groups or by the reliance on a recognition memory paradigm rather than on a battery that incorporated various components of memory ability.
Correspondence: *Joaquin Burciaga, MA, University of Cincinnati, 4150 Edwards Building One, P.O. Box 210376, Cincinnati, OH 45221-0376. E-mail: joaquinburciaga@msn.com*

S. MAGRYS & M.C. OLMSTEAD. Differential Effects of Alcohol and Stress on Sustained Attention.
Objective: Individually, alcohol and stress impair particular driving-related cognitive skills, such as sustained attention; however, less is known about their combined effect. Since alcohol use commonly co-occurs with stress, we sought to explore the joint influence of alcohol and psychosocial stress on sustained attention.
Participants and Methods: 103 undergraduate students were randomly assigned to one of five groups (low-, medium- or high-dose alcohol; sober; or placebo). Following beverage consumption, participants completed the Continuous Performance Test (CPT), a validated measure of sustained attention, before and after undergoing the Trier Social Stress Test.
Results: Data were analyzed using 2 (pre-stress vs. post-stress) x 5 (beverage groups) repeated-measures ANOVAs. Alcohol impaired CPT correct detections and discriminibility, an effect that persisted after stress exposure. In contrast, none of the CPT measures were impaired by stress. There was no significant interaction between the two factors.
Conclusions: Our results indicate that alcohol, but not stress, impairs sustained attention following intoxication. These findings add to our understanding of factors that affect the cognitive skills necessary for the safe operation of a motor vehicle. This work is supported by the Canadian Institute of Health Research.
Correspondence: *Sylvia Magrys, Psychology, Queen's University, 62 Arch Streeet, Humphrey Hall, Kingston, ON K7L3N6, Canada. E-mail: 7sm47@queensu.ca*

D.N. BLACK & B. JOLLEY. Impulsivity, Habit and Addiction in Online College Gamblers.
Objective: Pathological gamblers ignore the consequences of their risky decisions. We used an online version of the Iowa Gambling Task (IGT) in an internet gambling casino among college undergraduates. Hypothesis: The neurobiological trait of impulsivity, measured by the IGT, mediates the transition from habitual to pathological gambling.
Participants and Methods: Students completed the IGT when they registered for e-Casino. They placed bets on slot machines that experimentally varied return and payoff ratio.
Results: One hundred forty-six students, 80% male, completed the IGT. Only 37 completed an online questionnaire about their gambling habits adapted from DSM-IV. Median IGT score was -2.0, lower than the population norm of 10 but expected in these young and predominantly male players. ANOVA showed no association between IGT score and behavioral indices of addiction (betting frequency, amount wagered, amount lost, and duration of play). Structural equation modeling showed that players with the highest quartile of IGT scores (least impulsive), gambling frequency accounted for 93% of the addiction construct. In contrast, in players with the lowest IGT scores (most impulsive), gambling frequency accounted for only 73% of the addiction construct.
Conclusions: IGT score robustly predicted the addiction construct among less impulsive players. This relationship was less robust for the most impulsive players. This paradoxical finding may be explained by the "reward deficiency" hypothesis: Highly impulsive individuals may require stronger stimuli to develop a persistent habit. Including more exciting games may validate our hypothesis of an inverse relationship between IGT score and gambling behavior in the most impulsive individuals.
Correspondence: *Deborah N. Black, MD, Neurology, University of Vermont, 255 Flood Road, Barre, VT 05641. E-mail: dnblack2@gmail.com*

R.M. SCHUSTER, P.J. COLVIN & R. GONZALEZ. Compensatory Effects of Nicotine On Declarative Memory Among Recent Cannabis and Nicotine Using Young Adults.
Objective: Research suggests that nicotine might enhance some of the same cognitive abilities that are negatively impacted by cannabis. To test this hypothesis, we examined the effects of recent cannabis and nicotine use on declarative memory among a sample 17–24 year olds.
Participants and Methods: Participants were 54 cannabis non-users (NU) and 57 cannabis users (CU) who identified cannabis as their drug of choice and used cannabis within the last 30 days. Declarative memory was assessed using the Hopkins Verbal Learning Test-Revised (HVLT-R). Participants with CO levels less than or equal to 6ppm were classified as non-recent nicotine users (n=45); those with greater than 6ppm were classified as recent users (n=12).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The CU group performed more poorly than the NU group on total immediate recall (≥=-.15, p=.04), with no significant differences on delayed recall. Within the CU group, higher levels of CO among recent nicotine users was associated with better total immediate recall (≥=.72, p=.03), but not delayed recall (≥=.47, p=.24). Among non-recent nicotine users, no significant associations emerged.
Conclusions: Quantity of exhaled CO, a proxy for amount of nicotine use, was associated with better immediate recall among cannabis users in a dose-dependent manner, but only among the most recent nicotine users. This suggests that nicotine may have a compensatory effect on cannabis-associated memory problems and that this effect is likely not cumulative and may dissipate with time. Future studies will examine this possibility in more detail and examine the potential role of nicotine withdrawal effects and sensitivity of CO levels on our findings.
Correspondence: *Randi M. Schuster, M.A., Psychology, University of Illinois at Chicago, 1636 North Wells Street, Apartment 2507, Chicago, IL 60614. E-mail: Rschuste@gmail.com*

K. SULLIVAN, M. KRENGEL & R. KILLIANY. Hippocampal Volumes and Visual Memory Differences in Neurotoxicant Exposed Gulf War veterans: A Pilot Study.
Objective: In a prior study of cognitive functioning in military pesticide applicators from Gulf War I (GWI), veterans classified as higher pesticide-exposed performed less well on cognitive testing than lower-exposed veterans. It was the goal of this follow-up neuroimaging pilot study to identify the relationships between pesticides, brain imaging and cognitive functioning in this well-characterized group of pest-control personnel. It was hypothesized that GWI veterans with higher levels and more exposures to pesticides and anti-nerve gas (PB) pills would show lower brain volumes on MRI and perform less well on cognitive testing.
Participants and Methods: Participants included a group of 24 preventative medicine personnel (PM) including military pesticide applicators (high-exposed) and PM personnel with very little pesticide exposure (low-exposed) who were also categorized into high or low exposure to PB pills.
Results: Multivariate analyses adjusting for age and gender and presented as percent of intracranial volume showed no main effect for hippocampal volume when the high and low pesticide exposed groups were assessed. However, a significant interaction effect was found when comparing the combined effect of the insect repellant DEET and PB pills on hippocampal volumes and visual memory functioning such that the high DEET and PB exposed group showed significantly lower hippocampal volumes (p = .004) and performed significantly worse on visual memory testing (Rey-Osterrieth Complex Figure Test; p = .02).
Conclusions: These findings suggest that brain-behavior relationships appeared present with combined DEET and PB exposures in this pilot study that should be further validated in larger study samples.
Correspondence: *Kimberly Sullivan, PhD, Environmental Health, Boston University School of Public Health, 715 Albany Street, Talbot 4W, Boston, MA 02118. E-mail: tty@bu.edu*

J. VENNE, C.B. FORTIER, L. MORRA, W.P. MILBERG & R.E. MCGLINCHEY. Drinking Behavior Predicts Associative Learning Performance in Young OEF/OIF Service Members.
Objective: Alcohol abuse is pervasive among America's veterans and prevalent among recent returnees from Iraq and Afghanistan. Associative learning is a fundamental behavioral learning paradigm that has well documented neural correlates in animals and humans. Evidence indicates that associative learning is dependent on the cerebellum and learning performance decreases over the age span in humans and animals.
Participants and Methods: Thirty OEF/OIF military service members underwent an eyeblink classical conditioning associative learning paradigm (EBCC) and assessments of alcoholic behavior and neuropsychological function. Participants' age ranged from 19 to 62 (mean=34, median=31). Conditioning consisted of delay and trace paradigms. Trial types were randomized with two clearly discernable tones signifying each. During delay conditioning, the CS and US overlapped in time whereas during trace conditioning there was a temporal gap between the CS and US.
Results: A self-report measure of alcoholic behavior (Short Michigan Alcoholism Screening Test) was highly correlated with acquisition of learned responses. Higher scores (indicating greater severity) were associated with decreased acquisition of conditioned responses in delay (r=-.616; p<.001) and trace (r=-.451; p=.01) learning. Correlations remained significant when the effect of age was partialed out.
Conclusions: Participants who endorsed a greater number of alcoholic behaviors performed worse on eyeblink classical conditioning. Past research has demonstrated alcohol-related deficits in EBCC in older, abstaining alcoholics but this is the first demonstration in such a relatively young cohort. Effects were greatest for delay conditioning, a task highly dependent on the integrity of the cerebellum, but also evident for trace conditioning, which relies on forebrain and cerebellar circuits.
Correspondence: *Jonathan Venne, Boston VA Healthcare System, 150 South Huntington Ave., Jamaica Plain, MA 02130. E-mail: jvenne@heartbrain.com*

E.A. LONG, P.K. SHEAR, C.M. ADLER, S.M. STRAKOWSKI, R.M. ANTHENELLI, A. ALBERTZ, J. BEAVERS, L. JARVIS & M.P. DELBELLO. Fluency Abilities in Adolescents with Co-Occurring Bipolar and Alcohol Use Disorders.
Objective: Cognitive weaknesses are documented in individuals with bipolar disorder (BPD) that are more severe in those with comorbid alcohol use disorders (BPD+ALC). However, less is known about this comorbidity in adolescents. The present study compared adolescents with BPD with and without current alcohol use disorders on measures of verbal and non-verbal fluency. We anticipated greater impairment in the comorbid group, with disproportionate difficulty on tests with greater executive functioning demands.
Participants and Methods: Participants were 14 adolescents (ages 13-17) with BPD and 15 with BPD+ALC. Groups were compared on IQ, letter and category fluency, switching-total correct, switching accuracy, filled dots and empty dots, and design switching.
Results: The groups were comparable in age, mood symptom severity, and IQ. On verbal fluency tasks, the groups did not differ in letter or category fluency ability, but the BPD+ALC were significantly worse than BPD on verbal switching (p<.002). On nonverbal fluency tasks, BPD+ALC were significantly worse than those without alcohol use disorders (p<.02 for all comparisons) with the exception of the switching tasks. In both groups, mean performances on all tasks fell within normal limits.
Conclusions: Existing research in adolescents with bipolar disorder suggests mild deficits in verbal learning, memory and executive function. The present results reveal that comorbid alcohol and mood disorders may disproportionately impact cognitive functioning, although the effects are subtle.
Correspondence: *Elizabeth A. Long, M.A., Psychology, University of Cincinnati, 4150 Edwards One / Mail Location 0376, University of Cincinnati, Cincinnati, OH 45221-0376. E-mail: gernerea@mail.uc.edu*

R. GONZALEZ & R.M. SCHUSTER. Co-factors Contributing to Declarative Memory and Decision-Making Among Young Adult Cannabis Users.
Objective: Cannabis use is associated with deficits in declarative memory and decision-making, yet not all cannabis users show impairments. We examined the influence of several demographic (age, education, gender, race), mental health (symptoms of depression, anxiety, and ADHD), and substance use parameters (cumulative and recent marijuana, alcohol, and nicotine use) on declarative memory and decision making among 18 – 24 year-old cannabis users.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants were 43 cannabis users who identified cannabis as their drug of choice, used cannabis regularly, and reported use within the last 30 days. Declarative memory was assessed using the Hopkins Verbal Learning Test-Revised (HVLT-R) and decision making was assessed with the Iowa Gambling Task (IGT).
Results: Pair-wise correlations showed that immediate recall on the HVLT-R was correlated with education ($r = .40$, $p < .01$), whereas delayed recall was correlated with several measures of recent and cumulative cannabis use (rho ranged from -.33 to -.41, p-values < .04). IGT total net score was also associated with recent and cumulative cannabis use history (rho ranged from -.34 to -.39, p-values < .03). Additionally, more education ($r = .30$, $p = .05$), white race ($r = .41$, $p < .01$), and greater symptoms of anxiety ($r = .33$, $p = .03$) were each associated with better IGT performance. Multiple regression revealed that, from these factors, only symptoms of anxiety accounted for significant unique variance in IGT performance (Beta = .29, $p = .04$).
Conclusions: Dose-dependent relationships between recent and lifetime amounts of cannabis use were associated with poorer delayed recall and decision-making among young cannabis users. However, mental health and demographics may play a more prominent role in decision-making among young cannabis users than their history of cannabis use, per se. This work was supported by grant K23 DA023560 (PI: Gonzalez) from the National Institute on Drug Abuse.
Correspondence: *Raul Gonzalez, Ph.D., Psychiatry, University of Illinois, Chicago, 1601 W Taylor Street, MC912, Chicago, IL 60612. E-mail: rgonzalez@psych.uic.edu*

K. WILSON & R. BOWLER. Relationships between Obesity and Neuropsychological Function in Women ages 30-55.
Objective: Obesity, correlated with lower frontal lobe brain volume and higher risk for Alzheimer's, has been related to poorer executive and memory function in women □70 years. Few studies of obese women prior to menopause (Λ55 years) have investigated these relationships.
Participants and Methods: This study evaluated 50 women aged 30-55, as part of an epidemiologic study of environmental manganese (Mn) exposure in air. One hundred randomly selected residents from a Mn-exposed town and 90 from a control town were administered neuropsychological tests of executive and memory function. Mn in blood (MnB) and Ferritin in serum (SerFerr) were analyzed. The 50 women were categorized as obese (n=30) or non-obese (n=20) based on a body-mass index cut-off of 30kg/m2.
Results: Obese and non-obese women did not differ significantly on demographic or mood variables. When controlling for town of residence with ANOVA, obese women had significantly ($p<.05$) more MnB than non-obese women (10.59μg/L vs. 9.02μg/L). When controlling for examiner, logMnB and logFerritin with regression, obesity predicted poorer performance ($p<.05$) on both immediate and short delayed verbal learning, visual recognition, immediate daily living memory, the memory index on the NAB, Stroop Word, Color, Color-Word, and Interference.
Conclusions: In summary, obese women did not differ on SerFerr but had higher levels of MnB. They performed worse on tasks of memory and executive function. This implies deficits in executive function, with Interference moderating levels of stress. These findings should be replicated in other studies.
Acknowledgment: This study was funded by the U.S. EPA under Co-op. Agreement P8341600
Correspondence: *Katherine Wilson, M.A., Alliant International University, 1243 Allston Way, Berkeley, CA 94702. E-mail: kwilson3@alliant.edu*

J. SISANTE, S. MEDA, R. ROSEN, R. JIANTONIO, M. GINLEY, H. TENNEN, C. AUSTAD, S. RASKIN & G. PEARLSON. Alcohol Use in College Freshmen: Differences in Self-reported Sensation-seeking, Trait Impulsivity, and Motivation, but Not in Behavioral Delay-discounting or Risk-taking Tasks.
Objective: College drinking is a widespread activity that may result adverse consequences, including automobile accidents, unsafe sexual activity, assault, property damage, passing out, memory black outs, and death. We hypothesized that we would observe significant differences in the Experiential Discounting Task (EDT) and Balloon Analogue Risk Task (BART) performances among alcohol abstainers, social drinkers, and dysfunctional drinkers; likewise we expected differences among the groups in self-report scores on various widely used impulsivity, motivational and sensation-seeking measures.
Participants and Methods: We examined 160 college freshmen (95 females) who were participants in the NIAAA-funded Brain Alcohol and Cognition in College Students (BARCS) study and obtained self-reported measures of sensation-seeking with the Zukerman Sensation Seeking Scale; trait impulsivity with the Barratt Impulsiveness Scale (BIS-11); and appetitive motivation with the BIS/BAS scale. Students were interviewed in person concerning their detailed alcohol and contemporaneously were administered two tasks: the EDT to assess delay-discounting and BART to assess risk-taking.
Results: Alcohol interview total scores designated 21 students as alcohol abstainers, 53 as social drinkers, and 84 as dysfunctional drinkers. ANOVA showed no differences in EDT and BART performances among groups, but found differences in total Zuckerman scores ($p < 0.05$) and certain BIS-11 ($p < 0.05$) and BIS-BAS subscales ($p < 0.05$). Furthermore, we found different Zuckerman scale scores between social and dysfunctional drinkers ($p = 0.007$), in the predicted direction.
Conclusions: These findings suggest that self-report measures, particularly the Zuckerman scale, may be more sensitive than behavioral measures in identifying freshmen problem drinkers.
Correspondence: *Jason-Flor Sisante, Olin Neuropsychiatry Research Center, 91 Elm St., Apt. 415C, Manchester, CT 06040. E-mail: jsisante@harthosp.org*

FRIDAY AFTERNOON, FEBRUARY 4, 2011

Invited Address: The Role of the Cerebellum in Cognition and Emotion

Speaker: Jeremy Schmahmann

1:30–2:30 p.m.

J.D. SCHMAHMANN. The Role of the Cerebellum in Cognition and Emotion.
The cerebellum is incorporated into the distributed neural circuits subserving motor control, cognitive processing and the modulation of emotion. This lecture provides an overview of anatomical studies in monkey and functional connectivity magnetic resonance imaging (fcMRI) studies in humans as well as functional MRI demonstrations of topographic arrangement in the cerebellum of motor and non-motor domains. We consider motor impairments such as ataxia, dysmetria and dysarthria as resulting from lesions of the motor cerebellum predominantly in the anterior lobe, whereas executive, linguistic, spatial, and emotional impairments (the cerebellar cognitive affective syndrome, CCAS) arise following lesions of the cognitive cerebellum in the posterior lobe. Affective dysregulation occurs particularly when lesions involve the cerebellar vermis. We will propose that these higher order impairments represent subcortical disconnection syndromes, manifestations of dysmetria of thought resulting from loss of the universal cerebellar transform, the unique computation that the cerebellum contributes to functionally specific subcircuits within distributed cortico-subcortical

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

networks. Patient studies reveal that the affective component of the CCAS manifests as deficits in the domains of attentional control, emotional control, social skill set, autism spectrum disorders and psychosis spectrum disorders. Drawing on these observations, we conclude that this new appreciation of cerebellar circuits, functions, and deficits has relevance for understanding and treating patients with cerebellar disorders; investigating neuropsychiatric diseases including autism; and for new therapeutic possibilities in neuropsychiatry. This is exemplified by preliminary evidence that transcranial magnetic stimulation applied to the cerebellar vermis improves negative symptoms and enhances quality of life in patients with schizophrenia.
Correspondence: *Jeremy D. Schmahmann, MD, Neurology, Massachusetts General Hospital and Harvard Medical School, 175 Cambridge Street, Suite 340, Boston, MA 02114. E-mail: jschmahmann@partners.org*

Symposium 10: Building Bridges in Neuropsychology: Evolution of the Discipline and Remembering Edith Kaplan

Chair: Sandra J. Shaheen

Discussant: Deborah Fein

1:30–3:00 p.m.

S.J. SHAHEEN, D. FEIN, PH.D., W.B. BARR, PH.D. ABPP-CN, D.C. DELIS, PH.D. ABPP, R. AU, PH.D. & R.M. BAUER, PH.D. ABPP-CN. Building Bridges in Neuropsychology: Evolution of the Discipline and Remembering Edith Kaplan.
Symposium Description: The Boston Process approach in neuropsychology bridges data-driven empirical assessment and the interests of capturing clinical information which often has stronger ecological validity. Kaplan drew from Heinz Werner's distinction between "Process" and "Achievement" in formalizing her thinking on this methodology, sometimes described as "qualitative." Early critiques gave rise to efforts to develop sound psychometric techniques to improve reproducibility in technique and quantifiablity in data analysis and test development. Presentations in this symposium recall the rich historical context of this movement, discuss the sensitivity and specificity of the approach in disconnection and dissociation phenomena, report on the (ongoing) development of empirical tools to capture relevant distinctions, and describe the application of such techniques to epidemiological studies. In population studies, "process" methods are being used effectively to increase sensitivity to subtle change over time, without impacting subject burden. Clinical phenomena which can best be assayed with this approach are discussed, to include disturbances of visual recognition and emotional reactivity.
Correspondence: *Sandra J. Shaheen, Ph.D., Psychiatry, Children's Hospital/HMS, 319 Longwood Avenue, Boston, MA 02115. E-mail: r.guilligan@comcast.net*

W.B. BARR, PH.D. ABPP-CN. History of Neuropsychology: The Process Approach in Context.
Objective: This presentation will outline the evolution of the Boston Process Approach from an historical perspective. In many ways, the Process Approach can be seen as an Americanized version of the clinical phenomenological methods developed in Europe during the second half of the 19th and the first half of the 20th Century. Methodology originating from Western Europe and the Soviet Union during that period emphasized the important role of clinician observation of patients' behaviors during performance of psychological and neurobehavioral tasks. While many link the origination of the process approach to Heinz Werner, examples of similar work is seen in the works of Kurt Goldstein, Martin Scheerer, Kurt Koffka, Jean Piaget, Lev Vygotsky, and A.R. Luria. All of these individuals were known to have directly influenced Edith Kaplan, Harold Goodglass, and their colleagues in Boston during the creation of the Boston Diagnostic Aphasia Examination and in their development of novel approaches to testing limits with the Wechsler Adult Intelligence Scale. While labeled as a "qualitative" approach by critics, the Boston Process Approach continues to this day to represent the strongest and most viable method available for operationalizing and quantifying important clinical observations during neuropsychological testing.
Correspondence: *William B. Barr, Ph.D. ABPP-CN, New York University Comprehensive Epilepsy Center, 223 East 34th Street, New York, NY 10016 . E-mail: William.Barr@nyumc.org*

D.C. DELIS. Evolution of Test Development: The Role of Cognitive-Process Data in Assessment.
Objective: Edith Kaplan revolutionized neuropsychological assessment by going beyond simplistic single-score analysis of testing behavior and incorporating multiple cognitive-process data in the analysis. I will provide a personal history of the evolution of the "Process Approach to Neuropsychological Assessment," including Edith's brilliant insights, things we did right and wrong, criticisms encountered and how these were addressed. Future directions for the
process approach will be explored. Humorous anecdotes that made the journey so much fun are provided.
Correspondence: *Dean C. Delis, SDVAMC, 3350 La Jolla Village Drive, San Diego, CA 92161. E-mail: ddelis@ucsd.edu*

R. AU. Using Qualitative Neuropsychological Measures in an Epidemiologic Study: The Framingham Offspring Cohort.
Objective: The purpose of this talk is to discuss the significant contributions qualitative neuropsychological data can offer to a large scale, community-based cohort.The Boston Process Approach has been used for decades by clinical neuropsychologists. Qualitative analysis provides insight into the diagnostic process that standard quantitative measures do not. Integration of qualitative assessment of cognitive performance, however, has been surprisingly lacking in the research community, and not employed at all by epidemiologic studies. With increased interest in identifying preclinical markers of neurologic disease, qualitative measures provide a mechanism for detecting subtle changes in cognition.
Participants and Methods: From 2005-2010, 2020 participants from the Framingham Heart
Study have been administered a neuropsychological battery as part of a larger study on brain imaging and cognition. Adherence to standard test administration protocols was done to ensure collection of quantitative measures. Embedded within the testing methods and scoring protocols were additional instructions for obtaining qualitative
measures systematically and reliably.
Results: Qualitative scoring methods increased the number of neuropsychological measures by over 200% without additional burden to the participant. Further, qualitative measures allowed additional assessment of cognitive domains both within and across tests, particularly in executive function. The use of qualitative measures eliminated the limitation of "one test-one domain" practice of
epidemiologic studies.
Conclusions: Epidemiologic studies can expand the depth and breadth of their test batteries by incorporating qualitative methods for scoring standard neuropsychological tests without impacting subject burden. These additional measures can also increase sensitivity in detecting subtle changes in cognitive function in pre-clinical stages of disease.
Correspondence: *Rhoda Au, BU Department of Neurology, 715 Albany Street, B-6, Boston, MA 02115. E-mail: rhodaau@bu.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

R. BAUER, PH.D. ABPP-CN. Disconnection, Dissociation Logic, and the Legacy of the Process Approach.
Objective: In this talk, I highlight the seminal contribution of the famous Geschwind and Kaplan (1962) case and illustrate how the concept of disconnection syndromes is conceptually tied to the dissociation logic inherent in the process approach. Application of this logic is made in evaluating emotional disconnection syndromes (visual-limbic disconnection).
Geschwind & Kaplan (1962) described a patient with a callosal lesion who displayed apraxia, agraphia, and tactile anomia, all restricted to the left hand (Neurology 1962, 12, p. 675). Based on detailed neuropsychological analysis, the authors concluded that these symptoms could be explained as a disconnection of the right hemisphere from left-hemisphere language centers. This seminal paper renewed interest in early work that had introduced the disconnection concept, and cemented a fundamental brick in the foundation of the method of neuropsychological assessment that would come to be known as the Boston Process Approach. Dissociation logic, the idea that the "patient" is comprised of multiple input, processing, and output systems that can become dissociated through brain disease, was a revolutionary development in the field that is at the heart of Kaplan's approach to neuropsychological assessment. Further development of this idea led to the recognition of new clinical phenomena (e.g., visual hypoemotionality due to visual-limbic disconnection) and to the development of new neuropsychological tests with unprecedented process purity.
The historical importance of the dissociation concept will be reviewed and its application to the evaluation of important clinical phenomena including disturbances of visual recognition and emotional reactivity will be discussed.
Correspondence: *Russell Bauer, Ph.D. ABPP-CN, Department of Clinical & Health Psychology University of Florida, PO Box 100165 HSC, Gainesville, FL 32610-1065. E-mail: rbauer@PHHP.UFL.EDU*

D. FEIN. Building Bridges: Further Application of the Hybrid Approach to Addressing Diagnostic and Clinical Need.
Objective: The discussant further describes the specific advantages of the Process Approach for questions in child development and special populations, with emphasis on clinical interpretation, sharing insights on cognitive "style" with the client, and providing direction for clinical intervention.
Correspondence: *Deborah Fein, 406 Babbidge Road, Unit 1020., University of Connecticut, Storrs, CT 06269-1020. E-mail: deborah.fein@uconn.edu*

Symposium 11: fMRI-based Evidence of Neuroplasticity in Neurological Populations

Chair: Benjamin M. Hampstead

Discussant: John DeLuca

1:30–3:00 p.m.

B.M. HAMPSTEAD, J. DELUCA, B. CROSSON, F. HILLARY, J. TRACY & B.M. HAMPSTEAD. fMRI-based Evidence of Neuroplasticity in Neurological Populations.
Symposium Description: The long-held belief that neuroplastic change only occurs in the immature brain has been falsified by both animal and human research. The advent and subsequent widespread use of functional magnetic resonance imaging (fMRI) has revolutionized the study of brain-behavior relationships. However, only recently has fMRI been used to examine spontaneous reorganization following neurologic injury and the neural correlates of intervention-related improvement. This symposium highlights such efforts in four patient populations commonly encountered by neuropsychologists: traumatic brain injury (TBI), epilepsy, stroke, and aging/dementia. In each case, fMRI can provide important insight into the focal versus network-based dysfunction that underlies cognitive impairment as well as how such dysfunction is altered by spontaneous recovery and targeted intervention. Dr. Frank Hillary will address general methodological issues associated with using fMRI in this manner, while focusing specifically on neural network changes in TBI. Dr. Joseph Tracy will examine fMRI-based evidence of spontaneous reorganization of cognitive functioning after surgical resection in patients with epilepsy. Dr. Bruce Crosson will discuss the importance of establishing "normal" patterns of activation against which patient groups are compared and will also provide evidence of treatment-induced plasticity following stroke. Dr. Benjamin Hampstead will compare the behavioral efficacy and neural correlates of compensatory-based memory rehabilitation in healthy elderly and patients with mild cognitive impairment. Dr. John DeLuca will facilitate discussion of underlying themes such as whether the same principals of neuroplasticity persist across all forms of neurologic injury and how such work can guide patient-specific treatments to maximize functioning and quality of life.
Correspondence: *Benjamin M. Hampstead, Ph.D., Emory University, 1441 Clifton Rd NE, Room 150, Atlanta, GA 30322. E-mail: bhampst@emory.edu*

F.G. HILLARY. The Meaning of Neural Network Change after Neurological Compromise.
Objective: Over the past decade there has been a dramatic increase in the use of blood oxygen level dependent functional magnetic resonance imaging (BOLD fMRI) to examine cognitive, sensory, and motor dysfunction in neurologically impaired samples. One growing literature has focused on changes in the neural networks associated with basic deficits in information processing (e.g., working memory, processing speed), with specific interest in documenting brain reorganization and neural plasticity. One important goal of this literature is to determine the brain changes attributable to rehabilitation interventions. To do so, what becomes critically important is understanding the meaning of BOLD signal change after recovery/intervention. There are a number of methodological issues that pose challenges to researchers using BOLD fMRI methods to examine recovery and an important goal of this talk is to outline the methodological challenges as well as common problems encountered during data interpretation. This talk will outline how fMRI has been applied in one specific literature examining recovery and change in working memory deficits in TBI. This literature will serve as a model for how to use BOLD fMRI in order to document neural network change and how this information might complement behavioral indicators of recovery after rehabilitation.
Correspondence: *Frank G. Hillary, Department of Psychology, 223 Moore Bldg, University Park, PA 16802-3106. E-mail: fghillary@gmail.com*

J. TRACY. Epilepsy and Cognitive Plasticity.
Objective: Epilepsy, a disorder greatly contributing to our earlier modular conceptions of memory, can now be seen, ironically, as providing clear cases of network disturbances in cognition. Epileptiform activity sets off neuroplastic responses in the brain creating biased, favored pathways in neural communication that are not cognitively adaptive. In this setting of potential brain neuroplasticity, predicting cognitive outcomes following resective brain surgery becomes particularly difficult. Temporal lobe epilepsy surgery data (pre versus post resection) will be presented to examine changes in language functioning, and the potential presence of cognitive and neural reorganization within an expressive language network. The cognitive mechanisms implementing cognitive recovery following brain surgery will be discussed, with an emphasis on the ways that multimodal neuroimaging can help distinguish between these mechanisms. The broad goal of such research is to understand if there are principles that govern change in the brain rep-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

resentation of cognitive function following an acquired neural network disruption (i.e., brain surgery). In the clinical context, there is great value in determining if there are preoperative neuroimaging characteristics that can predict postoperative preservation (or decline) of "at risk" cognitive functions.

Correspondence: *Joseph Tracy, Comprehensive Epilepsy Center, Philadelphia, PA 19107. E-mail: Joseph.I.Tracy@jefferson.edu*

B. CROSSON, K.M. MCGREGOR, C.E. WIERENGA & A.B. MOORE. Implications of Aging for Functional Neuroimaging in Stroke and Stroke Rehabilitation.

Objective: Stroke occurs in older persons. Hence, interpretation of fMRI data in stroke requires knowledge of activity in normal older persons. Such baseline activity varies from that of young persons and has implications for data interpretation in rehabilitation. Our recent work showed that activity in sensorimotor cortex ipsilateral to the moving hand changes from negative to positive for young versus old participants, respectively, and that this activity change in older persons is correlated with a loss of suppression of motor activity in that hand during transcranial magnetic stimulation. This finding suggests that sensorimotor activity ipsilateral to an impaired, moving hand cannot be interpreted as compensatory in stroke. Our investigators have noticed similar phenomena in language, i.e., changes from negative to positive activity in right frontal cortex. As yet, we lack confirmation that this change relates to a loss of suppression. Nonetheless, right frontal activity during language production is normal for older persons and cannot be interpreted as compensatory when it appears in aphasic patients during language production. Indeed, our recent study showed right-hemisphere lateralization of frontal activity prior to treatment for aphasic patients similar to that of normal controls. After a treatment designed to shift frontal activity rightward during word production, aphasic patients showed greater right-hemisphere lateralization of activity than normal controls. Further implications for rehabilitation of changes in brain activity that occur with aging will be discussed.

Correspondence: *Bruce Crosson, 1VA RR&D Brain Rehabilitation Research Center, University of Florida Department of Clinical & Health Psychology, Gainsville, FL 32608. E-mail: nossorc1@PHHP.UFL.EDU*

B.M. HAMPSTEAD, A.Y. STRINGER, R.F. STILLA & K. SATHIAN. Cognitive rehabilitation of memory increases activation in patients with mild cognitive impairment relative to healthy elderly.

Objective: Associative memory is dependent on the medial temporal lobes and is impaired in patients with amnestic mild cognitive impairment (MCI). Therefore, associative memory paradigms provide sound models for assessing the efficacy of compensatory-based cognitive rehabilitation (CR). We have been systematically exploring the conditions under which CR can improve memory functioning in patients with MCI using face-name and object-location associations. Additionally, we use functional magnetic resonance imaging (fMRI) to elucidate the neural correlates of CR by comparing patterns of pre- and post-training activation. Our previous findings demonstrated that CR facilitates learning and memory of these associations significantly better than a matched-exposure intervention. Further, CR results in a markedly different pattern of fMRI activation that involves both medial and lateral frontal and parietal cortices, but little to no change in the medial temporal lobes. Here, we directly compare the behavioral and fMRI changes in MCI to those of healthy elderly controls (HEC) who were well matched by age, education, and brain volumetrics. CR helped normalize memory test performance and both groups demonstrated increased post-training encoding-related activity in the medial parietal and lateral temporoparietal regions. However, the MCI patients showed more extensive increases in frontal and subcortical areas. Despite the behavioral and fMRI changes, hippocampal activation did not change significantly post- versus pre-training as it was present in the HEC but absent in MCI. These findings suggest that CR allows MCI patients to recruit widespread frontal-parietal networks that may supplant the dysfunctional medial temporal lobe memory system.

Correspondence: *Benjamin M. Hampstead, 1441 Clifton Rd NE, Room 150, Atlanta, GA 30322. E-mail: bhampst@emory.edu*

Poster Session 8: ADHD, Child and Adult Neurological and Medical Disorders

1:30–3:00 p.m.

ADHD/Attentional Functions

S. CORREIA, M. WORDEN, D.C. AHERN, L.R. HOCHBERG, D. BENEDICTO, M. GIANFRANCESCO, S. MERNOFF & A.C. LO. Reaction Time Enhancement in a Modified Attention Network Task.

Objective: To develop a brief, reliable attentional measure for eventually guiding decisions about readiness to return to normal activities following mild traumatic brain injury (mTBI). We present an initial validation of a sound modification to the Attention Network Test (ANT) in healthy controls.

Participants and Methods: The ANT is a well-validated and widely-used computerized flanker test for assessing the altering, orienting, and executive components of attention. Our modified ANT (mANT) pairs stimuli onset with sounds of varying pitches and wave forms delivered by headphones. Blocks of standard ANT trials were alternated with blocks that included sounds on 50% of items. We hypothesized reaction time (RT) and accuracy would be lower for the sound items. Our pilot sample included 20 healthy undergraduate students.

Results: RT (collapsed across sound vs. no-sound condition) decreased significantly on items with alerting and spatially-orienting cues vs. no cue as well as for congruent vs. incongruent flankers (all $p < 0.01$) . Reaction time significantly improved with distractor sounds [$t(19) = 3.984$, $p < 0.01$)], which was an unexpected finding. No significant differences in accuracy were noted for any of the above analyses.

Conclusions: These pilot results show that presentation of sounds during a flanker task enhances RT without impacting accuracy in healthy young adults. This enhancement might reflect input from the second sensory attentional channel (i.e., auditory). The results motivate further research to determine if this affect is stable or attenuated in the context of acute mTBI.

Correspondence: *David Ahern, Warren Alpert Medical School of Brown University, 333 Atwells Ave, #208, Providence, RI 02903. E-mail: david_ahern@brown.edu*

T. ANTONINI, M. NARAD, J. SIMON, J. HARTL, L. RAWE, J. LANGBERG & J. EPSTEIN. Exploring the Relationship Between Reaction Time Variability and Off Task Behavior in Children With and Without ADHD.

Objective: Neuropsychological research examining reaction time patterns in children with ADHD has found that children with ADHD exhibit greater intra-individual variability (IIV) than typically-developing children. This higher IIV appears to result from intermittent periods of slower responding (Hervey et al., 2006). Several investigators have suggested that these periods may be indicative of attentional lapses (Van der Molen, 1996). Indeed, during behavioral observations, children with ADHD tend to be more off task and display more variability in on-task behaviors. This study was conducted to address the paucity of research regarding the relationship between neuropsychological manifestations of IIV and behavioral observations of attentional lapses.

Participants and Methods: Ninety-three children with ADHD and 45 typically-developing children completed five different computerized reaction time tasks. IIV was measured on these tasks and a single factor score representing IIV was computed. Children also watched an educational video and completed a 20-minute math task while being recorded. Off task behavior was coded using a continuous event-related coding scheme (Noldus Observer XT®).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Compared with controls, children with ADHD had higher IIV on the neuropsychological tasks, were off task significantly more times and for a longer duration on the math task and showed more varied lengths of off task behavior during the video task. Correlational analyses demonstrated significant relationships between IIV factor scores and off task variables during the math and video observations.
Conclusions: This study suggests that IIV on neuropsychological tasks may be related to off task behavior. This furthers our understanding of the behavioral correlates of IIV in children with ADHD.
Correspondence: *Tanya Antonini, B.A., University of Cincinnati/Cincinnati Children's Hospital Medical Center, 526 Martin Luther King Dr. W, Apt. 6, Cincinnati, OH 45220. E-mail: tanya.antonini@gmail.com*

J. BEAN & I. EIGSTI. The Impact of Response Salience on a Modified Posner Paradigm: Implications for Children with Typical Development, Autism Spectrum Disorders, and Attention-Deficit/Hyperactivity Disorder.
Objective: Posner's (1984) well-studied paradigm evaluates visual attention by presenting directional cues to subsequent targets. Executive dysfunction is characterized by slower reaction times (RT) to invalid cues (directing attention away from the target) relative to valid cues. This study utilized a modified Posner paradigm that controlled the number of valid cue trials preceding invalid cue trials, to assess the impact of response salience.
Participants and Methods: Participants ages 7-17 years with typical development (TYP; n = 24), autism spectrum disorders (ASD; n = 17), and attention-deficit/hyperactivity disorder (ADHD; n = 5) completed the Posner paradigm. Groups were matched on age and full scale IQ. MANCOVAs examined group differences in RT for valid vs. invalid cues and for two vs. four preceding valid trials.
Results: Age (which correlated with baseline RT) and baseline RT were included as covariates. The ASD group was significantly slower to respond to invalid relative to valid cues; children with ADHD were significantly slower than those in the TYP group (ASD > ADHD > TYP). The ASD group was significantly slower than both children with ADHD and TYP for invalid trials following multiple (n = 4) valid trials, indicating a greater susceptibility to the buildup of response salience (ASD > TYP, ADHD).
Conclusions: Children with ASD demonstrated the most difficulty disengaging from the invalid cues, followed by children with ADHD. Moreover, children with ASD had specific difficulty in breaking response set, even compared to children with primary attention dysfunction (e.g., ADHD), consistent with prior studies of prepotent responding in ASD. Underlying neural mechanisms and potential behavioral outcomes will be discussed.
Correspondence: *Jessica Bean, M.A., University of Connecticut, 406 Babbidge Rd, Unit 1020, Storrs, CT 06269. E-mail: jessica.bean07@gmail.com*

A.W. BERNARD, B.F. PENNINGTON, E. WILLCUTT, B. BYRNE & R.K. OLSON. A Cross-Lagged, Longitudinal Model of Attention and Naming Speed in School Age Children.
Objective: Previous research has identified contemporaneous relationships between attention problems and both processing speed (PS) and naming speed (NS) deficits, two factors which are also highly correlated (r=.77; McGrath, et al., 2010). However, no studies have tested direction of causality between attention and PS/NS deficits. The present study uses an autoregressive, cross-lagged, structural modeling design to examine four competing hypotheses about the relationships between NS and attention in children.
Participants and Methods: 1,496 twins from Colorado and Australia were tested prior to Kindergarten, 1st, 2nd, 3rd and 4th grades. Attention was measured via parent-, tester-, and teacher-reports, while NS factors were derived from rapid naming subtest scores. The models were tested across all combinations of time points.
Results: Models 1 and 3 are most frequently supported. In Model 1, NS and attention demonstrate a bidirectional influence over time. In Model 3, attention at Time X has an effect on NS at Time X+1, but not the other way around. When all time points were included in the analysis, Model 1 was supported; however, the path estimates from attention to NS were stronger and more significant, on average, than those in the opposite direction.
Conclusions: These results challenge the commonly held belief that PS and NS deficits precede attention problems. A potential explanation is that children with attention deficits are exposed to fewer experiences that would typically improve PS/NS performance. The findings suggest that early interventions for attention deficit disorders should intervene at the phenotypic as well as cognitive deficit levels.
Correspondence: *Anne W. Bernard, University of Denver, 2155 S. Race St., Denver, CO 80208. E-mail: aberna26@du.edu*

M.E. BODZY, C.D. ANDERSON, J. COLLINS, H. SCHNEIDER, L. FERENC & M. MAHONE. Emotional Impulsiveness Predicts Response Control in Preschoolers with and without ADHD.
Objective: Response control is a basic characteristic of human behavior, reflecting the ability to efficiently and accurately choose a preferred response while inhibiting the choice of a less preferred or incorrect response. Children with ADHD commonly exhibit deficient response control, leading to disinhibited and variable responding. Recently, it has been proposed that emotional impulsiveness (EI) and subsequent deficient emotional self-regulation (ignored in DSM-IV) also play a central role in the development of ADHD (Barkley, 2010). The present study examined the relationship of EI to neuropsychological measures of response control in preschoolers with and without ADHD.
Participants and Methods: Preschool children ages 3-5 years (23 ADHD, 31 control), were administered measures of IQ, response inhibition (Conflicting Motor Response Test), and intra-individual variability (Auditory Continuous Performance Test-Preschool), and were rated by parents and teachers on EI (BRIEF-P Emotional Control scale). Hierarchical regression analyses (controlling for age, IQ, and group) were used to assess incremental prediction of response control by parent/teacher ratings of EI.
Results: Children with ADHD performed worse than controls on both response control measures, and were rated by parents and teachers as having poorer EI (all $p<.05$). After controlling for age, IQ, and group, parent ($\Delta R2=.09$, $p=.03$) and teacher ($\Delta R2=.13$, $p=.02$) EI ratings added uniquely to the prediction of response inhibition. Similarly, parent ($\Delta R2=.31$, $p=.002$) and teacher ($\Delta R2=.34$, $p=.01$) EI ratings added uniquely to prediction of response variability.
Conclusions: Emotional impulsiveness, observable in preschoolers, appears to contribute unique variance to assessment of response control, and may deserve greater consideration in the ADHD diagnostic criteria in DSM-V.
Correspondence: *Mary E. Bodzy, Kennedy Krieger Insitute/Johns Hopkins Medical School, 707 S President St Unit 1512, Boston, MD 21202. E-mail: akac25@yahoo.com*

O. BOXER, D.A. KAUFMAN & R.M. BILDER. Evidence-based medicine in neuropsychology: A proposal for a new web-based, collaborative knowledgebase.
Objective: Biomedicine increasingly demands evidence-based practice for pragmatic, political, and scientific study. Just as other medical domains have developed systems for evaluating evidence-based medicine (EBM), neuropsychology needs a methodology to support EBM assertions relevant to clinical practice. As a result, we are implementing a free online service enabling collaborative development of a knowledgebase supporting EBM in neuropsychology.
Participants and Methods: Existing collaborative knowledgebases already exist that represent cognitive concepts, cognitive tasks, and their inter-relations (www.CognitiveAtlas.org) and permit entry of quantitative evidence from published literature (www.PhenoWiki.org). To demonstrate the utility of extending these knowledgebases to document EBM in neuropsychology, we conducted a meta-analysis to look at the efficacy of cognitive remediation in children with ADHD. Preliminary data were compiled from five studies focusing on improvement of working memory (WM) following cognitive remediation.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Meta-analytic results yielded moderate effect sizes. Within-group effects of cognitive remediation were larger for visual WM (d = 1.86) than auditory WM (d = 1.00). Across visual and auditory modalities, within-group WM effects (d = 1.60) were larger than between-group effects (d = 1.02).
Conclusions: Preliminary results suggest larger effects of cognitive remediation on visual WM compared to auditory WM in children with ADHD. Using these initial findings as a proof of concept, we believe this collaborative knowledgebase offers a useful infrastructure necessary for analysis of EBM in neuropsychology. Furthermore, this tool has potential to help document the utility of neuropsychological assessments, reveal quantitative effect sizes for treatment effects on neuropsychological outcomes, and ultimately support the medical necessity of neuropsychological services.
Correspondence: *Oren Boxer, PhD, Neuropsychology, UCLA, 760 Westwood Plaza, Semel Institute for Neuroscience and Human Behavior, 68-230, Los Angeles, CA 90095. E-mail: oboxer@mednet.ucla.edu*

J. GRIECO, B. KRONE, M. STEIN, NNE-CLAUD. BEDARD & J. NEWCORN. Comparative Effects of Methylphenidate versus Atomoxetine on the Continuous Performance Test (CPT) in Children and Adolescents with ADHD.
Objective: Attention Deficit Hyperactivity Disorder (ADHD) is a neurobehavioral disorder associated with inattention, hyperactivity, and impulsivity. Youth with ADHD often display errors on Conners Continuous Performance Test (CPT-II) reflecting inattention and impulsivity. Stimulant medications have been associated with improved CPT performance. The purpose of the study is to compare CPT-II performance measures of omission errors, comission errors, and average speed of correct response, while on OROS Methylphenidate(Concerta) and Atomoxetine(Strattera). It is hypothezied that Concerta will demonstrate greater response.
Participants and Methods: Children (N=160) from New York and Chicago participated in this crossover study using gradual titration until optimal response was obtained. After undergoing a comprehensive evaluation to confirm diagnosis, participants were administered MTH and ATX in a randomized, double-blind fashion with 2 week placebo/washout period between the 4-6 week medication periods. CPT-II was administered at baseline, optimal dose, and during placebo.
Results: Repeated measure ANOVA indicates significant overall improvement when children were on medication in comparison to when off medications[F (1,112) = 6386.805, p<.000]. More specifically, MTH significantly improved ability to attend to visual stimuli (i.e. - fewer omission errors[F(1,138)= 18.00, p<.00]) and efficiency of accurate responding (i.e. - Hit RT[F(1,139)= 23.99, p<.00]), but did not significantly impact ability to inhibit responses (i.e. - commission errors).The effects of ATX on CPT performance were less robust, with slight improvements on inhibition as evidenced by reduced commission errors [F(1,132)=5.83, p<.02].
Conclusions: Future studies should examine clinical impact of these changes in relation to alternative measures of functioning and suggests the possibility of ultimately selecting treatment based upon prominent symptoms for each child.
Correspondence: *Julie Grieco, University of Illinois at Chicago, 2970 N. Sheridan Rd., Apt. 827, Chicago, IL 60657. E-mail: jgrieco@psych.uic.edu*

L. HOKKANEN, E. HIETARINTA, S. KIVISAARI, M. SIVONEN, S. LEPPAMAKI, P. TANI & M. LAASONEN. Is the executive deficit in dyslexic readers similar to that in ADHD in adults?
Objective: A subgroup of dyslexic readers have attentional difficulties. Our aim was to determine how does their executive deficit differ from that of subjects with attention deficit hyperactivity disorder (ADHD)
Participants and Methods: Subjects (18-55 years of age) had diagnosed dyslexia (n=39) or ADHD (n=31), or were healthy controls (n=41). Exclusion criteria included other neurological or psychiatric diagnoses and medication. Neuropsychological assessment in project DyAdd included tests of executive functions that grouped into five factors: Working memory, Processing speed, Set shifting, Disinhibition, Divided attention, and Planning. As subjective measures we used Wender Utah Rating Scale (WURS) for childhood symptoms and Brown Attention Deficit Disorder Scale (BADDS) for current symptoms. In BADDS, 37/41 (90%) of the controls scored below the cutpoint 50. In the ADHD group 30/31 and in the dyslexia group 27/39 scored above cutpoint and these two subgroups with subjective dysexecutive symptoms were further studied. Groups did not differ in gender, education level, depression (BDI) or intelligence (WASI). The dyslexia subgroup was slightly older and age was used as a covariate for neuropsychological tests (MANCOVA).
Results: Of the executive factors, only in Disinhibition the two groups differed with the dyslexia group surprisingly performing more poorly than the ADHD (p<.05). In two BADDS subscales, Organizing and Effort, the ADHD group had more problems (p<.05) while in subscales Focus/Attention, Emotion/Affect and Memory the groups were similar. In WURS subcomponents Inattention/Anxiety, Conduct problems and Impulsivity the ADHD group recalled more symptoms (p<.05).
Conclusions: There is a subgroup of subjects with dyslexia who experience attentional problems similarly to those with ADHD but don't have an AHDH diagnosis. While in neuropsychological tests the groups share many features, in adult daily life the symptoms have different characteristics and childhood history shows divergence.
Correspondence: *Laura Hokkanen, PhD, Dept of Psychology, University of Helsinki, P.O.Box 9, Helsinki 00014, Finland. E-mail: laura.hokkanen@helsinki.fi*

D. IN DE BRAEK, J. DIJKSTRA, R. PONDS & J. JOLLES. Goal Management Training in adults with Attention Deficit/Hyperactivity Disorder (ADHD): an intervention study.
Objective: This study describes a controlled, neuropsychological intervention study in adult Attention Deficit/Hyperactivity Disorder (ADHD). We examined whether adults with ADHD would benefit from a structured course based on Goal Management Training (GMT). The comprehensive course also included psycho-education on the important aspects of executive functioning as well as counseling with respect to coping behaviours.
Participants and Methods: The intervention group (GMT, psycho-education and counseling) was compared to a control group of patients who received psycho-education only (N= 12 and N=15, respectively). A baseline assessment (T1) and two follow-up assessments (T2, T3) were used. The effects of the intervention were evaluated using subjective and objective test measures. In addition, a structured pre-assessment, an evaluation and a group comparison were carried out by an experienced clinician, who was blinded to the intervention itself.
Results: General Linear Model (GLM) with repeated measures analysis of variance was applied to examine the effect of intervention. Analyses were carried out with group as between-subject factor and time as the within-subject factor. Secondly, difference scores were calculated for all outcome measures (T2-T1), except for the ratings on the clinical rating scale (as 'change' was already measured in the clinical rating). To examine the effects of intervention on cognitive complaints as well as planning time at assessment two (T2) and three (T3), independent t-tests were carried out in both groups. The results of the structured clinical interview obtained in the active intervention group were significantly better in the intervention group than those of the control group.
Conclusions: The findings suggest that the combination of GMT with psycho-education and counseling may have validity for adults with ADHD.
Correspondence: *Dymphie In de Braek, Phd, Psychiatry and Psychology, Maastricht University Medical Center, P. Debeyelaan 25, Maastricht 6229 HX, Netherlands. E-mail: d.indebraek@np.unimaas.nl*

H.M. LAMONICA, K. BURSIK, M. JERRAM & D.A. GANSLER. Differentiating Between Adolescent Boys and Girls with Attention Deficit-Hyperactivity Disorder: A Principal Components Analysis.
Objective: The hallmark symptom of Attention Deficit-Hyperactivity Disorder (ADHD) has long been viewed as hyperactivity, and therefore

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

the preponderance of studies have examined the relationship between hyperactivity and neuropsychological difficulties. As symptoms of hyperactivity are more common in boys relative to girls, the majority of the research has focused on the manifestation of ADHD in boys. Although the number of studies investigating the direct effects of inattention on various domains of functioning has dramatically increased in the last two decades, research including girls is still relatively limited. Designed to highlight the neuropsychological dysfunction associated with predominant symptoms of inattention, this is the first study to investigate gender differences in symptom severity and neuropsychological functioning in adolescents with ADHD, Predominantly Inattentive Type (ADHD-I).

Participants and Methods: The participants were 36 boys and 26 girls, ranging from 12- to 15-years of age, diagnosed with ADHD-I on the basis of a clinical interview, DSM-IV symptom checklist, and neuropsychological testing.

Results: The results demonstrated that boys performed more poorly on an aggregate score reflecting overall neuropsychological performance relative to girls, with significant weaknesses seen on measures of impulse control. Variations in symptom profile did not account for this result. Additionally, the behavioral symptoms of ADHD were found to correlate poorly with neuropsychological test scores.

Conclusions: The overall results of this study suggest behavioral rating scales and symptom checklists are the most appropriate tools for the diagnosis of ADHD whereas neuropsychological evaluations appear to be best suited for the description of cognitive functioning.

Correspondence: *Haley M. LaMonica, Ph.D., Cooper University Hospital, 1520 Spruce St., Apt 510, Philadelphia, PA 19102. E-mail: haleylamonica@yahoo.com*

L.K. MACNEIL, M.A. GARVEY, D.L. GILBERT, M.E. RANTA, M.B. DENCKLA & S.H. MOSTOFSKY. Quantitative Assessment of Mirror Overflow in Attention-Deficit Hyperactivity Disorder: Association with ADHD Symptom Severity.

Objective: To develop methods for quantifying excessive mirror overflow in children with ADHD, as it is a motor sign thought to reflect impaired inhibitory control.

Participants and Methods: Fifty right-handed children, 8.2-13.3 years, 25 ADHD and 25 typically developing (TD), performed a sequential finger tapping task, completing both left-handed and right-handed finger sequencing (LHFS and RHFS). Phasic overflow of the index and ring fingers was assessed in 34 children with video recording and total overflow in 48 children was measured as total angular displacement of the index and ring fingers with electro-goniometer recordings.

Results: Phasic and total overflow were greater in ADHD than TD, particularly during LHFS. Separate gender analyses revealed that ADHD boys, but not girls, showed significantly more phasic and total overflow than their gender-matched controls. For children with ADHD, phasic overflow during RHFS was significantly correlated with parent-rated ADHD-RS-IV hyperactivity/impulsivity scores and with ADHD-RS-IV total score at a trend level.

Conclusions: Our quantitative overflow measures support past qualitative findings that overflow persists to a greater degree in ADHD than TD children, particularly in ADHD boys; they further reveal that excessive overflow is associated with ADHD symptom severity. Our findings also suggest that persistence of mirror overflow is more prominent during non-dominant hand task execution, but it may be that delayed development of dominant motor control circuits more closely reflects a maturational delay/abnormality of parallel higher-order systems necessary to control impulsive/hyperactive and distractible behavior. These quantitative measures will assist future physiologic investigation of the brain basis of motor and behavioral control in ADHD.

Correspondence: *Lindsey K. MacNeil, LNIR, Kenndy Krieger Institute, 707 N Broadway, Baltimore, MD 21205. E-mail: MacNeil@kennedykrieger.org*

D.L. GILBERT, L.K. MACNEIL, K.M. ISAACS, M. AUGUSTA & S.H. MOSTOFSKY. Transcranial Magnetic Stimulation (TMS): Impaired Motor Cortical Inhibition Predicts Attention-Deficit Hyperactivity Disorder (ADHD) Symptom Severity.

Objective: To determine whether, in children with ADHD, reduced motor cortex short interval cortical inhibition (SICI) is predictive of impaired motor function and core diagnostic features of ADHD.

Participants and Methods: 104 right-handed children, 8-12 years, participated: 52 with ADHD; 52 typically developing (TD) controls. SICI was assessed using paired pulse TMS. ADHD symptoms were assessed using Conners' Parent Rating Scale (CPRS). Motor control was assessed using Physical and Neurological Examination for Subtle Signs (PANESS) and Motor Assessment Battery for Children, 2nd Edition (MABC-2). Stepwise Logistic Regression and linear regression were used to model associations between SICI, PANESS, and diagnosis and between motor cortex physiology, motor control, and ADHD symptom ratings, respectively.

Results: Motor cortex SICI was reduced in ADHD ($p<0.0001$) as compared with TD. ADHD showed worse motor control (PANESS, $p<0.0001$; MABC-2, $p=0.0007$) than TD. SICI correlated inversely with higher CPRS symptom severity in the whole cohort ($r=-0.53$, $p=0.0001$) and in ADHD ($r=-0.49$, $p=0.0045$) and with more impaired (higher) PANESS scores. The odds of ADHD diagnosis were predicted by both higher PANESS scores ($p=0.0004$) and less SICI ($p=0.030$) (Model Chi Square=35.56, $p<0.0001$). In multivariate regression, only SICI was associated with ADHD symptom severity.

Conclusions: For children with ADHD, decreased motor SICI is strongly associated with severity of ADHD symptoms of inattention and hyperactivity/impulsivity. The findings suggest deficient motor cortex SICI may be a relevant biomarker of ADHD and that cortical inhibition (mediated by GABA-A interneurons and enhanced by dopaminergic projections) may contribute to failed development of appropriate response selection necessary to controlling behavior and attention.

Correspondence: *Lindsey K. MacNeil, LNIR, Kenndy Krieger Institute, 707 N Broadway, Baltimore, MD 21205. E-mail: MacNeil@kennedykrieger.org*

A. MARGOLIS & K. ZUCKERMAN. Using the BRIEF to Distinguish Between AD/HD Subtypes in Older Adolescents.

Objective: The Behavior Rating Inventory of Executive Function (BRIEF) describes the behavioral difficulties of children with executive functioning problems. Attention Deficit/Hyperactivity Disorder (AD/HD) is one childhood disorder frequently accompanied by deficits in executive function. Although studies have shown that the BRIEF ratings differ among broad diagnostic groups, the findings remain equivocal regarding whether BRIEF behavioral ratings differ with AD/HD subtypes. One consistent finding is that BRIEF Inhibit and Working Memory subscales differ between AD/HD subtypes in 5 to 13 year-olds. To date, no study has examined the developmental trend of this finding into late adolescence.

Participants and Methods: The present study examined parent and teacher ratings of hyperactivity/impulsivity and inattention on the DuPaul-Barkeley, and parent ratings of executive function on the BRIEF, in a large sample (n=120) of children and adolescents, age 6 through 19, referred for neuropsychological assessment.

Results: All BRIEF subscales differed between subjects with and without AD/HD ($p's<.0001$); further, the Inhibit subscale differed between ADHD subtypes, even in late adolescence ($p<.001$). Parent ratings of hyperactivity/impulsivity and inattention positively correlated with Inhibit scores ($p's<.0001$), whereas they negatively correlated with age ($p's < .01$). The Inhibit scale also negatively correlated with age ($p<.05$), although less strongly. Interestingly, teacher ratings of hyperactivity/impulsivity correlated with Inhibit scores ($p<.002$), but inattention did not ($p>.364$); teacher ratings of hyperactivity/impulsivity and of inattention did not correlate with age.

Conclusions: The behavioral features described by the BRIEF Inhibit subscale may represent salient differences between AD/HD subtypes, even at these older ages and in the absence of hyperactivity/impulsivity.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Amy Margolis, Ph.D., Columbia University, 1051 Riverside drive, Ny, NY 10032. E-mail: margola@childpsych.columbia.edu*

M. NARAD, T. ANTONINI, W. BRINKMAN, J. LANGBERG, T. FROEHLICH, J. SIMON, M. ALTAYE & J. EPSTEIN. Are Intra-Individual Variability and Task Accuracy Distinct Neuropsychological Deficits in Children with ADHD?

Objective: The purpose of this study was to examine whether reaction time (RT) variability and task accuracy present as a single related deficit or two distinct areas of neuropsychological deficit in children with ADHD.

Participants and Methods: A sample of 104 children with ADHD (51 ADHD-Combined Type and 53 ADHD- Predominantly Inattentive Type) and 47 controls completed five neuropsychological tasks, each assessing different neuropsychological constructs but all allowing trial by trial assessment of RTs.

Results: A factor analysis of the five variability and five accuracy variables across the five tasks revealed an oblique two factor solution; one factor included all five accuracy scores and the other included the five RT variability scores. Factor scores were generated for each of these factors. Children with ADHD exhibited greater RT variability and lower accuracy than controls (Accuracy: $t(138)=3.70$, $p < .001$; Variability: $t(138)= -4.87$, $p < .001$). The correlation between factor scores was -.51 ($p<.001$). When the variance due to Variability was removed from the Accuracy factor, there was no longer a significant between-group difference in task accuracy.

Conclusions: Although the results of the factor analysis suggest that RT variability and task accuracy are distinct, though correlated, deficits. The lack of significance between diagnostic groups when the effect of Variability was partialed out from the Accuracy variable suggests that ADHD-related deficits in task accuracy may be accounted for by RT variability.

Correspondence: *Megan Narad, MA, Psychology, University of Cincinnati, 7521 Glenover Drive, Cincinnati, OH 45236. E-mail: naradme@gmail.com*

A. GREMILLION, D.G. NEMETH, L.T. WHITTINGTON, T.W. OLIVIER, J.R. HAMILTON & A.P. STEGER. Differentiating Classroom Disobedience from Disinhibition with BRIEF and TOVA Results.

Objective: The Behavioral Rating Inventory of Executive Functions (BRIEF) allows for both parent and teacher input to the evaluation process. Whereas, the Test of Variables of Attention (TOVA), which measures Omission, Commission, Response Time, and Variability, is designed for direct assessment. This direct measure of sustained attention and impulsivity can add considerable information regarding disinhibition (Strauss, Sherman, and Spreen, p.645). The BRIEF allows a rating of executive functions that is not amenable to direct evaluation. It measures eight aspects; Inhibit, Shift, Emotional Control, Initiate, Working Memory, Plan/Organize, Organization of Materials, and Monitor. It also offers a Behavioral Regulation Index and a Metacognition Index (Strauss, et al., p. 1090). Using both approaches to the assessment of disinhibition can yield valuable findings.

Participants and Methods: Five children who exhibit disinhibition were compared with five children who do not. Data regarding their impulsivity and inattention scores were compared to parent and teacher assessments of their behavioral regulation and metacognitive skills.

Results: Children who exhibited difficulties on impulsivity were typically assessed to have behavioral dysregulation; whereas, children who only had inattention difficulties were not. Both, however, were commonly assessed to have metacognitive problems.

Conclusions: It is important to obtain both direct and observational data when evaluating children with disinhibition and learning difficulties. Oftentimes, either one or the other form of assessment is utilized. Frequently, this does not fully capture the frustration of parents and teachers who have often labeled the child as disobedient when the problem is better defined as disinhibition.

Correspondence: *Darlyne G. Nemeth, Ph.D., M.P., A.B.M.P., The Neuropsychology Center of Louisiana, LLC, 4611 Bluebonnet Blvd, Ste. B, Baton Rouge, LA 70809. E-mail: dgnemeth@gmail.com*

A. NORRIS-BRILLIANT, J. GLEASON, E. BRAVO & P. PRAMATARIS. Fine Motor Functioning in Children With ADHD From a Low-Income Urban Population: Do Comorbidities Matter?

Objective: A number of studies have demonstrated evidence of fine motor deficits in children with Attention Deficit Hyperactivity Disorder (ADHD). However, a recent study (Kooistra et al., 2005) suggested that comorbid diagnoses increased the likelihood of a fine motor impairment, and that children with ADHD-only are less likely to demonstrate fine motor issues. The current study investigated the presence of fine motor impairments in three groups of low income, urban children diagnosed with ADHD.

Participants and Methods: The participants were all low income, urban children ages 5-17, who were classed into three groups. The three groups consisted of children 1) diagnosed with ADHD (n=14), 2) diagnosed with both ADHD and a Reading Disability (RD, n=14), and 3) diagnosed with ADHD and Language Impairments (LI, n=14). Fine motor skills were assessed using the Beery Buktenica Test of Visual Motor Integration (VMI), and the Block Design subtest of the WISC IV was examined as a corollary measure.

Results: The results of the study indicate that children diagnosed with 1) ADHD alone and 2) ADHD & RD did not show evidence of significant fine motor impairment. In contrast, the ADHD & LI group showed statistically significant differences on both measures.

Conclusions: Potential etiologies and implications are discussed.

Correspondence: *Ami Norris-Brilliant, PsyD, Center for Attention and Learning Disorders, Lenox Hill Hospital, 210 East 64th Street, 4th Floor, New York, NY 10065. E-mail: Abrilliant@lenoxhill.net*

A. ORINSTEIN & M.C. STEVENS. Brain Activity in Predominantly-Inattentive Subtype ADHD during an Auditory Oddball Attention Task.

Objective: Previous functional neuroimaging studies have found brain activity abnormalities in ADHD on numerous cognitive tasks. However, few studies have specifically examined the Predominantly-Inattentive subtype of ADHD (ADHD-I), despite vigorous debate as to whether DSM IV-defined ADHD subtypes share a common etiology. This study compared brain activity on a simple attention task between ADHD-I and control participants.

Participants and Methods: Eighteen ADHD-I adolescents (ages 12-18) and 20 non-psychiatric, age-matched control participants completed a three-stimulus fMRI auditory oddball attention task. All ADHD-I participants were unmedicated during fMRI following a 24-hour medication washout. FMRI data were preprocessed and group differences examined using SPM5 at a $p<.05$ FWE whole brain statistical correction threshold.

Results: ADHD-I had significant activation deficits to infrequent target stimuli in dorsal anterior cingulate, midline SMA, bilateral anterior insulae, bilateral superior temporal gyri, bilateral globus pallidus/caudate, thalamus and several distinct cerebellum regions. For novel stimuli, ADHD-I participants showed diminished brain activity along the length of central superior/middle temporal gyri bilaterally. ADHD-I had no brain regions with greater hemodynamic activity to targets or novels than controls.

Conclusions: Reduced ADHD-I brain activity appeared predominantly to target stimuli processing. The deficits included numerous regions important to attention and working memory cognitive processes involved in target identification. These results differ from a previous report using the same fMRI task where Combined-subtype ADHD adolescents had a different profile of abnormalities and relatively more discrete regional deficits to novel stimuli. This suggests different etiological factors might underlie simple attentional orienting deficits in different DSM IV-defined ADHD subtypes.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Alyssa Orinstein, B.S., Psychology, University of Connecticut, 406 Babbidge Road, Storrs, CT 06269. E-mail: alyssa.orinstein@uconn.edu*

C. PETERSEN, D.J. BEARDEN, A.M. MELTON & K. O'TOOLE. Establishing a Cognitive Remediation Program in a Pediatric Neuropsychological Outpatient Facility: Insurance Issues and Clinical Rationale.

Objective: The Cognitive Remediation program (CRP; Butler, 2002) combines concepts from brain injury rehabilitation, educational psychology, and cognitive-behavioral therapy to improve attention in children with medical disorders. The purpose of this study is to provide details to establish a cognitive remediation (CR) program in an outpatient setting. Information regarding insurance approval and denial rates, therapist training, scheduling, and common pitfalls are discussed.

Participants and Methods: 23 participants with various neurological disorders were referred for CR after results from neuropsychological evaluations revealed deficits in attention. Parents enrolled their children in one of two summer sessions (six one-hour meetings per session), before which the patients' insurance companies were contacted for preauthorization. Pre-testing was used to design treatment according to each child's needs. Post-testing sessions were used to determine changes in attention following CR.

Results: Data are provided regarding patient approval (70%) and denial (30%) rates for treatment by insurance companies, as well as details related to this process (e.g., materials required before approval, reason for approval/denial, when approval occurred). Demographic and diagnostic information is included, as well as therapist training and therapist-related factors that may have affected treatment success. Suggestions for improvements regarding problems encountered during delivery of the program are offered.

Conclusions: Establishing a CR program within a pediatric outpatient facility requires a triad of: staff training, an ability to adapt to site-specific limitations and aggressive management of third- party payer demands. This study provides helpful information regarding establishing a CR program in such settings, as well as guidelines to improve children's attention.

Correspondence: *Catherine Petersen, M.A., Neuropsychology, Children's Healthcare of Atlanta, 1001 Johnson Ferry Road Northeast, Atlanta, GA 30328. E-mail: CEPetersen@hotmail.com*

A. MICHALEK, C. RICHELS, S. WATSON & A.M. RAYMER. Psychosocial Treatments for ADHD: A Systematic Appraisal of the Evidence.

Objective: Several systematic reviews and meta-analyses have been conducted to accumulate best scientific evidence for the effects of psychosocial treatments for ADHD in children. Reviews need to be conducted with rigorous methodologies to avoid bias in conclusions, however (Schlosser et al, 2007). The purpose of this project was to appraise the quality of systematic reviews examining psychosocial treatments for ADHD.

Participants and Methods: We identified 13 systematic reviews and 8 meta-analyses conducted from 1998-present through a search of several databases and reference lists. Reviewers independently rated each review on 27 quality criteria described by Auperin et al. (1997), rated on a scale of 0-2 (maximum score: 54). Criteria examined the identification of protocol and selection of trials, description of clinical trials, evaluation of study quality, description of data collection procedures, statistical analyses, and application of results. Trained raters coded studies; discrepancies were resolved with a third coder.

Results: Quality scores for the 21 studies ranged from 8-49 (mean 19.8/54). Only 8/27 criteria were observed in most of the reviews, largely focusing on methods for identifying and describing studies. Several criteria important for avoiding biased conclusions were lacking as were statistical analyses. Three studies included only randomized controlled trials, with the highest quality meta-analysis from the Cochrane Collaboration (Bjornstad et al., 2010).

Conclusions: Despite some strengths, this project demonstrated patterns of methodologic weaknesses that need to be addressed in future meta-analyses in order to increase confidence in the conclusions that psychosocial treatments are effective for children with ADHD.

Correspondence: *Anastasia M. Raymer, Ph.D., Dept of CDSE, Old Dominion University, 110 Child Study Center, 4501 Hampton Blvd, Norfolk, VA 23529-0136. E-mail: sraymer@odu.edu*

D.J. SCHMOLLER, E.N. ANDRESEN & D.C. OSMON. Exploration of New Symptom Validity Indicators in the Conner's Adult Attention Rating Scale.

Objective: Recent studies have demonstrated that it is relatively easy to feign symptoms of ADHD on self-report measures. Our study focuses upon detecting symptom exaggeration on the Conner's Adult Attention Rating Scales (CAARS) through the use of two recently developed scales: the CAARS Infrequency Index (CII) and the malingering index (MI). The CII consists of CAARS items that are infrequently endorsed in non-treatment seeking ADHD populations. The MI consists of 18 items which appear to be symptoms of ADHD but are in fact dissociative symptoms.

Participants and Methods: 56 undergraduate students were randomly assigned to a Supergroup or Simulator group. All participants were administered the CAARS as part of a larger study investigating ADHD simulation.

Results: In the Simulator group, the MI demonstrated medium to large correlations with all clinical scales ($p < .05$) except for Hyperactivity; and the CII showed medium to large correlations with all clinical scales ($p < .05$). In the Supergroup, the MI demonstrated medium correlations with Self Concept and ADHD Index ($p < .05$), but no other significant correlations. For the CII, the Supergroup showed moderate correlations to all clinical scales ($p < .05$) except for Hyperactivity. A t-test demonstrated that the CII, $t(47) = -7.36$, $p < .003$, and MI, $t(47) = -5.29$, $p < .001$, were significantly different between the groups.

Conclusions: Our results demonstrate that the CII and MI scores are impacted by simulation. Overall, higher levels of symptom reporting concomitantly increase the CII score in control subjects. This possibly indicates that the CII may be sensitive to high levels of symptomotology, and not necessarily the feigning or over exaggeration of symptoms.

Correspondence: *Daniel J. Schmoller, Neuropsychology, University of Wisconsin - Milwaukee, 2441 E. Garland Hall, Milwaukee, WI 53211. E-mail: schmoll2@uwm.edu*

H.T. SCHOFIELD, M.D. FRANZEN, A. FERRELLI & K. BLACK. A developmental comparison of the factor structure of the Conners' Continuous Performance Test.

Objective: Continuous performance tests (CPTs) are utilized by practitioners to obtain standardized information regarding sustained attention. The most frequently used CPT by practitioners is the Conners' Continuous Performance Test II (CPT-II; Conners & MHC Staff, 2000), a computerized visual continuous performance test utilizing a A-X task to examine sustained attention, response inhibition, and vigilance to a lengthy task. While the CPT-II provides individual measures of performance quality, there is no standard method of utilizing CPT-II data to aid in case conceptualization or to best understand the specific pattern of attention deficits demonstrated by each subject. This study aims at exploring whether individual factors of performance on the CPT-II can be identified. We will also explore whether these factors vary according to age, as research has supported changes in the attentional system throughout the lifespan (eg., Sinclair & Taylor, 2008).

Participants and Methods: Data was obtained through retrospective chart review of 2853 individuals who completed outpatient neuropsychological evaluations in an outpatient hospital setting from November 2002-June 2010. Ages range from 6-89. A factor analysis was completed in SPSS using a 5-factor structure as modeled in Egeland et al. (2010) with patients the same age as their sample (14-77 years). Additional factor analysis were conducted by developmental group. Factor analysis were completed using principal components analysis with promax rotation.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: A factor analysis with the broad sample indicated support for Egeland et al. (2010)'s 5-factor structure. Additional analyses suggest different factor loadings by developmental groups, which may instead support 4-factor structures.
Conclusions: The results of this study provided support for Egeland et al. (2010)'s findings of a 5-factor structure of measures from the CPT-II. This study also suggests the need to consider developmental variations in the factor structure of this instrument, particularly at younger ages.
Correspondence: *Hannah-Lise T. Schofield, Ph.D., Department of Psychiatry, Allegheny General Hospital, 4 Allegheny Center, 8th Floor, PIttsburgh, PA 15212. E-mail: htschofield@gmail.com*

E. STAIKOVA, E. KRUSZEWSKI, H. GOMES, V. TARTTER & J.M. HALPERIN. Pragmatic Deficits in Children with ADHD.
Objective: Attention Deficit Hyperactivity Disorder (ADHD) is the most common neuropsychiatric disorder of childhood. In addition to the core symptoms of inattention, hyperactivity, and impulsivity, ADHD is associated with behavioral dysregulation, learning problems, and social difficulties. Multiple studies indicate a high comorbidity between ADHD and language problems, with recent studies showing specific impairment at the level of pragmatics; however, research on pragmatic language in ADHD has been limited. The present study was designed to systematically assess pragmatic language abilities in children with and without ADHD. We hypothesized that the ADHD group would have poorer pragmatic language skills above and beyond receptive language difficulties.
Participants and Methods: Participants were recruited from an ongoing longitudinal study of ADHD and were classified as either ADHD or typically developing (TD) based on parent and teacher ratings on the ADHD-RS-IV, followed by the K-SADS-PL parent interview. Pragmatic language skills were assessed using the Pragmatic Judgment subtest of the Comprehensive Assessment of Spoken Language and parent ratings on the Children's Communication Checklist-2. Receptive language was assessed using the Concepts and Following Directions Subtest of the Clinical Evaluation of Language Fundamentals, Fourth Edition.
Results: Hierarchical linear regression analyses indicated that ADHD status predicted pragmatic language deficits above and beyond receptive language problems.
Conclusions: Children with ADHD have poorer pragmatic skills compared to their typically developing peers which may contribute to the social impairment well-documented in the disorder.
Correspondence: *Ekaterina Staikova, M.A., Psychology, The Graduate Center/Queens College, CUNY, 65-30 Kissena Blvd., Flushing, NY 11367. E-mail: ekaterina_staikova@yahoo.com*

H. TOLLANDER, J. STELMOKAS, B.J. SCOTT & K. WYMANCHICK. The Integrated Visual and Auditory Continuous Performance Task: Can the symptomatic Comprehension Scale discriminate ADHD?
Objective: The Integrated Visual and Auditory (IVA) continuous performance task (CPT) has adequate reliability and validity, according to the publishers. Reportedly visual and auditory modalities increase diagnostic accuracy of ADHD. According to the IVA manual, the symptomatic Comprehension Scale is "the single most sensitive sub-scale in discriminating ADHD." However, there is limited support for the sensitivity and specificity of the Comprehension Scale. The present study examined if individuals with ADHD score lower on the Comprehension Scale than those without ADHD.
Participants and Methods: IVA Comprehension scores from an archival database were examined for 186 individuals who were referred for a cognitive evaluation. Of those, 158 had complete and valid IVA profiles. 55 of those individuals were diagnosed with ADHD only. 82 had other disorders, such as learning disorder or psychiatric disorder. 28 had comorbid ADHD and another disorder.
Results: An independent sample t-test found considerable overlap between the means of the two groups for both visual (M = 77.85, SD = 32.95 and M = 89.75, SD = 27.06), $t(102) = 2.61$, $p < .05$ and auditory subscales (M = 75.65, SD= 33.97 and M = 89.26, SD = 25.46), $t(54) = 2.31$, $p < .05$. Analysis of sensitivity and specificity revealed that the use of a cutoff score of 75 for classification was the most accurate. Using this cutoff, the sensitivity of the Comprehension Scale of 116 individuals with ADHD with/without other psychiatric disorders was approximately .54 and specificity .20. Around .26 of individuals could not be classified according to the 75 cutoff score due to significant variance in visual and auditory subscales.
Conclusions: The Comprehension Scale did not adequately discriminate between individuals with ADHD. Comprehension errors may be reflective of key ADHD symptomology. However, more research is needed in order to enhance its clinical utility. Future analyses will compare the Comprehension Scale scores separately for those with and without comorbid disorders.
Correspondence: *Julija Stelmokas, Pacific University, 1615 SW Morrison, Apt 318, Portland, IL 97205. E-mail: Jewels864@gmail.com*

M. STERN & J. JOHNSON. Attention and Impulsivity: Possible Mediators of Simulated Driving Behaviors in Adolescents with ADHD.
Objective: Research has demonstrated that persons with ADHD show significant driving impairment compared to those without ADHD. The current study attempted to assess differences in speeded visual attention and impulsivity between adolescents with and without ADHD, and their relative contributions to driving impairment. Hypotheses predicted that adolescents with ADHD would have significantly worse speeded attention than adolescents without ADHD, and that both visual attention and impulsivity would be partial mediators of the relationship between diagnosis and simulated driving impairment.
Participants and Methods: Participants recruited were 16 males with ADHD and 16 non-clinical controls between the ages of 16 and 19 with valid driver's licenses. Participants completed the Useful Field of View Test (UFOV) as a measure of speeded visual attention as well as impulsivity tasks in a virtual-reality driving simulator. For the measure of driving abilities/impairment, adolescents also completed several driving tasks in the simulator.
Results: Using MANOVAs, results demonstrated that adolescents with ADHD performed significantly worse on the UFOV test than controls, consistent with hypotheses. Results of regression analyses with bootstrapping suggested that visual attention is a partial mediator of the diagnosis-driving impairment relationship. Conversely, impulsivity demonstrated a suppression effect on the relationship between diagnosis and driving impairment, possibly suggesting that adolescents with ADHD were not as impulsive as would be expected given their diagnosis.
Conclusions: Results of the study suggest visual attention is an important contributor to driving impairment in ADHD. Such findings indicate that future interventions to reduce impairment, pharmacological and behavioral, should likely seek to target visual attention. Further study of visual attention is also warranted.
Correspondence: *Melissa Stern, Clinical & Health Psychology, University of Florida, 75 S. Union Street, #210, Pawtucket, RI 02860. E-mail: mstern1981@yahoo.com*

M. STERN, J. JOHNSON & V. COSTA. Speed Patterns in Adolescents with ADHD: Exploratory Analyses Using Recurrence Quantification Analysis.
Objective: Driving impairment research in ADHD is still a relatively new domain, and most analyses thus far have utilized linear methods for data analyses. However, time series data change frequently over time and can fluctuate in irregular patterns. Linear methods like averages may not fully describe a complex pattern because of condensing or isolating data points. Reporting average speed of a driver is a vacant description as speed is constantly changing. The current secondary data analysis utilized Recurrence Quantification Analysis (RQA), a non-linear methods technique, to better capture and compare the patterning of simulated driving speed data between adolescents with and without ADHD.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants were 16 males with ADHD and 16 non-clinical controls between the ages of 16 to 19 recruited to participate in a study about driving impairment. Data utilized in the current analyses were from a 10-minute acclimation task to a driving simulator, providing approximately 5,000+ data points on speed per participant.
Results: Speed data were submitted to RQA analysis, including identification of the initial parameters of dimensions, delay, and radius. Results showed no significant differences between groups in percent recurrence, determinism, maxline, entropy or trend.
Conclusions: While no differences in pattern variability of speed where identified, RQA and nonlinear methods provide a new way to examine the patterns inherent in driving time-series data. Other factors, such as steering-wheel variability, brake and gas pressure, eye fixations and saccades, etc. should be examined as insight into these domains may provide better information about causes of driving impairment in ADHD and areas to target via intervention programs.
Correspondence: *Melissa Stern, Clinical & Health Psychology, University of Florida, 75 S. Union Street, #210, Pawtucket, RI 02860. E-mail: mstern1981@yahoo.com*

Medical/Neurological Disorders/Other (Adult)

B.C. BAUGHMAN, E.M. CROUSE & B.L. ROPER. Right Frontal Neurobehavioral Syndrome: A Case of Unilateral Anterior Fossa Meningioma.
Objective: Historically, the right frontal lobe was considered a functionally silent cerebral region (Stuss & Anderson, 2004). However, studies have refined this position to suggest that the region makes important contributions to nonverbal cognitive executive function, social behavior, theory of mind, episodic memory, and autonoetic consciousness (Stuss, 1991; Stuss & Anderson, 2004). This case study describes an individual with a unique neurobehavioral syndrome secondary to right frontal pathology. Initial assessment by our service occurred two years post-resection. Meningioma recurred a year after this evaluation, and the region was again surgically resected. Second evaluation was conducted six months following the second surgery.
Participants and Methods: Comprehensive neuropsychological testing was undertaken at two separate time points following surgical resections of right frontal fossa meningiomas in a 47-year-old, right-handed male with average premorbid intelligence and functioning.
Results: Across both examinations, neurocognitive impairments were identified in executive function and mental processing speed. With the exception of mild to moderate declines in cognitive executive tasks over the two-year interval, performance across other domains remained stable. Of greater concern for the subject's family were impairments in social awareness, affect recognition, emotional control, and prosody. Their perceptions of behavioral disturbance were supported by performance on specific theory of mind, social faux pas, and affect recognition tasks.
Conclusions: The subject's clinical profile supports a relatively lateralized right frontal lobe syndrome. The pattern of difficulties supports previous conceptualizations regarding the role of the right frontal region in social-emotional functions and cognitive executive tasks.
Correspondence: *Brandon C. Baughman, Ph.D., Psychology Section, Memphis VA Medical Center, 1030 Jefferson Ave. #116A, Memphis, TN 38014. E-mail: the.baughman.b@gmail.com*

Y. BOGDANOVA, K. STAVITSKY, M. DÍAZ-SANTOS, M. VALMAS & A. CRONIN-GOLOMB. Relation of Neuropsychiatric Symptoms and Sleep Quality in Parkinson's Disease.
Objective: Parkinson's disease (PD) is associated with anxiety, alexithymia, depression, and sleep disturbance. In healthy adults and in other clinical populations, depression, anxiety, and alexithymia have been related to poor sleep quality, raising the question of their relation in PD. We compared healthy adults and PD patients as a group as well as in subgroups defined by body side of motor symptom onset, which often predicts motor and non-motor symptom profiles in PD.
Participants and Methods: Twenty non-demented PD patients (10 right-side onset [RPD] and 10 left-side onset [LPD]) and 20 healthy control volunteers (HC) were administered assessments of depression, anxiety, alexithymia, and sleep.
Results: PD patients showed a higher level of anxiety, alexithymia and depression than HC. There was a significant correlation of anxiety ratings and sleep quality (nightmares, hallucinations while falling asleep/awakening, and insomnia). Alexithymia and depression were associated with frequency of insomnia and family history of sleep problems. In RPD, sleep difficulties were related to anxiety but not alexithymia, whereas in LPD, they were associated with alexithymia but not anxiety.
Conclusions: Our results demonstrate the association of neuropsychiatric symptoms and sleep problems in PD. The observed dissociation between RPD and LPD for neuropsychiatric and sleep symptoms suggests potentially distinct underlying neural substrates within the corticostriatal-thalamocortical circuitry that is disordered in PD. Our findings imply that treating neuropsychiatric symptoms may improve sleep quality, or treating sleep disturbance may positively impact the neuropsychiatric profile. Alleviation of both types of symptoms may significantly improve quality of life in individuals with this disorder.
Correspondence: *Yelena Bogdanova, PhD, Psychiatry, Boston University School of Medicine, Psychology Research (151-A), 150 South Huntington Street, Boston,, MA 02130. E-mail: bogdanov@bu.edu*

L. BRENNAN, M.T. SCHULTHEIS, K. DUEY, E. ROSENTHAL, H. HURTIG, J. KARLAWISH, D. WEINTRAUB, P. MOBERG, J. DUDA & A. SIDEROWF. Differential Impact of Neuropsychological Domains on Everyday Functioning in Parkinson's Disease.
Objective: Patients with Parkinson's disease (PD) often demonstrate a spectrum of type and severity of cognitive impairment. The pattern of impairment may differentially affect their ability to perform activities of daily living (ADLs). This study examined the association between performance on different neuropsychological domains and ADLs in PD.
Participants and Methods: PD patients 60 years of age or greater (n = 182) were assessed cognitively with the Dementia Rating Scale-2 (DRS-2), an overall measure of dementia severity which includes five cognitive domains: attention, initiation/perseveration, construction, conceptualization, and memory. Functional status was assessed via caregiver report using the Alzheimer's Disease Cooperative Study Activities of Daily Living Inventory (ADLI). Hoehn and Yahr scores, which describe motor symptom progression in PD and are assigned by a treating neurologist, were used to adjust for differences in motor performance that might impact functional abilities. Partial correlation coefficients, adjusting for age, education, gender and motor disability, were calculated to determine the association between ADLI scores and DRS-2 subscales.
Results: ADLI scores correlated with three of the five subscales of the DRS-2: initiation/perseveration ($r = 0.30$; $p < .001$), memory ($r = 0.21$; $p = .01$), and construction ($r = 0.22$; $p = 0.01$). We did not find a correlation between the ADLI and the attention ($r = .11$; $p = .18$) or conceptualization ($r = .11$; $p = .17$) subscales of the DRS-2.
Conclusions: Our data suggest that impairment on specific cognitive domains may have the greatest impact on everyday functioning in patients with PD, with executive impairment being the most significant contributor.
Correspondence: *Laura Brennan, B.A., Psychology, Drexel University, 1505 Race Street, Philadelphia, PA 19102. E-mail: laura.brennan29@gmail.com*

L.A. BRENNER, M.T. WAGNER & D.R. ROBERTS. Alexia with Agraphia with Right Frontotemporal Lobe Damage.
Objective: Acquired alexia, a loss of the ability to comprehend written materials, is believed to result from a disruption of pathways connecting visual cortex to language centers in the dominant hemisphere. Agraphia, or a loss of the ability to write, often occurs in conjunction with either alexia or aphasia. A case report of alexia with agraphia is presented to illustrate some diagnostic conundrums.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: A 66-year old, right-handed female with a 3-year history of seizures and past craniotomy to clip an aneurysm near the right paraclinoid region presented with symptoms that resulted in a diagnosis of alexia with agraphia following a severe generalized tonic-clonic seizure.
Results: 3T MRI showed post-surgical gliosis in the posterior middle and inferior right temporal gyri. Serial cuts analysis showed focal signal abnormality in the right frontal lobe corresponding exactly to what would be contralateral Broca's. Testing revealed verbal comprehension at the 91st percentile. No disturbance in expressive or receptive speech was observed. Isolated and profound deficits in reading (grade-level=1st) and spelling (grade-level=K) were found. There was no disturbance in her ability to copy figures, letters or words, although letters and words were meaningless shapes that she could not identify. The patient, a trained musician, also reported impaired sight-reading of musical scores, although this was not objectively assessed.
Conclusions: Results are discussed in the context of syndrome anatomic significance, including concepts of reversed cerebral dominance, dominant hemisphere control of music in a trained musician, and conversion disorder.
Correspondence: *Laurie A. Brenner, M.A., Neurology, Medical University of South Carolina, MUSC Rutledge Tower, Charleston, SC 29403. E-mail: brenner@musc.edu*

L.C. BUTTERFIELD, L.E. OELKE, R.T. AVILA & C.R. CIMINO. The Use of Clustering Strategies during Memory Retrieval in Parkinson's Disease.
Objective: Despite previous investigations of Parkinson's Disease (PD) patients' tendencies to rely more strongly on either serial clustering or semantic clustering in list learning tasks, results are not entirely clear. Some authors report that PD patients utilize serial clustering more than controls, who rely more on semantic clustering. Others report no differences in clustering between these groups. Results of the use of semantic clustering during recall in PD patients are not consistently reported.
Participants and Methods: Sixty-nine patients with mild to moderate PD completed tests of memory (HVLT-R), executive functioning (WCST-64), and global cognitive functioning (MMSE). Ratio semantic clustering scores (number of semantic clusters ÷ total recall score) and ratio serial clustering scores (number of serial clusters ÷ total recall score) were calculated from HVLT-R performance.
Results: PD patients utilized semantic clustering during recall more often than serial clustering during immediate and delayed recall. Secondly, semantic (but not serial) clustering scores were significantly correlated with total immediate recall ($r=0.56$, $p<0.001$), total delayed recall ($r=0.59$, $p<0.001$), executive functioning ($r=0.23$-0.24, $p=0.05$), and global cognitive functioning ($r=.304$, $p<0.05$). Finally, mediation analyses revealed that the use of semantic clustering partially mediated the relationship between executive functioning and recall at the level of a trend.
Conclusions: The PD patients in the present study demonstrated use of semantic clustering during recall. Given the correlation between executive function and semantic clustering scores, and the decrease in executive function seen over the course of PD, future studies should account for the influence of disease stage/severity in the use of clustering strategies.
Correspondence: *London C. Butterfield, MA, Psychology, University of South Florida, 4202 E. Fowler Ave., PCD 4118G, Tampa, FL 33620. E-mail: londonbutterfield@hotmail.com*

Y. CHENG, A. VYAS, E. HYMEN & L. PERLMUTER. Gender Differences in Orthostatic Hypotension.
Objective: Orthostatic Hypotension is a decrease in systolic blood pressure of more than 20mm Hg or a decrease in diastolic blood pressure of at least 10mm Hg, within three minutes of changing from a supine to an upright position. Blood pressure drop during positional change is normally compensated by orthostatic regulatory mechanisms. Women are found to be more prone to orthostatic hypotension. Our objective was to identify how gender plays a role and what mechanisms are actually involved in the increased prevalence of OH in women.
Participants and Methods: In our paper we did not have participants. We compiled conclusions from other papers that were experimental. Our methods were using PubMed and other research engines.
Results: We do not have results because it is a review paper.
Conclusions: Our conclusion is that women are more susceptible to Orthostatic Hypotension because of gender related differences. Some of the differences we mentioned in our paper are: autonomic system difference, anatomical differences, and hormonal differences. Women have a more active parasympathetic system, higher estrogen level, and a lower center of gravity. The implication of these differences is that women are less prepared to adequately compensate for the drop of blood pressure during positional change. Knowing these pertinent factors for orthostatic hypotension, physicians will be able to better diagnose and develop a treatment plan that is more appropriate for respective genders. In addition there are a number of sequellae to orthostatic hypotension even when the OH changes are sub-clinical. These include a variety of affective and cognitive outcomes including elevated levels of hopelessness depression and the risk of falling. This latter problem is especially problematic for women.
Correspondence: *Yu-Chien Cheng, Chicago medical school, 29591 N. Birch ave., Lake Bluff, IL 60044. E-mail: jennyily76@gmail.com*

J.I. EGGER, W.M. VERHOEVEN, A.I. AHMED, B.P. KREMER, S. VERMEER & B.P. VAN DE WARRENBURG. Cerebellar Cognitive Affective Syndrome in Charlevoix-Saguenay Ataxia (Arsacs): Neuropsychological Evidence from Two Adult Brothers.
Objective: Autosomal recessive ataxia of Charlevoix-Saguenay (ARSACS) is caused by mutations in the SACS gene (13q12) and is characterized by early onset cerebellar ataxia, lower limb spasticity, and sensorimotor axonal polyneuropathy. Early atrophy of the superior cerebellar vermis is always present. Apart from its crucial involvement in motor behaviour, the cerebellum plays an important functional role in human cognition and affect. Still, literature provides no information about the neuropsychological correlates of ARSACS. The present study examines this putative relationship between cerebellar dysfunction and affective symptoms.
Participants and Methods: In two brothers with ARSACS, systematic neuropsychological assessment was performed with extended batteries for intelligence, behavioural memory, executive functioning, and social cognition.
Results: In the first patient (55 years), the disease started in early infancy and a severe progressive cerebellar syndrome with spasticity of the legs and axonal polyneuropathy developed. In his brother (50 years), the debut of neurological symptoms was in preadolescence with a less severe deterioration over time. Cognitive functioning was only marginally impaired in the latter patient, whereas behavioural aberrations were present in the first patient only. Both patients showed a reduced cognitive and emotional responsivity to environmental events leading to impairments in several areas of daily life, such as lack of effort and strategic planning, as well as impulsivity and impoverished social interaction with emotional indifference.
Conclusions: ARSACS may be accompanied by a series of non-motor symptoms of which motivational and affective signs dominate. The presence of a cerebellar cognitive affective syndrome may be postulated.
Correspondence: *Jos I. Egger, MSc, PhD, Centre of Excellence for Neuropsychiatry, Vincent van Gogh Institute for Psychiatry, Stationsweg 46, Venray 5821 AJ, Netherlands. E-mail: j.egger@psych.ru.nl*

A. GERSTENECKER, B.T. MAST & I. LITVAN. Are Progressive Supranuclear Palsy Cognitive Deficits Mostly Frontal?
Objective: Progressive supranuclear palsy (PSP) is the second most common neurodegenerative parkinsonism and affects approximately 5.4 in 100,000 adults over the age of 60. This study examined cognitive deficits present in patients with PSP as part of a multisite effort.
Participants and Methods: One hundred and sixty seven patients diagnosed with PSP were examined across multiple sites. Patients

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

were considered impaired if their score was at the 2nd percentile or lower based upon normative data for measures of general cognition (Dementia Rating Scale-2; DRS-2), learning and memory (California Verbal Learning Test; CVLT-II), frontal-executive functioning (Frontal Assessment Battery; FAB) and naming (Boston Naming Test; BNT).
Results: Impairment was observed most frequently on the FAB (59.9%) and 25.7% of patients scored in the impaired range on the DRS Total Score (37.3% were impaired on DRS I/P). Naming and memory problems were relatively less common (9.8% and 13.2%, respectively). With regard to memory performance, a significant difference was observed between scores on CVLT Long Delay and CVLT Recognition Hits indicating the memory deficit in PSP may reflect retrieval rather than encoding deficits. In addition, poorer delayed recall was significantly associated with lower scores on the FAB (r=.37, p<.001).
Conclusions: These findings suggest that neuropsychological changes in PSP, as expected, follow a pattern consistent with frontal systems dysfunction. Moreover, the memory impairment may be secondary to a primary frontal deficit.
Correspondence: *Adam Gerstenecker, Univeristy of Louisville, 782 raymond kent cout apt. #2, Louisville, KY 40217. E-mail: agerst78@hotmail.com*

J. GUNSTAD, G. STRAIN, M. DEVLIN, R. WING, R. COHEN, R. PAUL, R. CROSBY & J. MITCHELL. Cognitive function is similar in bariatric surgery patients with and without binge-eating disorder.
Objective: There is growing evidence that persons with eating disorders such as anorexia nervosa and bulimia nervosa exhibit impaired cognitive functioning on testing. Less is known about neuropsychological functioning in persons with binge eating disorder (BED), despite its potential links to executive function and other abilities.
Participants and Methods: 122 surgical candidates enrolled the Longitudinal Assessment of Bariatric Surgery (LABS) underwent evaluation for the current study. BED groups were established using the Structured Clinical Interview for DSM (SCID). BED (N = 40) and Obese Non-BED (N = 82) groups were similar in demographic and medical variables. Neuropsychological function was assessed using the Integneuro, a computerized test battery that quantifies function across multiple cognitive domains.
Results: Test scores for all participants were standardized to z scores based on age, sex, and estimated IQ. Independent samples t-tests then compared standardized test performance between BED and Obese Non-BED individuals. Persons with BED exhibited poorer performance on Switching of Attention-Number [t(120) = 2.56, p = .012], a test similar to Trail Making Test A. No other between-group differences emerged.
Conclusions: Results suggest that cognitive function is generally similar in bariatric surgery candidates with and without BED. This finding runs counter to expectations and encourages additional work to clarify neural mechanisms for the onset and maintenance of BED symptoms, including functional neuroimaging, circulating biomarkers, and food lab studies.
Correspondence: *John Gunstad, Psychology, Kent State University, 221 Kent Hall Addition, Kent, OH 44242. E-mail: jgunstad@kent.edu*

J. GUNSTAD, G. STRAIN, M. DEVLIN, R. WING, R. COHEN, R. PAUL, R. CROSBY & J. MITCHELL. Pre-operative memory function predicts weight loss following bariatric surgery.
Objective: Obesity is an independent risk factor for cognitive dysfunction and bariatric surgery candidates exhibit impairment in multiple domains. Given the complicated medical regimen following these surgeries, it appears likely that patients with better cognitive function may show greater weight loss.
Participants and Methods: 108 bariatric surgery patients (average 44.66±11.03 years of age, 83.3% female) enrolled the Longitudinal Assessment of Bariatric Surgery (LABS) underwent evaluation for the current study. Neuropsychological function was assessed using the Integneuro, a computerized test battery that quantifies function across multiple cognitive domains. For the current study, we focused on subtests of memory and executive function. Weight was quantified at baseline and 12 weeks post-operatively.
Results: Examination of z scores based on age, sex, and estimated IQ indicated that cognitive impairment (score >1.5 SD below the mean) was prevalent. For example, 24.1% of patients had impaired learning and 18.5% on a Maze test. Partial correlations adjusting for baseline weight, age, and gender showed that multiple memory indices were associated with weight loss at 12 weeks, including Learning (r=0.26, p=.007), Short Free Recall (r=0.20, p=.04), and Long Free Recall (r=0.27, p=.005). No pre-operative measures of executive function were associated with weight loss at 12 weeks.
Conclusions: Results suggest that pre-operative memory function is associated with acute weight loss in bariatric surgery patients. Further work is needed to clarify the mechanisms for this finding, including the contribution of memory to adherence and eating patterns in this population. Such findings also highlight the potential importance of neuropsychological evaluation in medical populations.
Correspondence: *John Gunstad, Psychology, Kent State University, 221 Kent Hall Addition, Kent, OH 44242. E-mail: jgunstad@kent.edu*

M.A. HOMER, T.D. HOROWITZ, E.O. RICHTER & S.S. RUBIN. Language Testing During ON/OFF States of Electrical Stimulation to the Associative Portion of the Subthalamic Nucleus: A Case Report.
Objective: Bilateral deep brain stimulation (DBS) of the subthalamic nucleus (STN) is standard treatment for motoric symptoms of advanced idiopathic Parkinson's disease (PD) once medical treatments have been exhausted. The STN is divided into three sections (motor, associative, and limbic), which are part of the basal ganglia thalamocortical circuits. The motor (dorsolateral) portion is the target of STN DBS; two additional electrodes are placed in the associative STN to aid precise placement. Though cognitive-linguistic side effects have been found in studies addressing motoric stimulation, more specific data is necessary to explore the associative STN's potential role in linguistic processes.
Participants and Methods: One subject who met inclusionary criteria underwent linguistic testing in both the ON/OFF stimulation settings in the associative STN during two clinical visits. Specific language tasks targeting syntactic (grammar/word order) production and language generation (descriptive and procedural language samples) were used to measure the possible linguistic effects of stimulation. Syntactic tasks required the construction of grammatically correct sentences using given word/phrase segments; results were analyzed for number of correct responses. Language sampling tasks targeted the description of a procedure (e.g. how to…) and picture description. Results were analyzed using Systematic Analysis of Language Transcripts (SALT). All results were scored by two experimenters to ensure inter-judge reliability.
Results: Results indicated that syntactic processes were negatively affected by stimulation in the associative STN while semantic analysis revealed mixed results.
Conclusions: This case supports previous findings potentially connecting STN DBS with cognitive-linguistic effects but is a preliminary step in ongoing data collection. Additional cases will be presented.
Correspondence: *Maggie A. Homer, Louisiana State University Health Sciences Center, 1027 Second St., New Orleans, LA 70130. E-mail: mhomer1@gmail.com*

E. KOZORA, J. PELZMAN, M. BROWN, D. MILLER, D. ARCINIEGAS, S. WEST & C. FILLEY. Information Processing Speed and White Matter Abnormalities in Non-neuropsychiatric SLE.
Objective: This study aimed to examine abnormalities of cerebral white matter (WM) in relation to information processing speed in systemic lupus erythematosus (SLE) patients without overt neuropsychiatric disorders (nonNPSLE).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Subjects included 73 nonNPSLE subjects (94% female and 63% Caucasian) with a mean age of 36.8 (SD=8.5), mean education of 14.6 years (SD=2.5), mean length of diagnosis of SLE of 90 months (SD=76.7) and mean SLEDAI of 5.1 (SD=5.5). Participants completed the Paced Auditory Serial Addition Test (PASAT). Choline/creatine (Ch/Cr) was also obtained in right and left normal-appearing WM (NAWM) of the frontal lobes with magnetic resonance spectroscopy, and WM lesion volumes and numbers were obtained using quantitative MRI analysis.
Results: 26.2% of the nonNPSLE patients were impaired (scoring below a T-score of 40) on the PASAT. Using Spearman's correlation coefficient, lower PASAT scores were significantly correlated with elevated right Ch/Cr (p=0.03) and elevated left Ch/Cr (p=0.004). Higher left Ch/Cr was correlated with longer length of SLE diagnosis (p=0.012). Higher right Ch/Cr was correlated with greater WM lesion volumes (p=0.004) and higher number of WM lesions (p=0.001)
Conclusions: These results suggest that increased Ch/Cr in the frontal lobe NAWM of SLE patients is related to lower information processing speed as measured by the PASAT. The findings support our earlier studies (Kozora et al, 2004; Filley et al, 2009) suggesting that microstructural WM abnormalities early in SLE contribute to cognitive dysfunction. These data also support use of the PASAT in the assessment of cognitive impairment related to WM dysfunction.
Correspondence: *Elizabeth Kozora, Ph.D., Medicine, National Jewish Health, 1400 Jackson Street, Denver, CO 80206. E-mail: Kozorae@njheatlh.org*

K. MANNING, C. CLARKE, A. LORRY, J. DUDA & P. MOBERG. Medication Management in Patients with Parkinson's Disease.
Objective: The purpose of this study is to quantitatively assess the medication management ability of patients with Parkinson's disease (PD) and to probe the possible clinical, cognitive, and motor correlates of this skill.
Participants and Methods: Twenty-six men with PD completed a neuropsychological battery and the Hopkins Medication Schedule (HMS), a standard test of a person's ability to understand and implement a routine prescription medication (Carlson et al., 2005). The HMS is comprised of two components: 1) each participant is given a hypothetical prescription for two common medications (antibiotics & aspirin) and must fill in a daily schedule for taking them, and 2) each participant has to fill in the compartments of a daily pillbox.
Results: Compared to the HMS standardization sample of community dwelling older women (Carlson et al., 2005), patients with PD performed similarly on the HMS schedule (mean difference between groups, d = .23) and pillbox (d = .14). Memory and executive abilities correlated strongest with schedule performance (e.g., r = .70 with categories achieved from the Wisconsin Card Sorting test) whereas pillbox performance correlated strongest with processing speed (r = -.76 with time to complete Trails A).
Conclusions: Strong relationships between cognitive abilities and the ability to understand and implement a medication schedule and pillbox were observed. Ongoing work seeks to clarify the ecological validity of HMS performance to medication adherence in PD, as well as develop a disease-specific component to this test to reflect to the complicated medication regimens of patients with PD.
Correspondence: *Kevin Manning, Drexel University, 226 West Rittenhouse Square, Apt 214, Philadelphia, PA 19103. E-mail: kjm73@drexel.edu*

C. PRICE, J. WARD, K. MOFFETT, D. BOWERS, J. TANNER, H. FERNANDEZ & M. OKUN. Post-Operative Cognitive Dysfunction in At Risk Populations: A "Proof of Principle" Study.
Objective: Post-operative cognitive dysfunction (POCD) in memory or executive function occurs in 40% of non-demented older adults at discharge and 10-15% at three months post-surgery. Remarkably, cognitively at-risk individuals have not been studied for POCD. Using a prospective longitudinal design, we examined whether at risk individuals (i.e., mild cognitive impairment, amnestic (MCIa); Alzheimer's disease (AD); or Parkinson's disease (PD)) would experience greater cognitive decline after surgery relative to non-surgery peers and also "healthy" surgery peers.
Participants and Methods: From 246 screenings of study referrals, we acquired 5 MCIa, 1 AD, 5 PD, and 7 healthy adults prior to elective orthopedic surgery and post-surgery (2-weeks, 3-months, 1-year). Non-surgery peers (6 MCIa, 2 AD, 5PD, 6 NC) were followed at the same time intervals. Memory (HVLT, Story Memory), executive (Trail Making Test, Stroop), verbal fluency (COWA), and motor (Finger tapping) functions were assessed at each time point.
Results: Baseline cognitive function for respective surgery and non-surgery peers were statistically similar. Reliable change analyses showed significant post-operative change only in the surgery groups (>1.96 s.d.). MCI surgery: 2 of 4 had verbal fluency decline; PD surgery: 2 of 5 had executive function decline. The AD surgery patient performed at floor both at pre-surgery and post-operatively. At-risk surgery patients evidenced greater decline relative to the healthy surgery group at each time point.
Conclusions: POCD can occur for MCIa and PD. Individuals with dementia may be more difficult to study due to baseline floor performance. Multi-center investigations are needed on this important topic.
Supported by: Alzheimer's Association, National Parkinson Foundation, I. Heermann Anesthesia Foundation (CP)
Correspondence: *Catherine Price, Ph.D., Clinical & Health Psychology, University of Florida, PO Box 100165, Gainesville, FL 32610. E-mail: cep23@phhp.ufl.edu*

A.E. PUENTE & H. LINDSEY. Cortisol Levels, Self-Reported Anxiety and Neuropsychological Test Performance in Coronary Artery Bypass Patients.
Objective: Several variables have been posited to help explain the often reported neuropsychological deficits associated with coronary artery bypass patients. Recently, anxiety (especially pre-surgical levels) has been reported not only to be associated with neuropsychological deficits but with eventual death. However, questions have arisen as to whether self-reported anxiety is an accurate measure of patient's anxiety.
Participants and Methods: To address this issue, salivary cortisol levels (Salimetrics) together with results of the State and Trait Anxiety questionnaire as well as three tests that have been previously found to be sensitive to CABG surgery; Stroop, Symbol Digit Modalities Test and Trail Making Test A and B. A total of 47 patients were tested pre-surgically and 17 were tested pre and post surgically. Almost all patients were tested pre-surgically as inpatients in a teaching hospital center and all patients were tested as outpatients at the surgeons' office. Similar CABG procedures were used by all surgeons in all patients.
Results: No relationship was found between cortisol levels and either self-reported anxiety or the neuropsychological measures either pre or post-surgically. Pre-surgical neuropsychological test scores were in the impaired range when compared to scores of normals in the test manuals. However, no evidence was found between pre-surgical and post-surgical measures for any of the anxiety or neuropsychological measures.
Conclusions: Results are discussed in terms of prior studies which suggest anxiety, as well as the chosen neuropsychological measures, help explain the often reported neuropsychological deficits associated with CABG.
Correspondence: *Antonio E. Puente, Ph.D., Psychology, UNCW, Department of Psychology, Wilmington, NC 28403. E-mail: puente@uncw.edu*

L.M. REES, L.A. WALKER, L. BERRIGAN, A. CHEN & M.S. FREEDMAN. Learning and memory in MS: are difficulties due to acquisition or retrieval of information?
Objective: Multiple Sclerosis (MS) can result in impairments in learning and memory. Acquisition and retrieval processes were examined between individuals with relapsing remitting MS (RRMS) and healthy controls (HC) on verbal and visual learning and memory tasks.
Participants and Methods: 65 RRMS and 47 matched HCs were tested as part of a larger longitudinal study on a cognitive battery of tests including a number of visual and verbal memory tasks.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: A 2x2 repeated measures ANOVA revealed a significant main effect for modality during learning ($p<.01$). Both MS and HC perform better on verbal learning (Logical Memory I - LM I) than visual (Brief Visuospatial Memory Test – Revised - BVMT-R Total). No other effects were significant. On delayed recall, there was a significant finding for modality ($p<.01$) and group ($p<.05$) but no interaction. MS participants recall less information than HC regardless of modality, with visual recall worse than verbal recall.
Conclusions: Findings suggest that groups differ in terms of delayed recall but not learning suggesting that difficulty may be in retrieval of information rather than acquisition (recognition scores were equivalent between groups and revealed no difficulty with storage of information). This is in contrast to other findings in the literature and may reflect the specific characteristics of the MS sample. Learning and recall of visual information remains at lower levels than verbal learning and recall.
Correspondence: *Laura Rees, The Ottawa Hospital-Rehabilitation Centre, 505 Smyth Rd, Ottawa, ON K1H 8M2, Canada. E-mail: lrees@ottawahospital.on.ca*

M.R. BASSO, P. CANDILIS, D. COMBS, S. WOODS & J. JOHNSON. Prospective Memory Deficits in Multiple Sclerosis: An Extension an Confirmation of Prior Pilot Data.
Objective: Cognitive impairment occurs in 60% of patients with multiple sclerosis (MS). Forgetfulness is especially common, and deficits involving acquisition and retrieval are reported across studies. This research has addressed recall for retrospectively learned information, but little research has examined prospective memory in MS. Prospective memory is a form of episodic memory that involves recall of intended actions, and is presumed to reflect frontal-temporal lobe integrity. In a small pilot study, we previously compared prospective memory in MS patients and a control group, and found worse recall of prospective memory, but normal recognition (Basso et al. 2008). In this study, we extended our previous pilot research by collecting a large sample of patients.
Participants and Methods: Participants were administered a broad battery of neuropsychological tests and the Memory for Intentions Screening Test (MIST: Raskin, 2004), an instrument with acceptable reliability and validity. Patients were classified according to impairment on the neuropsychological battery, excluding MIST performance. If 33% of scores was impaired, then the person was categorized as impaired. This yielded 62 unimpaired and 27 impaired MS patients, and 29 controls.
Results: Impaired patients performed worse than the control and unimpaired MS groups on the MIST overall recall score and recognition index. MS patients did not differ from controls on the CVLT-2 recognition index. Executive function, working memory, and retrospective recall correlated with MIST recall. CVLT-2 recognition failed to correlate with MIST performance.
Conclusions: Extending our prior research, cognitively impaired MS patients show reduced prospective recall and recognition, whereas unimpaired patients do not. MIST scores correlated with executive function and working memory performance more than retrospective memory performance, implying a frontal substrate. This also suggests that prospective memory recruits planning and organizational skill more than retrospective memory.
Correspondence: *Michael R. Basso, Ph.D., Psychology, University of Tulsa, 800 South Tucker Drive, Tulsa, OK 74104. E-mail: michael-basso@utulsa.edu*

H.M. GENOVA, V. LEAVITT, N. CHIARAVALLOTI, J. DELUCA & G. WYLIE. Executive Dysfunction in MS and its Relationship with White Matter Integrity and Processing Speed.
Objective: The purpose of the current study was to determine whether executive task performance is related to reductions in white matter integrity, assessed by diffusion tensor imaging (DTI) in Multiple Sclerosis (MS), and whether this relationship is impacted by processing speed (PS). It was hypothesized that reduced fractional anisotropy (FA) is related to poor performance on executive tasks, but that this relationship is largely due to deficits in PS.
Participants and Methods: 15 healthy controls and 25 persons with MS participated. The Color-Word Interference (Stroop) Test and Trail-Making Test of the DKEFS (Delis et al, 2001) were used to assess different aspects of executive functioning. PS was assessed using the "Color-Naming" and "Word-Reading" subtests of the Stroop and the "Number-Sequencing" and "Letter-Sequencing" subtests of Trail-Making. Regression analyses were used to examine the relationship between executive functioning and FA, before and after controlling for PS.
Results: Reduced FA was associated with poor performance on both the Stroop and Trail-Making Test in multiple regions including the superior longitudinal fasciculus and the corpus callosum. However, once PS was controlled for, the spatial extent of these areas was reduced.
Conclusions: Our findings reveal that although there is a significant relationship between FA and executive abilities in MS, this relationship is largely affected by PS. These findings further support literature which suggests PS deficits underlie impairments in higher-order cognitive abilities in MS, and that this relationship can be investigated on the neuroanatomical level.
Correspondence: *Helen M. Genova, Ph.D., Kessler Foundation Research Center, Suite 010, 300 Executive Dr., West Orange, NJ 07052. E-mail: hgenova@kesslerfoundation.org*

K.A. RYAN, S. LANGENECKER, A. VEDERMAN, A. WELDON, M. MCFADDEN & M. MCINNIS. Cognitive factors related to occupational functioning in Bipolar Disorder.
Objective: Functional recovery often lags behind recovery from clinical symptoms in Bipolar Disorder (BD) and may still be incomplete when acute mood symptoms have subsided. One poorly captured area of functioning concerns the ability to work and the clinical and cognitive factors related occupational functioning are poorly understood.
Participants and Methods: 74 healthy controls (HC) and 91 euthymic BD participants were recruited from the Prechter Longitudinal Study on BD. Each diagnostic group was split up into an active/working group or an inactive/not working group . Extensive diagnostic and cognitive evaluations were conducted and measures of psychosocial and personality functioning were completed.
Results: HC were more likely to be employed than BD ($p<.0001$). There were no differences between the active or inactive BD groups in terms of clinical variables, but those who were not working displayed significantly poorer auditory learning and memory, processing speed with interference resolution, and emotional processing. Logistic regression analysis correctly classified 84.1% of the BD cases into either an active or inactive group with auditory memory making significant contributions to predicting work status. Non-employed BD participants who declined in employment status performed worse on auditory learning and memory, fine motor dexterity, processing speed with interference resolution, and emotional processing tasks than those who maintained stable employment status.
Conclusions: Deficits in cognitive functioning may be a trait-like feature that impacts one's ability to hold a job and resume employment to prior levels. However, remission in BD is not synonymous with functional recovery and persistent subsyndromal symptoms need to be identified and effectively treated.
Correspondence: *Kelly A. Ryan, Ph.D., The University of Michigan, 2101 Commonwealth, Suite C, Ann Arbor, MI MI. E-mail: karyan@umich.edu*

K.M. STANEK, M.B. SPITZNAGEL, G. STRAIN, M.J. DEVLIN, R. WING, R. COHEN, R.H. PAUL, R.D. CROSBY, J.E. MITCHELL & J. GUNSTAD. Body Mass Index and Neuropsychological Functioning across the Adult Lifespan.
Objective: Cognitive dysfunction and structural brain abnormalities have been observed in obese versus lean individuals, but with variability across age and weight groups. This study was designed to clarify the cognitive profile of obesity by examining performance across multiple cognitive domains in adults with wide-ranging age and weight status.
Participants and Methods: A total of 732 participants (60% women; ages 18-87; BMI range 19-75) underwent assessment of cognitive func-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

tioning and relevant medical/demographic covariates. Neuropsychological tests were grouped by cognitive domain (via confirmatory factor analysis), and standardized scores were averaged into composite variables. Hierarchical linear regression analyses examined main effects of BMI, as well as an interaction between BMI and aging, in predicting these cognitive domains.
Results: Significant main effects for BMI were observed for motor ($\Delta r2 = .02$, $\geq = -.15$, $p < .01$) and attention/processing speed ($\Delta r2 = .01$, $\geq = -.07$, $p = .04$), whereas a significant interaction between BMI and age was observed ($\Delta r2 = .01$, $\geq = -.08$, $p = .04$) for predicting executive functioning. BMI was not independently associated with memory or language functioning and no interaction effects were observed for these variables.
Conclusions: Results indicate that BMI is independently associated with decreased attention, processing speed, and fine motor speed, but not memory or language, across the adult lifespan. Although BMI was not independently related to executive dysfunction, a significant age x BMI interaction suggests that obesity-related executive deficits may increase with age. Overall, these findings support a hypothesized primary frontal/subcortical pathology that manifests itself gradually from slowing to more evident executive deficits with age in obese individuals. Prospective studies should explore these possibilities.
Correspondence: *Kelly M. Stanek, M.A., Kent State University, 238 Kent Hall, Kent State University, Kent, OH 44242. E-mail: kstanek@kent.edu*

J. WARD, L. BURRELL, M. NAQIBUDDIN, D. POWERS, S. BARR, L. KLEM, A. KIANI, H. FANG & M. PETRI. Cognitive Functioning and Work Status in Systemic Lupus Erythematosus.
Objective: The presence of cognitive and mood difficulties in systemic lupus erythematosus (SLE) is well established. However, the relationship of cognitive functioning and mood to work status has rarely been investigated in SLE.
Participants and Methods: In the current study, we assessed cognitive and adaptive functioning and mood in disabled SLE (DSLE; N=26), working SLE (WSLE; N=45), and healthy working control (WC) participants (N=32). Although not significantly different from the WC group in estimated baseline verbal intellect, the WSLE group had significantly more education than both the DSLE and WC groups. Therefore, analyses were computed covarying for years of education.
Results: WSLE and DSLE subjects endorsed a comparable but significantly greater degree of depressive symptoms than the WC group. Covarying for years of education, WSLE participants performed comparably to the WC group across all cognitive measures with the exception of better performance on one implicit learning task but poorer performance on another implicit learning measure. DSLE participants performed significantly worse than the WSLE and WC groups on measures of processing/psychomotor speed, verbal learning, mental flexibility/set-shifting, complex problem solving, and aspects of adaptive functioning. Additionally, the DSLE subjects' performance on an inhibitory control task was significantly poorer than WC but not WSLE participants.
Conclusions: In summary, the current results indicate notable cognitive deficits among disabled SLE patients. Although endorsing a significantly greater degree of depressive symptoms than controls, WSLE patients performed comparably to WC participants on most cognitive measures. Thus, cognitive deficits beyond those associated with depression appear to be related to disability status in SLE.
Correspondence: *Julianna Ward, Ph.D., Psychiatry & Behavioral Sciences, Johns Hopkins University/Hospital, Meyer 218, Div. of Med. Psychology, 600 N. Wolfe Street, Baltimore, MD 21218. E-mail: jward24@jhmi.edu*

T. ZAMORA, C. STEPNOWSKY & J. HAMILTON. Effect of Adherence with Obstructive Sleep Apnea Management on a Psychomotor Vigilance Task.
Objective: One major consequence of obstructive sleep apnea (OSA) is impaired daytime alertness. The gold standard treatment for OSA is continuous positive airway pressure (CPAP) therapy. The goal of the study was to evaluate the effect of CPAP treatment adherence on vigilance.
Participants and Methods: Two-hundred forty OSA participants from a larger study of CPAP adherence were included. Participants had a mean age of 56.2±12; mean body mass index of 33.3±6.3; and severe OSA (mean number of apneas and hypopneas per hour of sleep) of 37.5±20.2. Participants were all provided with identical CPAP instruction and assessed at 1-month and 6-months. The Psychomotor Vigilance Test (PVT), a sustained vigilance/attention reaction time task was administered via handheld PDA (PalmOne Tungsten, Sunnyvale, CA) using PalmPVT software (Walter Reed Army Institute of Research, Washington, DC). Participants were asked to respond as quickly as possible to the random appearance of bulls-eye, with a total task duration of ~6 minutes and an inter-stimulus interval of 3-7s.
Results: CPAP adherence at 1-month was associated with faster reaction time ($r= -.251$; $p=.001$) and fewer minor lapses ($r=-.299$; $p<.001$). CPAP adherence at 6-months was associated with faster reaction time ($r= -.268$; $p=.003$) and fewer minor lapses ($r=-.311$; $p<.001$).
Conclusions: This study suggests that higher levels of CPAP adherence are associated with greater improvements in vigilance. The data supports the hypothesis that increased use of CPAP provides greater symptom alleviation. Future research needs to examine the nature of this relationship to better inform the amount of CPAP use that impacts key clinical outcomes.
Correspondence: *Tania Zamora, VA San Diego Healthcare System, 3350 La Jolla Village Dr. (111N-1), San Diego, CA 92161. E-mail: tania.zamora@va.gov*

G. KIM, S. SEO, J. SHIN, C. KIM, M. KIM, B. LEE, K. JUNG, H. YOU & D. NA. Neural correlates of Motor intentional disorders in patients with Subcortical vascular dementia & Subcortical vascular mild cognitive impairment.
Objective: Human movements may consist of three basic movements(initiation, maintenance, and termination) and disruption of these movements without motor unit lesion is called motor intentional disorders (MID). Neural correlates of MID are known to be frontal areas. However, most previous studies on the neural correlates for MID were based on the patients with territorial infarction. Previous studies reported that the most predominant lesions in patients with subcortical vascular mild cognitive impairment (svMCI) or subcortical vascular dementia (SVaD) are located in frontal areas. Therefore, svMCI and SVaD can be a good model for investigating neural correlates of MID.
Participants and Methods: : Participants consisted of 23 svMCI and 9 SVaD patients. The NK Pinch-Grip TM (Model PF002, NK Biotechnical Co., USA; precision = 0.098 N, sampling rate = 32 Hz) was used to quantify MID, in which force control capabilities of the index finger were measured in four different phases (initiation, development, maintenance, and termination). Cortical thickness analysis was performed in all participants to find cortical thinning areas related to each phase of a force.
Results: The impairment in the maintenance of a force (motor impersistence) was associated with multiple frontal areas including bilateral dorsolateral, medial prefrontal and orbitofrontal cortices. Cortical thinning areas related to termination difficulty (motor perseveration) were bilateral prefrontal, right temporo-parietal, some of temporal cortices. There was no statistical significant cortical thinning area related to initiation and development of a force.
Conclusions: Our results suggest that multiple frontal areas are related to MID, especially with motor impersistence and perseveration, in patients with SVaD and svMCI.
Correspondence: *Geon Ha Kim, Department of Neurology, Sungkyunkwan University School of Medicine, Samsung Medical Center, Samsung Medical Center, Department of Neurology,50 Ilwon-dong, Kangnam-gu, Seoul 135-710, Republic of Korea. E-mail: celestiali@naver.com*

Medical/Neurological Disorders/Other (Child)

K.T. BAUM & J. PHILLIPS. Osteogenesis Imperfecta and Congenital Hydrocephalus: A Neuropsychological Case Study.
Objective: The objective of this case study is to describe the neuropsychological profile associated with the dual diagnosis of congenital hy-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

drocephalus (CH) and osteogenesis imperfecta (OI). CH and is an abnormal physiological condition present at birth in which excessive accumulation of cerebrospinal fluid within the ventricular system of the central nervous system results in increased cranial pressure. Neuropsychological deficits have been reported in the areas of academics, as well as visuospatial and visual motor functioning despite average to low-average intelligence. OI is a rare disorder affecting the connective tissue and is characterized by extremely fragile bones that break or fracture easily.

Participants and Methods: The neuropsychological data of a 3-year-old female with CH and OI type I, the most common and mildest form of OI, are reviewed. The Wechsler Preschool and Primary Scale of Intelligence, Beery Visual-Motor Integration, Peabody Picture Vocabulary Test-4, Expressive Vocabulary Test-2, and Bracken were administered. Parent measures, including the Behavior Assessment System for Children and Behavior Rating Inventory of Executive Function, were completed.

Results: Neuropsychological findings indicated high average to average receptive and expressive language abilities relative to low average visual spatial reasoning skills. Her performance on a task of visual motor integration was low average, while her acquisition of early academic concepts was average. Parent and teacher measures both indicated some concerns with emerging executive functioning and attention abilities.

Conclusions: This case demonstrates OI as a risk factor for visual spatial and fine motor difficulties in CH, further exacerbating a profile similar to nonverbal learning disability.

Correspondence: *Katherine T. Baum, M.A., Psychology / DDBP, University of Cincinnati / Cinti Children's, 3333 Burnet Ave, Neurology - MLC 4002, Cincinnati, OH 45229. E-mail: katherine.baum@cchmc.org*

D.W. BEEBE & D. ROSE. Impact of Experimental Sleep Restriction on Adolescents' Attention, Learning, and Arousal Level in a Simulated Classroom.

Objective: Inadequate sleep is common among healthy adolescents and even more common among those with neurological conditions. Few experimental studies of chronic sleep restriction have been conducted on adolescents. We recently reported that experimental sleep restriction can affect parent and self-reported attention and metacognitive skills in adolescents. Here we report objective findings from adolescents who were asked to learn within a simulated classroom setting, some of whom underwent monitoring of their behaviors and level of tonic arousal (via EEG). We hypothesized that, after five nights of restricted sleep, participants would learn less, be less attentive, and have lower arousal than after five nights of more optimal sleep duration.

Participants and Methods: 16 healthy adolescents underwent a sleep manipulation that included, in counterbalanced order, 5 consecutive nights of sleep restriction (6½ hours in bed) versus 5 nights of healthy sleep duration (10 hours in bed). At the end of each condition, they viewed educational films and took related quizzes in a simulated classroom. Eight participants also underwent video and EEG monitoring. Outcome measures included quiz scores, inattentive behaviors during the films (raters blinded to sleep condition), and spectral power in the theta range (4-7 Hz) at C3/A2.

Results: While sleep-restricted, participants had lower quiz scores, $p=.05$, displayed more inattentive behaviors, $p<.05$, and had lower arousal, $p=.08$ than when in the healthy sleep condition.

Conclusions: These data complement previous correlational reports by showing that chronic sleep restriction during adolescence can cause inattention, diminished learning, and lowered arousal in a simulated classroom.

Correspondence: *Dean W. Beebe, Ph.D., Beh Med & Clin Psychology, Cincinnati Children's Hosp Med Cntr, 3333 Burnet Avenue, MLC 3015, Cincinnati, OH 45229. E-mail: dean.beebe@cchmc.org*

D.W. BEEBE, A.E. CASSEDY, D. DROTAR & B.S. MARINO. Metacognition and Behavior Regulation in Childhood Survivors of Complex Congenital Heart Disease.

Objective: Survival rates in children with complex congenital heart disease (CHD) have improved dramatically, but survivors are at high risk for neuropsychological deficits. Their risk for difficulties with the metacognitive and behavior regulation aspects of executive functioning is poorly understood. Here we examine whether childhood survivors of CHD have poor behavior regulation and metacognition and, if so, whether these two facets of executive functioning are (a) equally affected, (b) associated with child age, and (c) predictive of parent- and child-reported academic functioning after controlling for intelligence and demographic factors.

Participants and Methods: 143 survivors of CHD aged 8-16-years underwent intelligence testing, parents completed the Behavior Inventory of Executive Functioning (BRIEF) and demographics questions, and survivors and parents completed the school subscale of the Pediatric Quality of Life Questionnaire (PedsQL).

Results: The sample had worse metacognitive skills (T=57) than behavior regulation skills (T=53), $p<.001$, though both domains differed from norms, $p<.002$. Age was not associated with behavior regulation scores, but older age was associated with worse metacognition, $p=.008$. The frequency of clinically significant metacognitive difficulties ranged from 18% among 8-9 year-olds to 38% among 14-16 year-olds; behavior regulation difficulties clustered around 13%. After controlling for age, sex, race, family income, and intellectual functioning, metacognitive skills predicted both parent- and self-reported school functioning, $p<.001$; behavior regulation predicted school functioning per parent report, $p=.002$, but not child report.

Conclusions: Survivors of CHD are at particularly high risk for metacognitive difficulties, which may become more apparent across development and which have important implications for classroom performance.

Correspondence: *Dean W. Beebe, Ph.D., Beh Med & Clin Psychology, Cincinnati Children's Hosp Med Cntr, 3333 Burnet Avenue, MLC 3015, Cincinnati, OH 45229. E-mail: dean.beebe@cchmc.org*

J. BERNABEU, M. MORAN, M. PLASENCIA, O. PRADES, A. SAPIÑA, M. ANDRES, A. CAÑETE, C. FOURNIER & V. GARCIA-AYMERICH. Neuropsychological Follow-up and Rehabilitation in two children with Neuroblastoma and Opsoclonus-Myoclonus syndrome.

Objective: Opsoclonus-myoclonus and cerebellar ataxia are usually associated with neuroblastoma in young children with a very good long-term survival but with neurological deficits (speech, motor, cognitive and behavioral delay) that worsen their quality of life.

Participants and Methods: Two 7 year-old girls with abdominal neuroblastoma and OM have been followed. Neuroblastoma was diagnosed and treated by surgery and chemotherapy at age 0 and 2 respectively.

Patient 1 showed severe ataxia, language delay, fine motor problems, dysarthrias, attention deficit and oppositional behavior…

Patient 2 was diagnosed at 9 months but presented symptoms from the age of 1 month (motor, social smile, visual tracking delay, "dancing" eye movements…generalized hypotonia).

A comprehensive assessment protocol was performed in 2010, including 54 neuropsychological measures, psychopathology (Achenbach), executive functions (BRIEF), attention (Conners CPT-II), occupational therapy and physiotherapy assessments. Individualized treatment was carried out by physiotherapy,occupational and speech therapy(psychomotricity,wiihab,proprioceptive...)

Results: At assessment, both patients presented an acute delay in all domains that has improved along follow-up (24 months)

Patient 1: IQ 44, Kaufman MPC 62. Generalized delay in all domains (worse in fine motor, language, apraxia and attention). Behavioral isolation and attention deficit. Below p10 in all Vineland-II domains. Follow-up: improvements in fine motor, pectoral girdle and self-care skills.

Patient 2: Kaufman MPC 78. Generalized delay in all domains. Follow-up assessment reveals significant generalized improvement in all domains except proprioceptive, attention, language and gross motor function.

Conclusions: 1/ Improvement in different skills and functions can be achieved by neuropsychological rehabilitation

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

2/The scarcity of these patients may be difficult to reach firm conclusions. Multinational and cooperative studies are needed to fully understand the OM syndrome.
Correspondence: *Jordi Bernabeu, PhD, University Hospital La Fe, Pediatric Oncology Unit, Avgda. Campanar, 21, Valencia 46009, Spain. E-mail: jordi.bernabeu@uv.es*

S. BUTT, M. GOLDMAN & F. ARMSTRONG. Preliminary Results from a Longitudinal Pediatric Sickle Cell Disease Study: Do Parent Focused Advocacy Interventions Improve Academic Success?
Objective: The study aim was to examine academic achievement in children with sickle cell disease (SCD) benefitting from a parent-focused educational intervention.
Participants and Methods: Selected subtests from the Woodcock Johnson Tests of Achievement-Third Edition (WJ-III-Ach) were administered to 13 children with SCD between 6 and 12 years of age, as part of a larger, three-year clinical trial investigating the impact of a parent-focused intervention on academic achievement. The intervention educates parents on how to obtain educational services within the school system. Neurocognitive assessment occurred at baseline and at one-year follow-up. Difference scores were calculated for participants on reading and math subtests administered at baseline and year one by subtracting the age-expected raw score from the child's actual raw score. Raw scores are more sensitive than standard scores to changes in performance. Paired t-tests were used to test for significant differences between actual and expected achievement raw score differences over time.
Results: Mean intellectual functioning was below average, with noted weaknesses in processing speed. Participants' raw scores were below age expectations on academic measures at both time points. Preliminary results showed statistically significant ($p < .05$) raw score improvement across academic tasks except for reading comprehension and math fluency, with declines noted in these areas. Educational plans were implemented for 9 (69%) of the selected sample and typically included accommodations for extra time to complete assignments and tests.
Conclusions: Preliminary results reveal below age-expected performance on academic tasks, particularly tasks involving a time constraint and this is likely due to processing speed deficits. Despite not meeting developmental expectations, the children in this sample made clinically meaningful academic gains over time. Data collection is ongoing for this longitudinal clinical trial and will lead to further examination of academic trends.
Correspondence: *Sakina Butt, Psy.D., Pediatrics, University of Miami Miller School of Medicine, 1601 NW 12th Avenue, Suite 3030A, Miami, FL 33136. E-mail: sbutt@med.miami.edu*

T. CUNNINGHAM, E. BOUFFET, N. LAPERRIERE, M. BRIERE, D. STROTHER, D. MCCONNELL, J. HUKIN, C. FRYER, J. DICKSON & D. MABBOTT. Radiation Dose Effects on Sustained and Selective Attention.
Objective: Past research has shown that posterior fossa (PF) pediatric brain tumors and their treatment have a negative impact on sustained and selective attention skills: patients treated with cranial radiation experiencing the greatest impairment. The current study extends previous findings through investigating the effects of radiation dose and field on sustained and selective attention.
Participants and Methods: Sustained attention was assessed through a continuous performance test and selective attention was assessed with a visual-search task. Sixty-two patients with PF tumors treated either with surgery alone (n=17), surgery plus focal PF radiation (n=11), surgery and reduced dose cranio-spinal radiation (23.4Gy) (n=19), or surgery and standard dose cranio-spinal radiation (36Gy) (n=15). To account for normal development, patient performance was compared with that of healthy age-matched controls (n=39).
Results: There were no significant differences between control and patient groups or within the patient groups on the sustained attention task. For the selective attention task, the findings replicated past research that found that in comparison to controls, PF tumor patients' selective attention was impaired regardless of treatment type. In extension, the current study found that PF tumor patients that were treated with surgery plus focal PF radiation had comparatively greater difficulties as the selective attention task demands increased. The difficulties they demonstrated were not predominantly in accuracy, but rather in their response time and the variability in their response performance.
Conclusions: PF tumor patients who receive surgery alone or in combination with different radiation treatments are differentially impacted in regards to the degree of impairment in selective attention. In the interest of improving outcomes, these findings support the importance of additional research to distinguish the relationship between different treatments and their impact on cognitive skills.
Correspondence: *Todd Cunningham, M.A., Psychology, The Hospital for Sick Children, 555 UNIVERSITY AVE, Toronto, ON M5G 1X8, Canada. E-mail: todd.cunningham@sickkids.ca*

L.A. DAY, J. KATZENSTEIN, J. OGHALAI & S. CAUDLE. A Comparison of Neurodevelopment in Children with Hearing Loss: Cochlear Implantation in Children with Intellectual Disabilities.
Objective: Research suggests that typically developing (TD) children with sensorineural hearing loss can achieve normal oral language with use of a cochlear implant. However, little evidence is available to support or refute the use of cochlear implantation (CI) in children with intellectual disabilities (ID). This study aims to compare the cognitive development of children with ID to TD children post-CI.
Participants and Methods: This is a retrospective, chart review study. ID was defined as a Mullen Scales of Early Learning (MSEL) Visual Reasoning (VR) T-score of <20. Typical development was defined as MSEL VR T-score >20. In total, 16 children were included, with 8 considered ID, matched on implant age, age at first evaluation, and time between evaluations. Mean age of implant was 28.9 months (SD = 12.0) and the mean time between evaluations (pre-CI and follow-up) was 20.9 months (SD = 8.3).
Results: Three separate 2 (time) x2 (ability) ANOVAs compared MSEL VR Raw Score, Vineland Adaptive Behavior Scale Daily Living (VABSDL) scaled score, and MSEL Gross Motor (GM) raw score, respectively pre- and post- CI. There was no significant interaction among ID and TD on change in = VR, VASBDL, or GM score. There was a significant main effect ($F(1, 14) = 9.257$, $p = .009$) of VR score over time.
Conclusions: Deaf children with ID did not show significant differences in developmental gains compared to TD controls, but both groups showed significant increases in cognitive abilities, supporting the use of CI in deaf children with ID.
Correspondence: *Lori A. Day, MA, Psychology, Texas Children's Hospital, 6621 Fannin St, CCC-16th Floor, Houston, TX 77030. E-mail: lori.day10@gmail.com*

D. DEWEY, S. MELTZER, A. EDWARDS, S. CRAWFORD & D. PACAUD. Developmental Outcomes of Children Born to Mothers with Type 1 Diabetes who Experienced Severe Hypoglycemia During Pregnancy.
Objective: Maternal diabetes can affect the development of the fetal nervous system. Severe hypoglycemia (SH) is a frequent side effect of intensified diabetes management and has been reported in up to 45% of pregnancies complicated by type 1 diabetes. The primary objective of this study was to examine the neurodevelopmental outcomes of children born to mothers with type 1 diabetes with or without SH during pregnancy relative to children of healthy mothers.
Participants and Methods: Of the 44 mothers with type 1 diabetes recruited early in pregnancy, 15 had at least one episode of SH and 29 did not (mean AIc = 6.67 vs 6.51, respectively, $p = .471$). Healthy mothers (n = 61) were recruited during pregnancy or soon after the birth of their children. Exclusion criteria were maternal toxemia, pre-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

maturity, chromosomal abnormalities, cerebral palsy or an identified condition in the child known to influence CNS development. Children were assessed at 18 months (n = 105) with the Bayley Scales of Infant Development-2nd Edition and at 3 years (n = 56) with the WPPSI-III. Parents completed the Child Behavior Checklist at 18 months and 3 years.

Results: Children born to mothers with type 1 diabetes with SH displayed poorer scores on the Bayley Mental Development Index (MDI; M = 87.74) compared to children born to healthy mothers (M = 94.15) when controlling for attention (p = .085). No difference was found between mothers with SH and mothers without SH (M = 91.12) on the MDI (p = .273). At 3 years, children of mothers with SH had lower Full Scale IQ scores (M = 94.67) compared to children of mothers without SH (M = 106.34; p = .011) and children of healthy mothers (M = 105.34; p = .099) when controlling for attention.

Conclusions: Children of mothers with type 1 diabetes with SH displayed poorer neurodevelopmental outcomes compared to children of mothers without SH and children of healthy mothers. Further research is needed to determine whether these children are at risk for long term neuropsychological and academic impairments.

Correspondence: *Deborah Dewey, PhD, Pediatrics and Community Health Sciences, University of Calgary, Alberta Children's Hospital, 2888 Shaganappi Trail NW, Calgary, AB T3B 6A8, Canada. E-mail: deborah.dewey@albertahealthservices.ca*

K. EDELSTEIN, P.T. CIRINO, L. HASHER, J.M. FLETCHER & M. DENNIS. Chronotype, Morning-Evening Preferences, and Sleep Problems in Spina Bifida.

Objective: The timing of sleep relative to the 24-hour day changes across the lifespan, with progressively later sleep-wake times over the course of adolescence, and a reversal of this relationship in aging adults. In this cross-sectional study, we explore sleep timing in children and adults with spina bifida meningomyelocele (SBM) a neurodevelopmental disorder that is associated with sleep problems.

Participants and Methods: Participants were individuals diagnosed with SBM at birth (n=202, age 7-55 years) and 62 healthy age-matched controls. We examined circadian chronotype using the Munich Chronotype Questionnaire, an established marker of the phase relationship between the timing of sleep and the 24-hour day. We also collected information about self-reported sleep problems from standardized questionnaires and diurnal activity preferences from the Horne-Ostberg Morningness-Eveningness Questionnaire.

Results: Both groups showed the typical decelerating quadratic relationship between age and chronotype scores (SBM, $F(1,188) = 12.77$, $p < .0004$; NC, $F(1,55) = 13.85$, $p < .0005$). The delay in sleep timing peaked at age 23.4 in NC, and at age 29.0 in individuals with SBM. Groups did not differ in morningness-eveningness preferences although older age was associated with increasing preferences for morning activities. Regardless of age, individuals with SBM reported a greater number of sleep problems than controls.

Conclusions: Although individuals with SBM show the characteristic developmental change in chronotype, the curve is displaced, with SBM individuals peaking later. This raises the possibility of aberrant synchronization of circadian rhythms to the 24h day in individuals with SBM, which may underlie sleep problems in this population.

Correspondence: *Kim Edelstein, PhD, Princess Margaret Hospital, 610 University Ave, Toronto, ON M5G 2M9, Canada. E-mail: kim.edelstein@uhn.on.ca*

J. EPPIG, D. WAMBACH, C. NIEVES, J. KITAIN, B. PETERLIN, G. ALEXANDER, R.J. SCHWARTZMAN, R. SWENSON & D. LIBON. Sinistrality, Learning Problems, and Autoimmune Disorder in Complex Regional Pain Syndrome: Revisiting the Geschwind-Galaburda Hypothesis.

Objective: Complex Regional Pain Syndrome (CRPS) is a severe chronic pain disorder characterized by continuous spontaneous or evoked pain out of proportion to the initial injury and does not respect a nerve or root distribution. Anecdotally, we have observed a high incidence on non-right handedness in CRPS patients. The current research sought to determine the incidence of the Geschwindian Triad - non-right handedness, autoimmune disorder (AID), and learning disabilities (LD) in CRPS.

Participants and Methods: 142 CRPS patients (81.0% female) were administered a health/ handedness questionnaire. Queried items include preferred handedness of patients and 1st degree relatives; presence of LD; environmental allergies (i.e. asthma, seasonal allergies, and eczema) and other AID. A modified Edinburgh handedness index was obtained: a Laterality Quotient (LQ) > 0.33 defined right-handedness, between -0.33 and 0.33 ambidextrous, and < -0.33 left-handedness.

Results: 17.6% of CRPS patients reported non-right handed dominance; 20.4% of participants obtained a score <0.33 on the modified Edinburgh Handedness Index. 54.7% of patients reported at least one non-right handed 1st degree relative. 30.3% of patients have at least one non-right handed child. 14.1% of patients described LDs; 62% described environmental allergies; and 26.8% endorsed a diagnosis of other AIDs.

Conclusions: The prevalence of elements from the Geschwindian Triad observed in CRPS patients is similar as reported by Geschwind and Behan (1982). The presence of these problems in CRPS patients provides support for the possibility of an auto-immune mediated aetiology. These data suggest a congenital basis for CRPS, at least in some patients.

Correspondence: *Joel Eppig, B.A. in psychology; Neurology, Drexel University College of Medicine, 2404 Aspen Street, Philadelphia, PA 19130. E-mail: joel.eppig@temple.edu*

L.E. HAMPTON, J.M. FLETCHER, P. CIRINO & M. DENNIS. Hydrocephalus status in spina bifida: Variations in cognitive profile.

Objective: The relation of hydrocephalus status (shunted, arrested with no shunt, no hydrocephalus) and neuropsychological performance in children with spina bifida is unclear, as the current literature often fails to differentiate hydrocephalus status. We examine the relation of hydrocephalus status and neuropsychological performance in children with spina bifida, hypothesizing a stepwise progression of performance.

Participants and Methods: Two hundred and eight school-age children (mean age = 11.2) were grouped as follows: spina bifida with shunted hydrocephalus (n=166), SB with arrested hydrocephalus (n=18), SB with no hydrocephalus (N=24) . An addition 61 typically developing (TD) children were also included for comparison. Each child was given a battery of neuropsychological and achievement tasks assessing verbal and nonverbal IQ, reading and math achievement, explicit memory, visuospatial, executive function and motor skills.

Results: Multivariate analysis revealed a significant hydrocephalus status x task interaction, $p<0.0001$. A linear contrast showed a significant stepwise pattern of performance, as the SB group with no hydrocephalus performed the best out of all SB groups (M= 91.68), and the SB arrested group performed better (M= 86.67) than the SB shunted group (M= 82.50). All groups performed lower than the TD group on average (M= 105.54).

Conclusions: Children who present with SB and shunted hydrocephalus exhibit the greatest impairment across neuropsychological domains. Those with arrested hydrocephalus show performance levels comparable to those with SB and no hydrocephalus but below TD children. Children with SB and no hydrocephalus perform lower than TD children, but higher than arrested and shunted SB. Their and their performances are in the average range across most tasks. The results suggest SB and hydrocephalus status are both critical factors in assessing neuropsychological outcomes.

Correspondence: *Lyla E. Hampton, M.A., Clinical Psychology, University of Houston, One Hermann Museum Circle Dr., Apt 3060, Houston, TX 77004. E-mail: lelmessi@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A.L. JANOS, D.K. GRANGE, R.D. STEINER & D.A. WHITE. Processing Speed and Variability in Children with Phenylketonuria.
Objective: Phenylketonuria (PKU) is a hereditary metabolic disorder that results in cognitive impairment, even in individuals treated early and continuously. This cross-sectional study was conducted to examine information processing speed, as well as variability in information processing speed, in children with PKU.
Participants and Methods: The early-treated PKU group comprised 42 children (23 girls, 19 boys) aged 7-18 years (M = 11.8, SD = 3.5). The control group comprised 81 typically-developing children (42 girls, 39 boys) aged 7-18 years (M = 12.3, SD = 3.2). No child had a history of major medical disorder, neurologic compromise, or learning disorder unrelated to PKU. Children completed three computerized tasks assessing processing speed: (1) Simple Reaction Time; (2) go condition of Go/No-Go; and (3) compatible condition of Stimulus-Response Compatibility.
Results: Raw reaction time (RT) data were analyzed using repeated measures ANOVA and linear regression. Results showed that, compared with the control group, the PKU group performed significantly more slowly on each of the three speeded tasks ($p < .04$). Performance by the PKU group was also significantly more variable than that of the control group on the Simple Reaction Time ($p < .001$) and Go/No-Go ($p < .01$) tasks. Regression revealed that RT decreased (i.e. improved) as a function of increasing age for the PKU and control groups to a comparable degree. Variability in RT, however, decreased at a faster rate as a function of increasing age for the PKU than control group, such that the RT variability of the oldest children with PKU was approximately comparable to that of older control children.
Conclusions: Taken together, these findings indicate slower and less efficient information processing speed in children with PKU.
Correspondence: *Alicia L. Janos, Washington University in St. Louis, 4400 Lindell Blvd, 15L, St. Louis, MO 63108. E-mail: alicia.janos@gmail.com*

T. KANE, W. PACKMAN, B. HORN, B. CHESTERMAN & M. CRITTENDEN. Cognitive Functioning Associated with Pediatric Bone Marrow Transplant.
Objective: Studies of cognitive functioning following bone marrow transplant (BMT) in pediatric patients have found age-related decline. We hypothesized that neuropsychological test scores would decline at 1 year post-BMT and stabilize by 3 years post-transplant. We compared participant scores to normative means and examined the influence of demographic, family contextual, and medical treatment variables on longitudinal change.
Participants and Methods: 89 participants (mean age = 3.9 years, SD = 3.9) who received BMT for heterogeneous malignant (55%) and non-malignant (45%) disorders were administered age-appropriate global intellectual functioning measures, as well as the Beery-Buktenica Developmental Test of Visual-Motor Integration and the Wide Range Achievement Test, prior to and 1 and 3 years following BMT.
Results: Repeated measures ANOVA revealed significant longitudinal decline in FSIQ ($F=16.84$, $p=.001$) and PIQ ($F=12.23$, $p=.007$), with FSIQ reflecting the hypothesized pattern of change. Participant means were lower than normative means ($p<.05$) on PIQ, quantitative reasoning and spelling achievement at pre-transplant, on VIQ, PIQ, memory and achievement at 1 year post-transplant, and on FSIQ, VIQ, PIQ, memory, visual-motor integration and achievement at 3 years post-transplant. Regression analysis showed that, beyond the contribution of pre-BMT test scores ($p<.05$), gender (R^2 change=.087, $p=.029$) uniquely explained 11% of the variance in PIQ, and post-BMT survival (R^2 change=.144, $p=.018$) contributed 34% unique variance to spelling achievement.
Conclusions: Results indicate decline in cognitive abilities up to 3 years post-BMT, with partial stabilization at 3 years. Lower pre-BMT performance, male gender, and post-BMT non-survival predicted decline in cognitive abilities. Findings suggest areas for preventive and rehabilitative intervention.
Correspondence: *Tara Kane, MS, Psychology, Palo Alto University, 1038 Natchez Point, Apt. 266, Memphis, TN 38103. E-mail: tkane@paloaltou.edu*

K.E. KING, K. DELANEY & E.G. SHAPIRO. Visual Perception in Children with MPS I and II.
Objective: The mucopolysaccharidoses (MPS) are a group of rare disorders characterized by the accumulation of glycosaminoglycans (GAGs) throughout the body due to absent or low enzyme levels. Children with MPSI Hurler syndrome (MPSIH) have earlier onset and more CNS involvement than those with attenuated MPSI (MPSIA) or MPSII. Hematopoietic cell transplant (HCT) is standard treatment, halting cognitive decline. HCT adversely affects white matter and its functions. Corneal clouding is more common in MPSIH than in MPSI and II. Thus, the visual perceptual abilities of MPS disorders are at risk and are unexplored.
Participants and Methods: The visual perceptual, spatial, and visual motor skills of 12 children with MPSIH (all treated with HCT) were compared to 6 with MPSIA and to 8 with MPSII. The latter two groups received enzyme replacement therapy.
Results: The children with MPSIH had significantly lower PIQ and spatial memory scores than MPSII. Across tasks, children with MPSIH were more impaired on average than MPSIA who were lower than MPSII. When a motor component was added to a visual perceptual task, both MPSI groups were equally impaired and lower than the below average MPSII group.
Conclusions: Children with MPSIH had more difficulty than MPSIA and MPSII on tasks requiring visual perception and visual memory. Poor performance may be due to both treatment effects and corneal clouding. The poor performance across all groups on visual motor tasks suggests that these tasks may underestimate visual perceptual skills in these children, due to the poor joint mobility found in all MPS disorders.
Correspondence: *Kelly E. King, Ph.D., University of Minnesota, 360 Spring St. #239, St. Paul, MN 55102. E-mail: kingx780@umn.edu*

M.A. LANCASTER, C. MYERSON, M. WEINER, S. LACY, M. LACY & D. FRIM. Post-Surgical Functioning in Children with Chiari Malformation Type 1.
Objective: Type 1 Chiari malformations (CM1) are rare conditions caused by downward displacement of the cerebellar tonsils into the foramen magnum. Previously, we documented subtle executive dysfunction in children with this condition (Kopland et al, 2009). A common intervention for CM1 is decompression surgery, yet the effect of this procedure on cognition has received little attention.
Participants and Methods: Ten children (mean age = 11.3 years; SD = 3.3) with CM1 were administered a battery of neurocognitive tests before undergoing decompression surgery as well as shortly after the procedure (mean time duration = 6.7 months, SD = 4.1). Performance on measures of memory, visuoconstruction, planning, and attention were compared using paired-sample t-tests.
Results: Of the tests given, improved performance was seen post-surgery on several measures, specifically the Rey Complex Figure Test (RCFT), California Verbal Learning Test (CVLT), and Cognitive Assessment System Planned Connections subtest (CAS-pc). On the RCFT, improved scores were seen on Immediate ($t(9) = -3.0$; $p = .02$) and Delayed ($t(9) = -3.1$; $p = .01$) memory measures. On the CVLT, a significant improvement was seen on Trial 1 ($t(9) = -2.8$; $p = .02$). On the CAS-pc, children post-surgery were significantly faster at completing the tasks ($t(9) = 2.2$; $p = .05$).
Conclusions: Children with CM1 post-decompression surgery showed significant improvement on measures of verbal learning, visual memory, and attention, visual scanning, and motor speed. While practice effects should be considered, surgery most importantly did not have a negative impact on cognition in this small sample. Continued investigation will examine these relationships.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Melissa Lancaster, Rosalind Franklin University of Medicine and Science, 3615 N Whipple St, Unit 2, Chicago, IL 60618. E-mail: melissa.lancaster@my.rfums.org*

J.L. LEE, A.M. MELTON & K. O'TOOLE. Neuropsychological Sequelae of Lightning Strikes in Adolescents: Two Serial Case Studies.
Objective: Effects of lightning strike injuries vary tremendously based on voltage, entry site, and pathway of electrical current through the body. Approximately 70% of lightning strike victims lose consciousness, and 80% experience confusion with amnesia and periods of paresthesias and paresis. Neurocognitive functions often impacted include attention, processing speed, verbal learning and memory, executive functions, and emotional disturbances. Language and visual perceptual skills usually remain intact. This study presents serial neuropsychological test data on two lightning strike victims to illustrate the variability of functioning that exists and the progression of functioning over time.
Participants and Methods: Serial neuropsychological test results of two lightning strike victims (moderate case, age 14 and severe case, age 19) are presented. Comparisons to the prototypical neuropsychological profile, discussion of the variability observed, and a longitudinal view of neuropsychological progression of lightning strike victims are offered.
Results: Both cases demonstrated impairments in processing speed, verbal memory, motor skills, executive functioning, and emotional regulation consistent with the neuropsychological profile of lightning strike victims. Language skills and spatial abilities were relatively intact. Although both cases saw improved functioning across domains over time, impairments in the above domains remained. The severe case made less substantial gains in functioning over time than the moderate case.
Conclusions: Both cases support the current neuropsychological profile for victims of lightning strike. Overall, trajectories of improvement for the two cases appear similar, showing increases over time; however, they differ in magnitude according to the extent of injury received.
Correspondence: *Jennifer L. Lee, B.S., Neuropsychology, Children's Healthcare of Atlanta - University of Georgia, Psychology Building, University of Georgia, Athens, GA 30609. E-mail: jenlee09@gmail.com*

K.L. LEISER & R. ZIEGLER. The Neuropsychological Profile of a 7-year-old Patient with Cobalamin C Deficiency: Results of Longitudinal Assessment.
Objective: Methylmalonic Acidemia with Homocystinuria (also called MMA + HCU; cobalamin C (cblC) deficiency is the most common subtype) is a rare, genetically-linked disorder involving an inability to metabolize the vitamin B12. Little is known about the long-term effects of the disorder on cognition and behavior in children. A recent study added to the sparse literature the complete neuropsychological profiles of two 12-year-old girls with cblC disease. Results of longitudinal testing indicated neuropsychological dysfunction, attention problems, and executive functioning concerns. Both patients demonstrated patterns of decreased intellectual functioning over time with relatively spared verbal expression and comprehension abilities, as well as strengths in sociability. The present study hopes to add to limited data regarding neuropsychological functioning of children with cblC deficiency by presenting longitudinal data from a 7-year-old male patient.
Participants and Methods: The current case study documents the neuropsychological profile of a 7-year-old boy tested longitudinally at regular intervals since age 5-months.
Results: Decreased intellectual functioning, but stable verbal comprehension skills were noted. Attention and executive functioning struggles were documented, with the intensity of these problems increasing over time. Persistent struggles with fine and visual motor skills were found. Parent report of adaptive skills suggested preserved social skills. Qualitatively, parent interview indicated concerns about dysinhibition, attention problems, and motor restlessness, but strengths in socialization.
Conclusions: Specific strengths and weaknesses identified in the neurocognitive profile of our patient together with previous case studies may aid in establishing a neuropsychological profile for cblC disease, and distinguishing it from CNS effects of other inborn errors of metabolism.
Correspondence: *Kara L. Leiser, PhD, Pediatric Clinical Neuroscience, University of Minnesota, Division of Pediatric Neuropsychology, Mayo Mail Code 486, 420 Delaware St. SE, Minneapolis, MN 55455. E-mail: kleiser@umn.edu*

K.L. LEISER, A. KAUGARS, A. HEFFELFINGER, J. KOOP & E. BIRD. The Influence of Family Factors on Intellectual Functioning and Language in Preschoolers with Neurological Insult.
Objective: Children impacted by neurological insult or disorder are at risk for impaired neuropsychological functioning; however, there is substantial variation in outcome, with many affected children doing very well. Factors explaining this variation are poorly understood. The present study examined the nature of relationships among family factors, specifically primary caregivers' perceptions of stress and primary caregiver-child relationship quality, and children's intellectual functioning and language.
Participants and Methods: Seventy-two children ranging from 2 to 5 years of age with neurological insult or disease and their primary caregiver participated in a play interaction as part of an outpatient pediatric neuropsychology clinic visit during which children's intellectual functioning and language was also assessed. Additionally, primary caregivers completed questionnaires about perceived stress. Research assistants trained to an established reliability standard coded the play interaction to assess specific elements of caregiver involvement and parent-child relationship quality. Psychometrists administered measures of intellectual functioning and language.
Results: After controlling for the severity of a child's neurological insult, regression analyses revealed that the quality of the primary caregiver-child relationship accounted for a significant amount of unique variance in predicting children's overall intellectual functioning, verbal reasoning ability, total language, receptive language, and expressive language but not nonverbal reasoning ability. Significant interaction effects between primary caregivers' appraisals of stress and the quality of the primary-caregiver child relationship were found when examining predictors of language abilities.
Conclusions: Results underscore the value of assessing multiple dimensions of family functioning as factors of influence on outcomes in young children with neurological insult and have implications for cognitive rehabilitation.
Correspondence: *Kara L. Leiser, PhD, Pediatric Clinical Neuroscience, University of Minnesota, Division of Pediatric Neuropsychology, Mayo Mail Code 486, 420 Delaware St. SE, Minneapolis, MN 55455. E-mail: kleiser@umn.edu*

L. LUTON & J. KIEFEL. Timing is Everything: Examining Neurocognitive Changes Over Time in an Adolescent with Encephalopathy.
Objective: Encephalopathy is a term for any diffuse disease of the brain that alters cognitive function. While encephalopathy may be caused by a number of conditions (e.g., infection; mitochondrial dysfunction; prolonged exposure to toxins), often the cause of the dysfunction remains unclear. Not surprisingly, research on the neurocognitive prognosis for individuals suffering from this condition has been minimal. As such, further investigation is warranted.
Participants and Methods: An 18-year-old male diagnosed with encephalopathy of unknown origin was evaluated three times between September 2009 and July 2010 in order to track changes in cognitive functioning following diagnosis of encephalopathy. Results from neuroimaging were normal; however, EEG findings indicated diffuse slowing.
Results: The patient was initially seen while receiving treatment on an inpatient rehabilitation unit at a large children's hospital. Results from that evaluation revealed impairments across all domains assessed, with significant behavioral difficulties noted. The patient was subsequently evaluated in March 2010 while participating in an outpatient rehabilitation program and then as an outpatient in July 2010. Findings from these assessments indicated significant gains in all areas, with most scores

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

falling within normal developmental expectations. The most pronounced improvements were seen in behavioral functioning. However, the patient did demonstrate continued difficulties with dominant hand speed and dexterity and visuomotor organization. Further, struggles with adaptive functioning were also noted across time.
Conclusions: These findings suggest that while most neurocognitive areas improve over time following encephalopathy, certain skills remain compromised.
Correspondence: *Lindsay Luton, Psy.D., Neuropsychology, Children's Healthcare of Atlanta, 5455 Meridian Mark Road, Atlanta, GA 30342. E-mail: Lindsay.Luton@choa.org*

E. ZIMMERMAN, T. MAHANEY, A. MELTON, T. PECK & T. BURNS. Comparison of WISC-III and WISC-IV Perceptual Indices in Children Diagnosed with Cerebral Palsy.
Objective: Motor impairments as seen in children with Cerebral Palsy (CP) can pose challenges with reliable assessment of intellectual functioning, specifically on performance based tasks. The Wechsler Intelligence Scale for Children revision from the third (WISC-III) to fourth edition (WISC-IV) emphasized reduced motor components on the subtests comprising the WISC-IV Perceptual Reasoning Index (PRI) in relation to the previous WISC-III Perceptual Organization Index (POI) subtests. The current study compared scores on the perceptual indices of the WISC-III and WISC-IV, suspecting that children with CP would perform better on the WISC-IV PRI due to less demands placed on motor skills.
Participants and Methods: Thirty-nine participants (84% males) total were included. Twenty-six participants with CP, aged 7-16, were referred for outpatient neuropsychological evaluation and received either WISC-III (n=13) or WISC-IV (n=13). The remaining 13 were matched from the WISC-IV normative database based on age, gender, and geographic location. ANOVA's were used to analyze differences in perceptual-based indices between groups.
Results: A One-way ANOVA indicated overall group differences in perceptual index scores [F (2,38) =19.01, $p < .01$]. Post hoc comparisons using Tukey HSD revealed significantly lower WISC-III scores (M =77.0, SD =10.44) when compared to the WISC-IV CP group (M =92.15, SD =14.05, p =.012) and the WISC-IV normative group (M =105.77, SD =10.89, $p < .001$). Significant differences were also observed between WISC-IV groups (p =.016).
Conclusions: The present study contributes to the validity of the reconstructed WISC-IV PRI suggesting more adequate representation of perceptual abilities without confounding motor impairments as often seen in the CP population.
Correspondence: *Tanya Mahaney, M.S., Florida Institute of Technology, 3442 N Druid Hills Rd, Apt D, Decatur, GA 30033. E-mail: trm162@gmail.com*

K.A. MCNALLY, D. BEEBE & P. SHEAR. Iowa Gambling Task Performance in Overweight Children and Adolescents At-Risk for Obstructive Sleep Apnea.
Objective: Obstructive sleep apnea (OSA) is associated with cognitive and behavioral deficits, including impairments in executive functions (EF). Previous literature has focused on the "cool" aspects of EF (e.g., working memory), rather than "hot" EF that involves the regulation of affect and emotion. This study examined performance on the Iowa Gambling Task (IGT), a task believed to assess "hot" EF, in overweight adolescents at risk for OSA. It was predicted that older or more mature adolescents would perform better on the IGT; performance would be related to some measures of "cool" executive functioning; and adolescents with OSA would demonstrate impairments.
Participants and Methods: Based on polysomnography, overweight adolescents (ages 10-16) were classified as having no OSA (N = 37), mild OSA (N = 43), or moderate-severe OSA (N = 31). Participants were administered several traditional measures of EF and the IGT. General linear mixed modeling was conducted to model IGT performance (net advantageous draws) over the course of the task.
Results: IGT performance was significantly related to tasks that required working memory or behavioral inhibition. Individuals without OSA learned to make more beneficial decisions on the IGT over time; however, participants with OSA continued to make choices associated with higher initial rewards, but greater long-term losses. Finally, developmental level was related to IGT performance only among participants without OSA; the expected developmental trend was not seen in participants with OSA.
Conclusions: These results suggest that OSA may impact "hot" aspects of EF. This is consistent with suggestions that OSA may be associated with impairments in ventromedial prefrontal cortical functioning.
Correspondence: *Kelly A. McNally, Ph.D., Psychology, Nationwide Childrens Hospital, 700 Children's Drive, Columbus, OH 43205. E-mail: kelly.mcnally@gmail.com*

J.M. PERRY-AVERY. WISC Profile Analysis of Children with Early Orphanage Experience as a Function of Duration Institutionalization.
Objective: Studies of children with histories of early deprivation (ED) have found that length of time spent in institutions prior to adoption is negatively correlated with global IQ. However, the relationship of duration of deprivation to specific cognitive domains is less understood. The present study examined whether specific domains are differentially associated with duration of deprivation.
Participants and Methods: Participants included 125 children (9.6 ± 2.3 years of age) placed in an orphanage at birth and subsequently adopted into the U.S. (mean duration 26.0 ± 18.9 months). Participants were placed into one of three groups based on duration of institutionalization: <12 months, 12-23 months, and >23 months. A three (Group) x four (Wechsler scale Index score - VCI, PRI/POI, WMI/FDI, PSI) repeated measures MANCOVA was performed to examine whether the groups differed along the four domains.
Results: The overall test with gender, age at testing, and region of orphanage entered as covariates, revealed a significant duration group x indices interaction ($F[6,224] = 2.4$, $p < 0.05$). Three follow-up 3 (Group) x 2 (Index Scores) repeated measures MANCOVAs were used to evaluate the interaction, with select indices chosen after visual inspection of profile plots. Results revealed a significant interaction with VCI and PRI/POI, and VCI and PSI included as multivariate outcomes ($F[2,114]=4.6$, = 0.01; and $F[2,114]=5.5$, $p< 0.01$), but not with VCI and WMI/FDI included as the multivariate outcome ($F[2,114]= 0.7$, p= 0.49).
Conclusions: Verbal comprehension demonstrates a different relationship with duration of ED than perceptual reasoning and/or processing speed.
Correspondence: *Jacquelyn M. Perry-Avery, Psychology, Wayne State University, 3371 Braeburn, Ann Arbor, MI 48108. E-mail: jmperry@wayne.edu*

M.R. POWELL, M. MCCREA, T. HAMMEKE, G. OLSEN, K. FLORA, P. LEO & K. GUSKIEWICZ. Acute Effects and Natural Recovery Following Concussion in High School Football Players.
Objective: This study sought to prospectively measure acute effects and natural recovery of subjective symptoms and cognitive functioning following concussion in high school football players and identify variables that differentiate players who experience typical versus prolonged recovery following concussion.
Participants and Methods: One hundred twenty five players with concussion and 105 normal controls were evaluated. Injured and matched controls received a battery of tests assessing cognition and subjective symptoms at time of injury, day 1, day 6 and day 45 post injury.
Results: Concussed athletes exhibited the most severe symptoms and cognitive impairment immediately following concussion. Cognitive symptoms resolved within several days, whereas subjective symptoms remained through day 6 follow-up but were no longer evident at day 45 follow-up. Concussed players with more prolonged recovery were more likely to report posttraumatic amnesia (PTA) and retrograde amnesia (RGA) at time of injury and were more symptomatic up to day 6 follow-up compared to athletes with typical recovery.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Recovery curves following concussion for high school athletes is similar to recovery curves in collegiate athletes, though athletes who report PTA or RGA at time of injury may have a more prolonged recovery. These findings may enhance clinical decision making about a high school athlete's readiness to return to competition after concussion.

Funding provided by Waukesha Memorial Hospital Foundation, National Academy of Neuropsychology, National Federation of State High School Associations, National Football League Charities, Green Bay Packer Foundation, Milwaukee Bucks, Herbert H. Kohl Charities, Waukesha Service Club, Michael Emme, and the Medical College of Wisconsin General Clinical Research Center.

Correspondence: *Matthew R. Powell, PhD, Neuroscience, Waukesha Memorial Hospital, 721 American Avenue, Suite 406, Waukesha, WI 53188. E-mail: matthew.powell@phci.org*

C.V. RESENDIZ, S.A. ROPACKI & A. ZOUROS. Neurocognitive Performance among Bilingual and Monolingual Children with Spina Bifida.

Objective: Neurocognitive differences have been documented between monolingual and bilingual individuals. However, research that examines the neurocognitive profiles of Latino children with Spina Bifida (SB) is limited, despite being the ethnic group most commonly affected by this condition. Thus, this study examined various neurocognitive domains among bilingual (English-Spanish) children with SB, and compared their performance to monolingual (English) children with SB.

Participants and Methods: Forty four children with SB (22 bilingual English-Spanish, and 22 monolingual English) were assessed using a neuropsychological battery consisting of the WISC-IV, measures of memory, executive functioning and motor skills. Principal factors extraction was performed on subtests of the neuropsychological battery, followed by a multivariate analysis of covariance (MANCOVA) with parental income and education levels, and participants' language proficiency and acculturation level as covariates.

Results: Six factors were extracted: visual memory/abilities, verbal memory, verbal abilities, motor abilities, processing speed, and executive function. MANCOVA analyses indicated overall differences in neurocognitive performance between both groups [Wilks' $\lambda = .021$, $F(6, 33) = 2.92$, $p < .05$]. Post hoc comparisons revealed that bilingual SB participants exhibited lower scores on visual memory/abilities than their counterparts [$F(1, 42) = 3.84$, $p < .05$]. No additional significant differences were found in other neurocognitive domains.

Conclusions: Similar neurocognitive profiles were found between bilingual and monolingual children with SB after controlling for various cultural variables (i.e., parental income and education, children's language proficiency and acculturation level). However, significant differences between groups were observed in visual memory and visual abilities, suggesting a more intact performance in this domain among monolingual children.

Correspondence: *Claudia V. Resendiz, MA, Loma Linda University, 322 E Dryden st #4, Glendale, CA 91207. E-mail: cresendiz@llu.edu*

A. SLONAKER, S. FARROW, L. PASS, J. BLASIK & N. COMOLESKO. Wolff-Parkinson-White Syndrome: A Case Study of Neuropsychological Functioning.

Objective: Wolff-Parkinson-White Syndrome (WPW) is a condition in which there are electrical abnormalities within the heart, which may cause individuals with WPW to experience tachycardia, dizziness, fainting, or, in rare cases, cardiac arrest. In the typical heart, there is one pathway through which electrical signals move. However, in WPW, there is an extra conduction path, which can cause electrical signals to arrive to the ventricles sooner than needed. This case presentation will provide an overview of WPW and detail the neuropsychological functioning of an adolescent diagnosed with WPW following cardiac arrest. Additionally, appropriate educational interventions based on the neuropsychological findings will be discussed.

Participants and Methods: This case presentation will include the general demographic information and neuropsychological test results of an adolescent male diagnosed with WPW following cardiac arrest.

Results: Results from the neuropsychological evaluation indicated generally intact visual and auditory perceptual abilities; however, tactile sensation was variable. Attention and impulse control were intact. There was evidence of reduced fine motor speed and dexterity as well as reduced processing speed abilities. Memory functioning was variable, although the student demonstrated a strength in the cued recognition of visual information. Overall, diffuse cognitive deficits were demonstrated, thus impacting the student's educational performance.

Conclusions: Given the neuropsychological findings, this case study details the importance of the neuropsychologist's role in providing specific educational recommendations and interventions for success of students with WPW in school. Such interventions also will be discussed.

Correspondence: *Amanda Slonaker, Psychological Services, Virginia Beach City Public Schools, 1413 Laskin Road, Virginia Beach, VA 23451. E-mail: Amanda.Slonaker@vbschools.com*

A. SLONAKER, S. FARROW, J. BLASIK, L. PASS & N. COMOLESKO. CHARGE Syndrome: A Neuropsychological Case Study of Siblings.

Objective: CHARGE is a complex syndrome that involves various birth defects that may include heart defects, breathing and swallowing problems, loss of hearing and/or vision, problems with balance and motor difficulties, and communication delays. CHARGE is relatively rare, occurring in approximately 1 out of 9,000 to 10,000 births. The many medical and physical difficulties associated with CHARGE vary from child to child. This case study will present an overview of CHARGE syndrome, specifically with regard to the neuropsychological presentation of two siblings with CHARGE. Interventions for children with CHARGE syndrome also will be discussed.

Participants and Methods: This case study presentation includes two siblings, pre-adolescent and adolescent, diagnosed with CHARGE syndrome. A series of home observations were conducted to assess the students according to neuropsychological domains of functioning. The presentation will include general demographic information and results regarding the neuropsychological presentation of the siblings.

Results: The siblings presented with significant sensory, motor, language, and academic impairment. Attention and concentration abilities also were variable for both siblings. Given the significant sensory impairment, standardized assessment was not deemed appropriate and therefore reporting of functional abilities was conducted. The students' significant difficulties and delays were consistent with their medical history and subsequent CHARGE diagnosis.

Conclusions: Due to the presentation of significant impairments associated with the syndrome, recommendations for intervention based on the neuropsychological findings will be discussed.

Correspondence: *Amanda Slonaker, Psychological Services, Virginia Beach City Public Schools, 1413 Laskin Road, Virginia Beach, VA 23451. E-mail: Amanda.Slonaker@vbschools.com*

L. PASS, S. FARROW, J. BLASIK, A. SLONAKER & N. COMOLESKO. Tetralogy of Fallot: A Pediatric Neuropsychological Case Study and Educational Implications.

Objective: Tetralogy of Fallot (TOF) accounts for 10-15% of all congenital heart defects. TOF results in abnormally deficient blood-oxygen levels, which can lead to various symptoms. Specific neuropsychological profiles have been noted in children with TOF. Since many with TOF attend school, identification of neuropsychological strengths and deficits can provide information for the planning of appropriate educational supports and services. This proposed case study will present an overview of TOF, with a specific emphasis placed on how neuropsychological data can aid in educational planning.

Participants and Methods: The case presentation of an elementary age student includes basic demographic information and results from the neuropsychological test data.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Neuropsychological findings indicated mild to moderate impairments in Attention/Concentration, inhibition, and mental flexibility. Severe impairment in Working Memory, with more pronounced deficits in verbal and narrative memory as compared to visual memory, was noted. Impairments in understanding and correctly responding to aurally presented instructions, phonological processing, and speeded naming were demonstrated. Visuospatial ability was impaired, specifically when copying 2-dimensional geometric figures. Although fingertapping was within normal range, moderate deficits in hand imitation were present. Parent report indicated elevated concerns for organization of materials.
Conclusions: The case study is significant based on the consistency of findings with previous studies. Based on the particular symptoms presented in this case, specific educational considerations and suggestions for the role of the neuropsychologist in informing these educational decisions will be discussed.
Correspondence: *Amanda Slonaker, Psychological Services, Virginia Beach City Public Schools, 1413 Laskin Road, Virginia Beach, VA 23451. E-mail: Amanda.Slonaker@vbschools.com*

L. PASS, A. SLONAKER, J. BLASIK, S. FARROW & N. COMOLESKO. Neurofibromatosis type 1: A Pediatric Neuropsychological Case Study and Educational Implications.
Objective: Neurofibromatosis type 1 (NF1) is a neurogenetic condition which effects one in 3000 individuals. Physical manifestations of NF1 can include multiple noncancerous tumors of nerves and skin, benign and malignant neural tumors (neurofibromas, optic gliomas), café-au-leit spots, iris hamartomas, osseous lesions, and shortness of stature. Specific neuropsychological profiles have been noted in children with NF1, including deficits in attention, executive function, language, and visual perception. In addition, learning disabilities have been identified in 30% to 60% of NF1 patients. Because cognitive abilities have a major impact on educational prospects, future employment, self-image, and relationships, children with NF1 need appropriate educational supports in the schools. This proposed case study will present an overview of NF1, specifically emphasizing how neuropsychological data can aid in educational planning.
Participants and Methods: The case presentation includes basic demographic information and results from the neuropsychological test data for an elementary-aged child diagnosed with NF1.
Results: Neuropsychological findings indicated mild to moderate impairments in Attention/Concentration, inhibition, and mental flexibility. Severe impairment in Working Memory, with more pronounced deficits in verbal and narrative memory as compared to visual memory, was noted. Particular difficulty in the achievement areas of Reading, Writing, and phonological processing were demonstrated. Visuo-spatial ability was impaired. Parent report indicated elevated concerns for inhibition, working memory, and planning.
Conclusions: The case study is significant based on the consistency of findings with previous studies. Based on the particular symptoms presented in this case, specific educational considerations and suggestions for the role of the neuropsychologist in informing these educational decisions will be discussed.
Correspondence: *Amanda Slonaker, Psychological Services, Virginia Beach City Public Schools, 1413 Laskin Road, Virginia Beach, VA 23451. E-mail: Amanda.Slonaker@vbschools.com*

S. FARROW, L. PASS, A. SLONAKER, J. BLASIK & N. COMOLESKO. Cognitive and Academic Profiles of Sickle Cell Disease In School-aged Children: Educational Implications.
Objective: Sickle cell disease (SCD) is one of the most prevalent genetic disorders and is characterized by abnormal, sickle-shaped red blood cells. It affects approximately 30,000 students in the United States. There are many health implications associated with this disease, including chronic pain and fatigue, weakness, infections, blood clots, and damage to tissues and organs. Associated impairments include decrements in general intellectual functioning, language and verbal abilities, visual-motor and visual-spatial processing, memory, academic achievement. Studies have also suggested neurocognitive deficits in attention and concentration, executive function, and visual-motor speed and coordination. The proposed examination will present an overview of SCD in school-aged children, specifically with regard to neuropsychological functioning and the impact on educational performance. It will also highlight the use of neuropsychological data to support educational planning.
Participants and Methods: This presentation will include basic demographic information and results of neuropsychological test data from several cases involving children diagnosed with SCD.
Results: Results from the neuropsychological evaluation suggested deficits in functioning that are consistent with the findings of previous studies. Overall, students demonstrated deficits in general cognitive functioning, verbal ability, spatial ability, sequencing, and design memory. Achievement was low in reading, mathematics, and written language; with lower scores demonstrated for reading. Further, overall deficits in executive functioning were noted as well.
Conclusions: This investigation examines the cognitive and academic profiles of several students diagnosed with SCD. Based on the presentation of symptoms, specific educational considerations and suggestions for the role of the neuropsychologist in assisting with the educational decision-making process will be discussed.
Correspondence: *Amanda Slonaker, Psychological Services, Virginia Beach City Public Schools, 1413 Laskin Road, Virginia Beach, VA 23451. E-mail: Amanda.Slonaker@vbschools.com*

H. TAYLOR, N. KLEIN, A. COSTIUC, M. ANSELMO, N. MINICH, B. HAGESFELD, M.R. JACOBS & M. HACK. Classroom behavior of kindergarten children with extreme prematurity: Comparisons with term-born controls and neuropsychological correlates.
Objective: To determine if children with extreme prematurity (EP, birth weight <1000 g or gestational age <28 weeks) display problems in classroom behavior relative to term-born normal birth weight (NBW) classmates and to examine the neuropsychological basis of these problems.
Participants and Methods: The sample comprised 109 children with EP attending regular kindergarten classrooms and a matched group of 109 NBW classmates. Assessments included tests of intelligence and executive function and "blinded" observations of the children during 1-hour instructional periods using a time-sampling procedure (MS-CISSAR). Observational codes included % time in which the target child was: (a) the focus of teacher attention, (b) making an academic response, and (c) displaying off-task behavior. Group comparisons were made using ANCOVA and controlling for age, ethnicity, and gender. Regressions were conducted to examine associations of test scores with student behavior after controlling for these same factors.
Results: The EP group demanded more teacher attention (9% vs. 5% of intervals) and was more often off-task (14% vs. 11%) than the NBW group. Within the EP group, children with lower intelligence and poorer executive function demanded more teacher attention. Poor executive function was also related to less frequent academic responding and more off-task behavior.
Conclusions: Kindergarten children with EP require more teacher attention and are more often off-task than their NBW classmates. Cognitive deficits related to EP contribute to these problems and to poorer academic responding. The findings support the need for special education interventions for children with EP beginning at school entry.
Correspondence: *H. Gerry Taylor, Ph.D., Pediatrics, Case Western Reserve University, W.O. Walker Building, Suite 3150, 10524 Euclid Ave., Cleveland, OH 44106-6038. E-mail: hgt2@case.edu*

C.C. VELAZQUEZ, S.M. BUTT, E. WILLEN, M. GOLDMAN & F. ARMSTRONG. Regression Based Norms for Motor Speed and Manual Dexterity in Pediatric Sickle Cell Disease and Human Immunodeficiency Virus.
Objective: The aim was to identify relevant predictors of motor skills in children with sickle cell disease (SCD) and human immunodeficiency virus (HIV) to develop regression based norms (RBN).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: The sample consisted of 52 children (26 HIV; 26 SCD), ages 7-13, as part of two larger clinical trials. Participants received a standardized neuropsychological battery, and the following data were utilized: a) FSIQ and PSIQ from the WISC; b) Letter-Word Identification (LWI) from the WJ-III; c) and the Grooved Pegboard. Preliminary analyses were conducted for all the neurocognitive and demographic variables. Only significant mean differences on PSIQ between the disease groups were found ($t = 3.46$, $p < .01$). Therefore, the groups were combined. Bivariate correlations were performed to examine the relationship between the variables of interest and only LWI and PSIQ were incorporated into the model.
Results: Global cognitive functioning in the present sample fell in the low average range (FSIQ, M=81; PSIQ, M=86); whereas, word reading fell within the average range (LWI, M=91). Fine motor skills fell in the borderline impaired range for both non-dominant (M=71) and dominant (M=77) hands. PSIQ and LWI were entered in the regression, explaining 16% of the variance in dominant hand ($R2 = .16$, $adjR2 = .13$, $p = .01$) and 32% for non-dominant hand ($R2 = .32$, $adjR2 = .29$, $p = .001$) performance. Based on these results, RBNs will be presented for motor skill performance.
Conclusions: Results indicate that PSIQ and LWI are predictive indicators of motor skills in this sample. RBNs allow the evaluation of abnormal discrepancies in pediatric chronic disease. As such, these equations were used to uniquely identify abnormal discrepancies in individual performance in our sample. In both these populations, disease process manifests in processing speed deficits. RBNs can aid in the interpretation of processing speed deficits relative to motor skills above and beyond traditional norms.
Correspondence: *Carmen C. Velazquez, PhD, Pediatrics, University of Miami, Miller School of Medicine, 1601 NW 12th Ave. (D-820), Miami, FL 33136. E-mail: cvelazquez3@med.miami.edu*

R. WESTMACOTT, T. WILLIAMS, L. GRANITE, P. DIRKS, R. ASKALAN, D. MACGREGOR, M. MOHARIR & G. DEVEBER. The Impact of Disease Laterality and Stroke on Intellectual Ability and Executive Function in Pediatric Moya-moya Disease.
Objective: Moya-moya disease is characterized by progressive stenosis of the cerebral vasculature, resulting in compromised blood flow and increased risk of stroke. Several studies have suggested that pediatric moya-moya is detrimental to intellectual function, but little is known about individual differences or cognitive abilities beyond overall intelligence in this population. This study examined the impact of disease laterality (bilateral vs. unilateral) and stroke (presence or absence) on intellectual ability and executive function in pediatric moya-moya disease.
Participants and Methods: Thirty participants (Mean Age = 10.07 yrs., SD = 4.06 yrs.) diagnosed with moya-moya disease (14 bilateral, 16 unilateral) before 18 years of age completed age appropriate Wechsler scales of intelligence. Reports of executive function were obtained from parents and teachers using the Behavior Rating Index of Executive Function.
Results: Moya-moya patients scored significantly lower than the normative sample on all indices of intelligence as well as parent and teacher ratings of executive functioning. Patients with a history of clinical stroke scored significantly lower on perceptual reasoning compared to those without stroke, but there were no other differences in intellectual or executive function. Patients with bilateral disease scored significantly lower than those with unilateral disease on measures of overall intellectual function and verbal comprehension, and nonsignificant trends were observed for the other Wechsler indices. Deficits in metacognitive executive functions were also significantly more pronounced in bilateral patients according to teacher ratings.
Conclusions: Moya-moya patients are at risk for intellectual and executive problems regardless of clinical stroke history. Patients with bilateral disease appear to be most severely affected.
Correspondence: *Robyn Westmacott, Ph.D., Psychology, Hospital for Sick Children, 555 University Ave., Toronto, ON M5G 1X8, Canada. E-mail: robyn.westmacott@sickkids.ca*

T. WILLIAMS, R. WESTMACOTT, W. LOGAN, G. DEVEBER, L. GRANITE, P. DIRKS, R. ASKALAN, D. MACGREGOR, M. MOHARIR & N. DLAMINI. Cerebrovascular reactivity and neuropsychological functioning in pediatric moya-moya disease.
Objective: There is increasing interest in measuring cerebrovascular reactivity (CVR) among patients with moya-moya disease. The measurement of cerebrovascular reactivity indexes vascular capacity to self-regulate blood flow which becomes compromised among moya-moya patients. Studies have shown an association between decreased CVR and cognitive decline among neurodegenerative conditions, but less is known about CVR and neuropsychological functioning among children. This study examined the associations between CVR ratings and intellectual ability in pediatric moya-moya disease.
Participants and Methods: Twenty three participants (Mean Age = 10.04 years, SD = 4.04 years) diagnosed with moya-moya disease before 18 years completed age appropriate Wechsler scales of intelligence. All participants underwent blood oxygen level dependent (BOLD) functional MRI. CVR maps were scored for each hemisphere, such that normal positive reactivity = 1, reduced positive reactivity without or with less than 10% negative reactivity = 2, and > 10% negative reactivity with or without reduced positive reactivity = 3.
Results: CVR ratings of both hemispheres were associated with full scale intellectual and verbal comprehension scores. Specifically, left hemisphere CVR ratings were correlated with verbal comprehension scores and right hemisphere CVR was uniquely associated with working memory. Decreased cerebrovascular reactivity bilaterally was associated with lower intellectual scores across all intellectual indices.
Conclusions: Assessment of cerebrovascular reactivity by functional BOLD MRI is associated with neuropsychological functioning in pediatric patients with moya-moya disease. Further studies are required to explore the utility of BOLD MRI for regular and pre-surgical assessment of children with moya-moya disease with the aim of preventing cognitive decline and stroke.
Correspondence: *Tricia Williams, Ph.D., Hospital for Sick Children, 555 University Ave, Toronto, ON M5G1X8, Canada. E-mail: tricia.williams@sickkids.ca*

J.L. ROSENBERG, C.D. ANDERSON, A.T. SCHMIDT & T.A. ZABEL. Clinician Ratings of Diffusion Tensor Imaging Do Not Predict Neuropsychological Status in Children with Cerebral Palsy.
Objective: Abnormalities in specific white matter fibers/bundles have been identified in young children with Cerebral Palsy (CP) using Diffusion Tensor Imaging (DTI) (Nagae et al., 2007). It was hypothesized that these white matter abnormalities might be predictive of later neurocognitive functioning.
Participants and Methods: Ten children (mean age 9) with spastic diplegia or hemiplegia were recruited for neuropsychological testing from a previously conducted study of 28 children with CP. These children had undergone DTI and motor assessment an average of three years prior to the current neuropsychological study. DTI was analyzed via an ordinal grading system based upon examination of fiber track morphology (0=Normal; 1=Abnormal; 2=Severely Abnormal/Absent). The Modified Ashworth Scale for Grading Spasticity was used to quantify muscle tone. A brief neuropsychological test battery with limited motor and expressive language formulation demands was also administered.
Results: For most participants, white matter abnormalities were identified bilaterally in the retrolenticular part of the internal capsule (RLIC), the posterior thalamic radiation (PTR), and/or the corona radiata (CR). Strong associations were found between ratings of upper extremity tone/spasticity and ordinal DTI ratings of the RLIC and PTR. Abnormalities in DTI ratings and/or motor ratings were not associated with later performance on verbal or nonverbal neuropsychological tasks.
Conclusions: Clinician ratings of DTI in young children with CP were concurrent predictors of motor status, but were not predictive of later cognitive functioning in middle childhood. Prospective and concurrent neuropsychological assessment and DTI using region of interest analysis is planned to further investigate a possible brain-behavior relationship in children with CP.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *T. A. Zabel, Ph.D., Kennedy Krieger Institute, 416 Bretton Place, Baltimore, MD 21218. E-mail: zabela@kennedykrieger.org*

Neurocognitive Aspects of Obesity:

2:45–3:30 p.m.

J. GUNSTAD. Neurocognitive Aspects of Obesity.
Obesity is now a recognized risk factor for Alzheimer's disease and stroke. Recent studies demonstrate that obesity is associated with differences on neuroimaging and neuropsychological testing long prior to the onset of these disorders. Work from our lab extends these findings and shows that weight loss following bariatric surgery is associated with improved cognitive function.
Correspondence: *John Gunstad, Kent State University, 221 Kent Hall Addition, Kent State University, Kent, OH 44242. E-mail: jgunstad@kent.edu*

Symposium 12: The Ubiquity of Sex Differences in Neuropsychological Research

Chair: Cynthia A. Munro

Discussant: Edith V. Sullivan

3:15–4:45 p.m.

C.A. MUNRO, E.V. SULLIVAN, E. MAHONE, A. MENDREK, K.P. COSGROVE & C.A. MUNRO. The Ubiquity of Sex Differences in Neuropsychological Research.
Symposium Description: The year 2011 marks the 10-year anniversary of the publication of the Institute of Medicine's report, *Exploring the Biological Contributions to Human Health: Does Sex Matter?* The past decade has since witnessed a preponderance of evidence for the existence of sex differences in numerous biological indices, from the cellular to the functional, from conception to old age. Nevertheless, data concerning sex differences can be difficult to glean from published studies, which are often underpowered to study these differences, and control for sex rather than study it.
The panelists in this symposium will present findings from a broad range of topics: First, Mark Mahone will report findings describing sex differences in brain volume, and motor and cognitive skills among children with attention-deficit/hyperactivity disorder. Second, Adrianna Mendrek will present findings indicating a sex difference in the default mode network in both healthy adults and in patients with schizophrenia. Third, Kelly Cosgrove will discuss sex differences in the relation between depressive symptoms and nicotinic acetylcholine receptor availability in tobacco smokers. Finally, Cynthia Munro will report findings indicating that sex differences in measures of serotonin and cognition in adults are altered with advancing age.
The goal of this symposium is to highlight, in a single venue, the breadth of neuropsychological research investigating sex differences. Future studies should be designed to assume that these differences exist, rather than to obscure them. In so doing, such investigations will allow us to elucidate the biological underpinnings of illness in both sexes.
Correspondence: *Cynthia A. Munro, Ph.D., Psychiatry, Johns Hopkins School of Medicine, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21287-7218. E-mail: cmunro@jhmi.edu*

E. MAHONE, S.H. MOSTOFSKY & M.B. DENCKLA. Sexual Dimorphism in Children with ADHD.
Objective: Like many disorders affecting CNS development, the incidence of ADHD differs in boys and girls. This finding is not surprising in light of known sexual dimorphism in behavioral, motor, cognitive, and biological development. By school age, boys are diagnosed with ADHD 3-4 times as often as girls, with genetic and hormonal factors cited as potential causes of the male preponderance. Diagnosis of ADHD in girls is more complicated than in boys, however, due to later age of onset, different patterns of comorbidities, more subtle clinical manifestation, and limitations associated with DSM-IV-TR diagnostic nomenclature. Furthermore, girls present more commonly with the inattentive subtype than do boys, complicating sex comparisons within ADHD when groups are not matched on subtype. To date, most research investigating brain-behavior relationships in ADHD has been based on samples comprised primarily of boys, with subsamples of girls not matched (to boys) on subtype and comorbidities. Thus, available research has only begun to specify a neuropsychological profile distinct to girls with ADHD.
Participants and Methods: The current presentation summarizes recent findings involving sex differences in neurobehavioral development among both typically developing children and those with ADHD.
Results: When matched on age, subtype, and patterns of comorbidities, both boys and girls with ADHD demonstrate deficits (relative to controls) involving brain volume, motor and oculomotor skills, and executive function.
Conclusions: In most (but not all) cases, deficits are more subtle and less widespread among boys with ADHD; however, unique deficits involving oculomotor speed and higher level planning are beginning to emerge among school-aged girls with ADHD.
Correspondence: *E. Mark Mahone, Kennedy Krieger Institute, 1750 East Fairmount Avenue, Baltimore, MD 21231. E-mail: mahone@kennedykrieger.org*

A. MENDREK, J.A. JIMÉNEZ & N. LAKIS. Sex Differences in the Default-Mode Network in Schizophrenia and in Health.
Objective: Functional neuroimaging studies have consistently revealed deactivations in precuneus/posterior cingulate, medial prefrontal and inferior parietal cortices during performance of various cognitive tasks. This network has been found to be active in the resting brain and is referred to as the default mode network (DMN). The DMN disturbances have been observed in schizophrenia, but nothing is known about potential sex differences in the DMN in this grave psychiatric disorder (and there are only a few inconsistent reports in the general population).
Participants and Methods: Forty schizophrenia patients (20 women) and 40 matched control participants underwent functional MRI (3T) during performance of a mental rotation task. Subjects mentally rotated pairs of 3D figures to determine whether the stimuli were identical or mirror-images of each other. The control task required no mental rotation. The experimental and control conditions were interspersed with periods of rest. Analyses comparing 'rest' with 'activation' conditions were performed with SPM5.
Results: fMRI analysis revealed much more extensive DMN activations in healthy women than in healthy men. In schizophrenia there were greater DMN activations in men than in women. Thus, there were significant differences in the DMN function in women patients relative to the same-sex controls, while there were no differences between the two groups of men.
Conclusions: DMN has been associated with self-reflective behaviour. Thus, present results of greater DMN activations in healthy women than in men suggest that they exhibit more self-evaluation during visuo-spatial processing. In contrast, in schizophrenia it is men who activate DMN more than women. These results will be discussed in association with task performance and sex differences in cerebral activations during mental rotation.
Correspondence: *Adrianna Mendrek, Département de Psychiatrie,, Centre de recherche Fernand-Seguin, Montreal, QC H1N 3V2, Canada. E-mail: adrianna.mendrek@umontreal.ca*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

K.P. COSGROVE, S. MCKEE, I. ESTERLIS, S.S. O'MALLEY, C.M. MAZURE & J.K. STALEY. Sex Differences in Beta2*-Nicotinic Acetylcholine Receptors in Abstinent Tobacco Smokers.

Objective: Women have a harder time quitting smoking than men, and this may due to the emergence of depressive and anxiety symptoms during abstinence. We previously demonstrated higher beta2*-nicotinic acetylcholine receptor (nAChR) availability throughout the brain in smokers versus nonsmokers during acute abstinence which normalizes during prolonged abstinence. There is high variability in the normalization of the receptor, which may be due to neurochemical differences between men and women.

Participants and Methods: Tobacco smokers were imaged during acute and prolonged abstinence using [123I]5-IA-85380 (5-IA) SPECT to examine beta2*-nAChR availability over time. Men (n=6) and women (n=6) smokers participated in 2 5-IA SPECT scans during abstinence: at 1 week and 4-12 weeks. All subjects completed 1 MRI. At intake, tobacco smokers smoked 16 + 8 cigarettes/day for 20 + 8 years. They were helped to quit smoking with contingency management.

Results: When adjusting for age, higher depressive and withdrawal symptomatology is associated with lower beta2*-nAChR levels in the parietal and frontal cortices. In analyses accounting for main effects of nicotine withdrawal symptoms, female sex is also associated with lower beta2*-nAChR levels in frontal and parietal cortices. When accounting for main effects of depressive symptoms, there is a trend towards women having lower beta2*-nAChR levels in the frontal cortex. All other brain regions examined are nonsignificant. Interactions with day of scan were not significant.

Conclusions: This suggests low beta2*-nAChR availability in women is associated with high scores on depression and withdrawal scales and may underlie the increased risk for tobacco smoking relapse in women.

Correspondence: *Kelly P. Cosgrove, Yale University School of Medicine and the VACHS, 950 Campbell Ave / 116A6, New Haven, CT 06516. E-mail: kelly.cosgrove@yale.edu*

C.A. MUNRO, D.J. SCHRETLEN & G.S. SMITH. The Influence of Age on Sex Differences in Cognitive Test Performance and on Indices of Serotonin Function.

Objective: We and others have previously reported sex differences in cognitive functioning and in neurotransmitter responses as inferred by positron emission tomography (PET) measures. The aim of the current studies was to examine the effects of age on sexual dimorphisms in cognitive test performance (study 1) and on serotonin function *in vivo* (study 2) in normal healthy individuals.

Participants and Methods: In study 1, the cognitive test performance of 327 healthy men and women, divided into "young" (mean age = 38.9 years) and "old" (mean age = 70.8 years) groups, were compared. In study 2, the correlation between age and cerebral metabolism in response to a single 40-mg dose of the selective serotonin reuptake inhibitor citalopram was studied in healthy men (n=14) and women (n=19).

Results: : In study 1, the classic pattern of sex differences in cognition—an advantage of visuospatial skills in men and verbal skills in women—was observed in both age groups, but was attenuated in the older compared to the younger group. In study 2, age was correlated with cerebral metabolic response in both sexes, but the correlations were stronger in men than in women in several brain regions.

Conclusions: Findings from both studies indicate that the nature of sex differences changes with advancing age. These findings have implications not only for healthy individuals, but also in patients with diseases affecting cognition. As blunted responses to citalopram have been observed in geriatric depressed patients, the present findings also bear relevance to future studies of treatment response in patients with depression.

Correspondence: *Cynthia A. Munro, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21287. E-mail: cmunro@jhmi.edu*

Symposium 13: Functional and effective connectivity: Communication within neural networks underlying cognition in clinical populations

Chair: Victoria Leavitt

Discussant: Andrew J. Saykin

3:15–4:45 p.m.

V.M. LEAVITT. Functional and effective connectivity: Communication within neural networks underlying cognition in clinical populations.

Symposium Description: The field of functional neuroimaging has been dominated by attempts to link activation in discrete brain regions to cognition in a one-to-one manner (e.g., hippocampus to memory). We know, however, that cognition is complex and requires distributed processing within networks encompassing both proximal and distant brain regions. Functional connectivity has emerged as a novel data analysis technique that utilizes information about temporally correlated brain regions to allow inferences regarding communication between spatially remote brain regions. That is, functional connectivity analysis helps to elucidate the functional neural networks underlying cognition. Effective connectivity utilizes information about time-lagged relationships between brain regions to allow inferences about the directionality of information transfer within functionally connected networks. Understanding what brain regions comprise distinct networks both during rest and during cognitive tasks holds compelling implications for neural efficiency and plasticity, and has been examined in the context of a growing number of disorders and diseases. There is mounting evidence to suggest that these networks play a pivotal role in the efficiency of cognitive function in domains including memory consolidation and processing speed. In this symposium, we will present evidence for abnormal functional connectivity in the context of neurological and psychiatric disorders. The default mode network, a collection of brain regions more active during rest than during task performance, will be given special consideration as a potentially vital biomarker for cognitive dysfunction in a number of brain pathologies as well as normal aging. Finally, future clinical implications of exploring functionally connected brain networks will be discussed.

Correspondence: *Victoria M. Leavitt, Ph.D., Neuropsychology and Neuroscience Laboratory, Kessler Foundation Research Center, 100 Executive Drive, ste 10, West Orange, NJ 07052. E-mail: vleavitt@kesslerfoundation.org*

G.R. WYLIE, F. HILLARY, V. LEAVITT & N. CHIARAVALLOTI. Connectivity Changes in Traumatic Brain Injury across Recovery.

Objective: To ascertain how patterns of resting-state functional connectivity (RSFC) change in individuals with Traumatic Brain Injury (TBI) as a function of recovery.

Participants and Methods: Each of six individuals with moderate / severe TBI and six healthy controls (HCs) were scanned using a 3T functional magnetic resonance imaging (fMRI) scanner. Scanning was done twice for all participants. For the TBI participants, the first scan was conducted 3 months after the resolution of post-traumatic amnesia, and the second three months later. For the HCs, the scans were conducted with a 3 month interval between them. The scanning included both task-related and resting fMRI. Resting state functional connectivity was assessed by correlating the resting state data with two seeds placed in critical areas of the 'default network': posterior cingulate cortex (PCC) and medial prefrontal cortex (MPFC).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Early in recovery, individuals with TBI showed widespread differences relative to HCs in RSFC associated with both posterior (PCC) and anterior (MPFC) sites. As recovery progressed, the differences associated with the anterior seed (MPFC) were reduced; however, the differences associated with the posterior seed (PCC) remained.
Conclusions: Resting state functional connectivity appears to be a sensitive marker of both functional recovery and of persisting deficits in individuals with moderate / severe TBI.
Correspondence: *Glenn R. Wylie, 300 Executive Drive, West Orange, NJ 07052. E-mail: gwylie@kesslerfoundation.org*

J.F. SUMOWSKI, G.R. WYLIE, V.M. LEAVITT, N. CHIARAVALLOTI & J. DELUCA. Default Network Activity is a Sensitive and Specific Biomarker of Memory Capacity in Multiple Sclerosis.
Objective: The default network (DN) is a set of structurally and functionally connected brain regions that are active during rest, and deactivate during cognitive tasks. Reduced DN activity is observed in memory-impaired populations (e.g., Alzheimer's disease, Multiple Sclerosis [MS]), but the current study is the first to investigate the sensitivity and specificity of task-induced DN deactivation as a neurophysiologic biomarker of memory capacity in neurologic patients.
Participants and Methods: MS patients (N=28) underwent high-resolution MRIs to measure brain atrophy (third ventricle width, cerebral gray matter, cerebral white matter, brain parenchymal fraction), and fMRI to measure DN deactivation during sustained attention relative to rest. Neuropsychological assessment of memory and non-memory cognitive domains was performed on a separate day.
Results: Using stepwise regression, brain atrophy predicted worse memory ($R2 = .12$, $p < .05$), and maintenance of DN activity (lesser deactivation) predicted better memory ($R2 = .21$, $p < .01$). Importantly, an interaction between atrophy and DN activity ($R2 = .11$, $p < .05$) showed that MS patients with better maintenance of DN activity were less vulnerable to the negative impact of atrophy on memory. There was no relationship between DN activity and non-memory cognitive performance.
Conclusions: Results support DN activity as a sensitive and specific neurophysiologic biomarker of memory capacity in MS patients. The DN–memory association is consistent with the neuroanatomy of the DN, which consists of medial / limbic structures (e.g., hippocampus). We will discuss genetic and environmental risk and protective factors that may independently contribute to DN activity, and memory.
Correspondence: *James F. Sumowski, 300 Executive Drive, West Orange, NJ 07052. E-mail: jsumowski@kesslerfoundation.org*

V.M. LEAVITT, G.R. WYLIE, H. GENOVA, N. CHIARAVALLOTI & J. DELUCA. Abnormal Patterns of Effective Connectivity in Multiple Sclerosis.
Objective: To characterize effective connectivity- spatially remote but functionally connected networks of the brain- in the context of an information processing speed task in individuals with multiple sclerosis (MS).
Participants and Methods: 16 individuals with MS and 17 healthy controls (HCs) performed a processing speed task, a modified version of the Symbol Digit Modality Task (mSDMT), during functional magnetic resonance imaging (fMRI) scanning. Granger causality analysis (GCA) was applied to the fMRI data of both groups. GCA allows inferences about the direction of information flow in the brain by assessing correlated activity across spatially remote regions while taking into account a predetermined time lag between regions. 8 seed regions were selected on the basis of a priori data showing areas involved in mSDMT performance of healthy controls. A 2-second time lag was used.
Results: : Results of GCA revealed that while the majority of connections between the ROIs were common to both groups the MS group showed differences in connectivity between critical brain regions. Specifically, the MS group had more connections to dorsolateral prefrontal cortices (DLPFC) bilaterally relative to HCs, whereas HCs had more connections to inferior parietal regions relative to MS.
Conclusions: Greater involvement of DLPFC in the MS group is consistent with the literature, and lends further support to the notion that these areas are recruited to maintain adequate performance in the presence of brain pathology.
Correspondence: *Victoria M. Leavitt, 300 Executive Drive, West Orange, NJ 07052. E-mail: vleavitt@kesslerfoundation.org*

C. KELLY, X. ZUO, K. GOTIMER, C. COX, L. LYNCH, D. BROCK, D. IMPERATI, H. GARAVAN, J. ROTROSEN, F. CASTELLANOS & M. MILHAM. Reduced Interhemispheric Resting State Functional Connectivity in Cocaine Dependence.
Objective: Models of cocaine addiction emphasize the role of disrupted frontal circuitry supporting cognitive control processes. Yet, addiction-related alterations in functional interactions among brain regions, especially between the cerebral hemispheres, are rarely examined directly. Resting state fMRI approaches, which detect patterns of coherent spontaneous fluctuations in the fMRI signal, offer a means to directly quantify functional interactions between the hemispheres. In this talk, I will describe a study in which we examined interhemispheric resting state functional connectivity (RSFC) in cocaine dependence using an approach recently developed and validated in our laboratory, named "voxel-mirrored homotopic connectivity."
Participants and Methods: We compared interhemispheric RSFC between 25 adults (aged 35.0 +/- 8.8) meeting DSM-IV criteria for cocaine dependence within the past 12 months, but currently abstaining (>2 weeks) from cocaine, and 24 healthy comparisons (35.1 +/- 7.5), group-matched on age, sex, education and employment status.
Results: We observed reduced prefrontal interhemispheric RSFC in cocaine-dependent participants relative to controls. Within the cocaine-dependent group, those with the weakest RSFC between bilateral prefrontal areas reported more frequent lapses of attention, suggesting that reduced prefrontal RSFC was associated with poorer attentional control.
Conclusions: Our findings provide further evidence of an association between chronic exposure to cocaine and disruptions within large-scale brain circuitry supporting cognitive control. We did not detect group differences in DTI measures, suggesting that alterations in the brain's functional architecture associated with cocaine exposure can be observed in the absence of detectable abnormality in the white matter tracts supporting that architecture.
Correspondence: *Clare Kelly, Phyllis Green and Randolph C[\#333#\]owen Institute for Pediatric Neuroscience at the NYU Child Study Center, 577 First Avenue, New York, NY 10016. E-mail: amclarekelly@gmail.com*

M.J. HOPTMAN, P. BUTLER & D. JAVITT. Functional Connectivity in the Default Mode Network in Schizophrenia: Abnormalities and Structural Substrates.
Objective: Schizophrenia has increasingly been characterized as a disorder of brain connectivity. This has been supported by diffusion tensor imaging (DTI) studies which have shown disruptions in white matter integrity in multiple regions. These include frontotemporal pathways, but other areas have also been implicated, and overall, the findings may be thought of as widespread. Functional connectivity studies examine the temporal correlation of brain signals from disparate regions. One set of areas that have repeatedly shown to coactivate in resting state positron emission tomography (PET) or functional MRI studies are medial frontal regions, posterior cingulate/precuneus, and parietal regions. This set of regions has been referred to as the default mode network, and is thought to reflect task-independent introspection. Recent data suggest that this network is abnormal in patients with schizophrenia. Here I report on such data and examine their relation to white matter integrity as measured with DTI. The results point to abnormalities in organized brain networks in schizophrenia and suggest that the white matter substrates of that connectivity are abnormal.
Correspondence: *Matthew J. Hoptman, Nathan Kline Institute, Orangeburg, NY 10962. E-mail: hoptman@nki.rfmh.org*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Poster Symposium: Recent Advances in the Science of Consciousness

3:15–4:45 p.m.

R. NAKASE-RICHARDSON, J.T. GIACINO, J. WHYTE, S. PAVAWALLA, S. BARNETT, S.A. YABLON, M. MCCARTHY, J. TRAN, M. SHERER, K. KALMAR, F. HAMMOND, B. GREENWALD, L. HORN, M. CARLISLE, R. SEEL & W. WALKER. Prospective Characterization of the Natural History of Recovery from Severe Acquired Brain Injury and Relation to Functional Outcome.

Objective: Research on the natural course of recovery from prolonged disorder of consciousness following severe TBI is sparse. This study examined acute and longitudinal outcomes of unresponsive persons admitted to the NIDRR TBI Model System Program.

Participants and Methods: Of 9028 persons enrolled from 1988-2009, 396 from 20 centers met study criteria. Participants were primarily male (73%), Caucasian (67%), injured in MVC (66%), median age of 28, and Glasgow Coma Scale (GCS) of 3. Participants underwent prospective evaluation throughout acute rehabilitation and 1, 2, and 5 years post-injury.

Results: During inpatient rehabilitation, N=271 (66%) returned to consciousness and N=91 (23%) emerged from posttraumatic amnesia. Participants demonstrated significant improvements on GCS ($z=16.135$, $p<.001$) and Functional Independence Measure (FIM; $z=15.584$, $p<.001$) from rehabilitation admission to discharge. Of 337 with at least 1 follow-up, 28 deaths were observed on average 2.1 years from discharge. Among survivors, 66 were rated as capable of living without in-house supervision and 63 demonstrated employment potential using the Disability Rating Scale (DRS). Using repeated measures generalized linear models, 108 participants with follow-up at 1, 2, and 5 years post-injury, demonstrated signficant improvement across all follow-up evaluations on the Cognitive and Total FIM Scores and Supervision Rating Scale ($p<.01$). Improvements were observed on the DRS and FIM Motor at 1 and 2 years post-injury ($p<.01$) but not at 5 years ($p=.053, .052$ respectively).

Conclusions: Persons with disordered consciousness evidence neurobehavioral change throughout early recovery and in years post-injury. Cognitive recovery surpasses motor recovery with implications for changes in functional status and evolving opportunities for intervention.

Correspondence: *Risa Nakase-Richardson, James A. Haley Veterans Hospital, Polytrauma / Psychology Service (116B), 13000 Bruce B. Downs Blvd., Tampa, FL 33612. E-mail: Risa.Richardson@va.gov*

D.I. KATZ, J. GIACINO, J. WHYTE, M. SHERER, K. KALMAR, D. LONG, B. EIFERT, P. NOVAK, N. CHILDS, W. MERCER, M. LUTHER, F. MEULLER, A. NORDENBO, F. HAMMOND, S.A. YABLON & E. BAGIELLA. The Effectiveness of Amantadine Hydrochloride in Restoring Behavioral Functions Following Severe Brain Injury.

Objective: Rehabilitation programs treating patients with traumatic brain injury(TBI) with prolonged disorders of consciousness (DOC) typically employ pharmacologic strategies including stimulants, dopaminergics, tricyclic antidepressants, and even GABA agonists to promote recovery but with limited research evidence to support efficacy. The primary aim of this study was to determine the effectiveness of amantadine hydrochloride (AH) in improving function in patients diagnosed with post-traumatic vegetative (VS) or minimally conscious state (MCS).

Participants and Methods: 5 year, multicenter prospective, double blind, RCT (8 centers in the US, 3 in Europe). 184 patients in VS or MCS, between 4 and 16 weeks post-TBI, were randomized to 4 weeks of amantadine (AH) (200 – 400 mg/day) or placebo, followed by a 2-week washout. Outcome measures were the Disability Rating Scale (DRS) (weekly) and Coma Recovery Scale-Revised (CRS-R) (weeks 0,4 and 6). Rate of functional recovery on the DRS was compared between the AH and placebo groups using a mixed regression model with random intercept.

Results: Patients who received AH had a significantly greater rate of functional recovery on the DRS compared to those who received placebo ($p<.01$) over 4 weeks of treatment. The rate of improvement in the AH group slowed significantly after treatment was discontinued compared to the placebo group but improvements were maintained in the AH group over the 2 week washout period. A larger proportion of the AH group than the placebo group demonstrated behaviors indicative of a higher level of consciousness on the CRS-R after 4 weeks of treatment, including consistent command following, reliable yes/no communication, verbalization and functional object use. There were no significant differences in the incidence of adverse events between the AH and placebo groups.

Conclusions: AH is effective in improving function and promoting behaviors indicative of higher levels of consciousness in patients with very severe TBI with prolonged DOC.

Correspondence: *Douglas I. Katz, Braintree Rehabilitation Hospital, 250 Pond Street, Braintree, MA 02184. E-mail: dkatz@bu.edu*

Poster Session 9: Adult Assessment, Forensic Neuropsychology, Traumatic Brain Injuiry

3:15–4:45 p.m.

Assessment/Psychometrics/Methods (Adult)

M. KRYZA, M. FREEDBERG, A. HOUGHTON, S. RYAN, T.M. ATKINSON & J.P. RYAN. Establishing Distinct Cognitive Flexibility and Language Function Factors in the Controlled Oral Word Association Test (COWAT-FAS).

Objective: Various studies have suggested an alternative scoring paradigm for the Controlled Oral Word Association Test (COWAT-FAS), which hypothesizes that in addition to language function, the COWAT-FAS can be used to detect changes in cognitive flexibility. The purpose of the present study is to establish the factor structure of the COWAT-FAS through examining its relationship to Trails B of the Trail Making Test (TMT), a well-established measure of cognitive flexibility, and Boston Naming Test (BNT), a widely used assessment of language function.

Participants and Methods: The COWAT-FAS, TMT, and BNT were individually administered to 144 (30% male) undergraduate psychology students aged 18-24 ($M = 19.58$, $SD = 0.89$) in each of six possible orders. Confirmatory factor analysis (CFA) was used to investigate construct validity of the outcome measures, factorial invariance, and potential order effects.

Results: CFA techniques showed that a two-factor structure of cognitive flexibility (i.e., Trails B and switching components of COWAT-FAS) and language function (i.e., BNT and clustering components of COWAT-FAS) best represents the data as an alternative to a single or three factor solution. Factorial invariance was demonstrated across age and gender groups, and a latent factor means analysis provided evidence that there were no order effects present.

Conclusions: In establishing the relationship between the COWAT-FAS, BNT, and Trails B of the TMT, our results provide further evidence that the COWAT-FAS can be used as a measure of cognitive flexibility and language function. The demonstrated versatility of this instrument can assist clinicians when making selections for inclusion in their respective neuropsychological testing batteries.

Correspondence: *Thomas M. Atkinson, Ph.D., Psychiatry & Behavioral Sciences, Memorial Sloan-Kettering Cancer Center, 641 Lexington Ave, 7th Floor, New York, NY 10022. E-mail: atkinsot@mskcc.org*

F. BARWICK, A. RABINOWITZ & P. ARNETT. Base Rates of Abnormally Low Test Scores Among Male and Female Collegiate Athletes at Baseline Concussion Assessment.

Objective: Growing research attests that healthy older adults and children commonly obtain some abnormally low scores on multiple test neu-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ropsychological assessment batteries, but findings have yet to be confirmed in healthy younger adults such as collegiate athletes. Knowing base rates of abnormally low test scores is especially important for collegiate athletes, whose participation in programs for managing sport-related concussion frequently requires the interpretation of baseline and post-concussion test results.
Participants and Methods: Male (186) and female (143) collegiate athletes (age: M=18.4, IQ: M=102.9) from soccer, lacrosse, and basketball teams underwent baseline testing as part of a university-wide concussion assessment program. Genders were compared on maximum discrepancy between highest and lowest test scores, total number of test scores significantly below the mean (< 1SD), and percentage of athletes showing abnormally low scores (< 1.5 SD) across multiple tests.
Results: Both male and female collegiate athletes showed considerable performance variability at baseline testing, but gender differences emerged. Compared to female athletes, male athletes had a significantly larger maximum discrepancy between tests, a significantly greater number of test scores below the mean, and a significantly higher percentage earning abnormally low scores across multiple tests.
Conclusions: Knowing base rates of abnormally low scores across a multiple test assessment battery among healthy male and female collegiate athletes is crucial for interpreting baseline and post-concussion test results and thus for making diagnostic inferences and return to play decisions. Gender differences in neuropsychological test performance necessitate separate base rate tables when interpreting test results for male and female athletes.
Correspondence: *Fiona Barwick, M.S., Psychology, Pennsylvania State University, 420 Bruce V. Moore Building, University Park, PA 16801. E-mail: fhbarwick@gmail.com*

F. BARWICK, A. RABINOWITZ & P. ARNETT. Correlates of Abnormally Poor Test Performance Among Male and Female Collegiate Athletes at Baseline Concussion Assessment.
Objective: Collegiate athletes show considerable performance variability on a neuropsychological test battery at baseline concussion assessment. Contributing factors to poor baseline performance have yet to be fully elucidated, and gender differences in such factors have yet to be thoroughly explored.
Participants and Methods: Male (146) and female (119) collegiate athletes (age: M=18.4, IQ: M=102.9) from soccer, lacrosse, and basketball teams underwent baseline testing as part of a university-wide concussion assessment program. Athlete IQ, sport, mood, and personality traits were measured and included as predictor variables in separate multiple regression analyses for male and female athletes. Criterion variables were total number of test scores 1, 1.5, and 2 SD below the mean.
Results: Athlete IQ consistently accounted for the greatest amount of unique variance in both male and female athlete groups. Athlete sport accounted for some unique variance but only in female athletes. Overall regression models accounted for significant variance in total number of test scores 1 and 1.5 SD below the mean for female but not male athletes.
Conclusions: Regression models differed between male and female athletes, with athlete IQ the strongest predictor of variance in abnormally poor neuropsychological test performance at baseline assessment for both genders but sport and personality factors significant predictors for female athletes only. However, no model accounted for more than 25% of the variance, leaving the preponderance of variability in abnormally poor test performance at baseline concussion assessment among male and female collegiate athletes still to be explained.
Correspondence: *Fiona Barwick, M.S., Psychology, Pennsylvania State University, 420 Bruce V. Moore Building, University Park, PA 16801. E-mail: fhbarwick@gmail.com*

P. WATSON, A. LACOSTE & N.S. FOLDI. Visual Search for Meaningful Line Drawings: The Effects of Top-Down and Bottom-Up Attentional Mechanisms and Efficiency of Search.
Objective: Attentional visual search can depend on a) top-down (TD) versus bottom-up (BU) strategies, if the to-be-searched target is previously viewed, or b) efficient versus inefficient, if targets and distractors are physically dissimilar or similar. Selective attention in Alzheimer disease is vulnerable to similarity, but only using non-meaningful stimuli; whether impaired TD mechanisms interact with similarity is not known. This study's objective was to develop a task using meaningful everyday objects to test both strategy and efficiency in a selective search paradigm.
Participants and Methods: *Expt.1*: Twenty-four healthy participants (mean age 21.76 ±3.7 years) rated physical similarity between paired drawings of 59 objects using a 0-7 Likert scale. *Expt.2*: Thirty-four healthy participants (20.12, ±3.4 years) performed 239 search trials with a single target surrounded by five distractors. Reaction time and accuracy were recorded on conditions (1) processing strategy: target viewed before search (TD) versus no prior exposure (BU) (2) efficiency: similar versus dissimilar between target and distractors.
Results: *Expt.1*: Objects scored as most dissimilar, mean(sd) Likert score=1.04(0.73), for efficient or most similar, 5.17(0.63), for inefficient searches served as Experiment 2 stimuli. *Expt.2*: Search was faster, $F(2,82)=84.46$, $p<.001$, and more accurate, $F(2,66)=17.602$, $p<.001$, on the efficient TD compared to either efficient BU or inefficient TD conditions. Also, different semantic categories between distractor and target facilitated search during the inefficient TD condition, $F(14,462)=33.401$, $p<.001$.
Conclusions: The combination of both TD strategy and efficient facilitated visual search but of meaningful objects, but discrepancy of semantic category of meaningful target and distractors may impede the TD processing.
Correspondence: *Nancy S. Foldi, Ph.D., Department of Psychology, Queens College - CUNY, 65-30 Kissena Blvd., NSB E318, Flushing, NY 11367. E-mail: nancy.foldi@qc.cuny.edu*

T. HEITZMAN. Investigating the Use of the ROCF-Developmental Scoring System to Assess Qualitative Neurodevelopmental Patterns in Young Adults.
Objective: The Developmental Scoring System (DSS) of the ROCF offers developmental guidelines and a quantitative framework to support qualitative analysis of performance for children ages 5-14. The aim of the current study was to extend the DSS to a college-aged sample and study variability in performance within a more mature neurodevelopmental context.
Participants and Methods: College undergraduates (N=105) volunteered to participate in neuropsychological research. Each participant completed the ROCF according to standard DSS administration as part of a battery of neuropsychological test. DSS scores were then compared to performance on tests of executive functioning (WCST; BRIEF) and memory (WMS-III Logical Memory).
Results: Descriptive statistics of ROCF-DSS performance in this college sample revealed surprising variability in organization and process styles, which were generally consistent with the pattern of the oldest children in the original normative sample (Bernstein & Waber, 1996). Little correlation was found between DSS scores and self-reported executive functioning or WCST scores. Similarly, little correlation was found between quantitative scores on the ROCF-DSS and WMS-III; however, some consistencies were found in the qualitative style of performance across these measures.
Conclusions: These results suggest a value in extending ROCF-DSS norms for use with older adolescents and young adults and for considering methods for measuring qualitative processing styles in other neuropsychological tests.
Correspondence: *Timothy Heitzman, PhD, Psychology, Fairfield University, 1073 North Benson Rd, Fairfield, CT 06824. E-mail: theitzman@fairfield.edu*

M. JERRAM & D. GANSLER. Differential Correlations of Tests of Impulsivity in Healthy Males.
Objective: Impulsivity is an important concept in clinical neuropsychology. The behaviors that are examined to determine impulsivity are broad and there is no clear consensus on what are the most valid measures. The objective of this study was to examine relationships between various aspects of performance on tasks associated with impulsivity.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Ten healthy males, aged 20-35, were recruited as part of a neuroimaging study. The Color-Word Interference Test (CWIT) of the Delis-Kaplan Executive Function System, the Barratt Impulsivity Scale (BIS) and the Iowa Gambling Task (IGT) were administered to the participants. Completion time scaled scores and total errors from the Condition 3 (Inhibition) CWIT, the Motor, Nonplanning, and Attention subscales of the BIS and total earnings and disadvantageous choices from the IGT were correlated using Spearman's rho.
Results: A significant correlation existed between CWIT errors and IGT total earning (÷ = -0.63). By comparison, CWIT scaled scores and IGT total earning were not significantly correlated (÷ = -0.15). A significant correlation was also found between CWIT scaled scores and BIS Nonplanning (÷ = -0.62); CWIT errors and BIS Nonplanning were not significantly correlated (÷ = 0.14). No other correlations reached significance.
Conclusions: These results support the idea that impulsivity represents a multifaceted concept. The relationship between CWIT errors and IGT earnings suggest a facet related to error monitoring while the relationship between CWIT completion time and BIS Nonplanning suggest a facet that is related to cognitive disinhibition. These results are preliminary given the sample but suggest directions for research.
Correspondence: *Matthew Jerram, Ph.D., Psychology, Suffolk University, 41 Temple Street, Boston, MA 02114. E-mail: mjerram@suffolk.edu*

S.K. JOHNSON & R. HANNA. Validating Subjective Cluster Coding in Verbal Fluency Using Response Times.
Objective: Cluster coding systems for verbal fluency have successfully revealed differential deficits (e.g., reflecting frontal- versus temporal-lobe dysfunction) in a variety of populations, yet they are unquestionably subjective techniques. Using response times as a more objective measure, we tested the validity of cluster coding by examining switch costs, hypothesizing longer inter-item response times between clusters (switch trials) compared to within clusters (no-switch trials).
Participants and Methods: Semantic and phonemic fluency protocols were obtained from 36 young adults (age 17-22) following the typical procedure. Clusters were coded according to Troyer et al.'s (1997) rules for both forms of fluency, with one notable adaptation: phonemic fluency trials were coded for both phonetic clusters and semantic clusters. We compared response times (available for 16 participants) for switch versus no-switch trials. The results for phonemic fluency were analyzed once including only phonetic clusters and once including both semantic and phonetic clusters.
Results: Robust switch costs occurred for semantic fluency, consistent with the presence of additional cognitive processes for shifting between sub-categories. The pattern was more complicated for phonemic fluency. When both semantic and phonetic clusters were included, switch costs occurred, albeit to a lesser extent than for semantic fluency. However, when only phonetic clusters were included, as is advocated by the traditional scoring method, no switch costs were revealed.
Conclusions: These results support the validity of a commonly used subjective scoring method for determining clusters and switches in verbal fluency; however, the results call into question the practice of scoring only sound-based clusters for the phonemic version of this task.
Correspondence: *Sarah K. Johnson, Ph.D., Psychology, Moravian College, 1200 Main St., Bethlehem, PA 18018. E-mail: skjohnson@moravian.edu*

C.P. JOHNSON & M. HISCOCK. Risky Decisions and Ambiguous Decisions: Explaining Poor Performance on the Iowa Gambling Task.
Objective: The Iowa Gambling Task (IGT) combines two types of decision tasks under a single measure. Early exploratory choices are made as decisions under ambiguity while later choices may be made as decisions under risk. However, poor performers may fail by developing a disadvantageous strategy or failing to develop a strategy. Decision level variables may illuminate differences between these two groups.
Participants and Methods: 88 college students from a large public university completed the progressive computerized IGT (v2.0, 2002). In addition to number of advantageous draws, a strategy development variable (SDV) was derived based on changes in the participant's subsequent reaction to losses over time. The SDV was then used to predict performance in a general linear model. Next, participants were divided into good performers (advantageous draws □ 60; n=29) and poor performers (disadvantageous draws < 60; n=59). Participants were also divided into those with evidence of changes in strategy with high SDV values (n=54) and those with low SDV values (n=34). A chi-square analysis was utilized to determine the utility of the SDV.
Results: General linear modeling of the SDV revealed it to be a significant predictor of advantageous deck selections ($F(1,86)=8.55$, $p=0.004$). Chi-square analysis revealed significantly fewer participants in the high strategy development group with poor performance on the task ($\alpha^2(1,N=88)=8.35, p=0.004$).
Conclusions: The current pattern of findings suggests that the SDV may be a promising tool for differentiating between poor performing populations who fail due to excessive risk-taking versus those with poor task conceptualization. Decision level variables may increase the specificity and clinical utility of the IGT.
Correspondence: *Chad P. Johnson, MA, Clinical Neuropsychology, University of Houston, 4800 Calhoun Road, Houston, TX 77004. E-mail: C.Parker.Johnson@gmail.com*

R.G. JONES, J.P. FRANCIS, L.J. BAUM & S.W. SAUTTER. Test-Retest Reliability and Effort Testing of the CNS-Vital Signs (CNSVS).
Objective: Computerized neuropsychological assessment programs are commonly used to aid in concussion diagnosis and management. Although test developers of these programs report moderate to good test-retest reliability, research has shown that some of these programs have low to moderate test-retest reliability when using clinically relevant time frames. This study examined the test-retest reliability of a computerized cognitive battery (CNS-Vital Signs) using clinically relevant time and controlling for effort.
Participants and Methods: Thirty-one healthy college graduate adults completed select subtests of the CNSVS for the baseline and were retested approximately 30 days later. Subtests were selected to assess constructs similar to those measured by other computerized neuropsychological assessments: verbal memory, processing speed, executive functioning, and reaction time. Each participant also completed Green's Medical Symptom Validity Test and Reliable Digit Span to evaluate effort.
Results: Intraclass correlation coefficients were calculated on the computerized output scores to estimate test-retest reliability. Intraclass correlation coefficient estimates from baseline to retest ranged from .63 to .91 on the CNSVS. All participants demonstrated adequate levels of effort according to Medical Symptom Validity Test and Reliable Digit Span interpretive guidelines.
Conclusions: This data demonstrated moderate to good test-retest reliability in a nonclinical sample performing with sufficient effort, especially when compared to the test-retest reliability of other computerized neuropsychological assessment programs using pragmatic time intervals.
Correspondence: *Ryan G. Jones, Masters in Clinical Psychology, Regent University, 320 S. Walnut St. Apt. 1, West Chester, PA 19382. E-mail: ryangrantjones@gmail.com*

V.M. KLEMAN, B.J. SCOTT & S. DAVIS. The Influence of Verbal Mediation on WAIS-IV Matrix Reasoning.
Objective: Verbal mediation predicts successful performance on a variety of tasks (Chi et al., 1994; Cole & Pheng, 1998; Silverberg & Buchanan, 2005). Accordingly, the influence of verbal mediation must be accounted for in order to interpret test results accurately. The Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV; The Psychological Corporation, 2008) includes subtests of visuospatial intelligence, but the influence of verbal mediation on these subtests has not yet been explored. The current study compared Matrix Reasoning (MR) item scores to total Similarities scores as well as to total Verbal Fluency scores on the Delis-Kaplan Executive Function System (D-KEFS; Delis, Kaplan, & Kramer, 2001). It was hypothesized that verbal skills would be more strongly associated with more difficult MR items.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Using archival clinical data for 43 patients seen primarily for academic assessment, point biserial correlations were used to compare WAIS-IV MR item scores with total Similarities scores. In order to further evaluate the relationship between variables, scores on MR also were correlated with phonemic and category Verbal Fluency total scores. Bonferroni corrections were used to reduce experimentwise error.
Results: The most significant correlations were found between MR items and total Similarities scores, while the fewest were found between MR items and category fluency scores.
Conclusions: The hypothesis that verbal skills would be significantly correlated with more difficult MR items was not confirmed. Further analysis suggested that items involving tracking changes in stimulus orientation may be especially subject to verbal mediation.
Correspondence: *Virginia M. Kleman, M.S., Pacific University, 190 SE 8th Ave, Hillsboro, OR 97123. E-mail: ginny.kleman@pacificu.edu*

V.W. MARK, A.J. WOODS & J.W. PHILBECK. The NIH Toolbox's Sensitivity To Cognitive Illness In Acute Brain Rehabilitation.
Objective: The NIH Toolbox was recently developed to standardize short but comprehensive neurological assessment of general clinical populations ages 3-85 (Gershon RC et al, *Lancet Neurol* 2010). Field testing to date of the Toolbox has concentrated on developing norms for healthy community-living persons. In contrast, our laboratory has commenced the first trial of Toolbox assessment in acute general brain illness in the inpatient rehabilitation setting. As an assessment battery for neurological function, the Toolbox should be sensitive to the effects of brain illness. We evaluated whether the Toolbox would be feasible and sensitive to the effects of acute brain illness on cognitive functions.
Participants and Methods: A convenience sample of 16 adults ages 22-82 hospitalized for rehabilitation for acutely disabling brain illness (stroke, traumatic brain injury, tumor, etc) and 17 age-matched brain-healthy community-living adults were evaluated on 5 touchscreen, computer-administered, cognitive tests of the 2-hour Toolbox battery. Patients were tested only if they were functionally independent before illness and actively participating in rehabilitation. We assessed their ability to comply with testing and group differences in test scores (1-tailed *t*-test).
Results: Only half of the patients satisfied screening criteria to proceed on Dimensional Change Card Sort (DCCS, cognitive flexibility) and Flanker (attention) tests. All patients could be assessed on Imitation Based Memory (IBAM), List Sorting (LS, a memory test), and visual Pattern Comparison. Patients' response times were significantly slower than controls (p's<0.001). However, accuracy scores did not differ from controls except on LS (p< 0.001).
Conclusions: The NIH Toolbox assessments are sensitive to the impact of acute brain illness on cognitive performance. Differences from controls are primarily in response times, in agreement with prior studies. Brain illness patients may sacrifice quick responding to maintain accuracy. Findings may aid rehabilitation planning.
Correspondence: *Victor W. Mark, M.D., Physical Medicine and Rehabilitation, University of Alabama at Birmingham, 619 19th Street South, SRC 190, Birmingham, AL 35249-7330. E-mail: vwmark@uab.edu*

J.D. MCKEEVER, A. BLASCO, V. PADMANABAN & M. SCHULTHEIS. Driving and Texting: Exploring the Hazards of Distracted Driving.
Objective: Distracted drivers may be responsible for 16% of motor vehicle deaths. Use of mobile phones for text messaging while driving has been declared illegal in many states; nevertheless, many drivers continue to text while driving. To date, very few empirical studies have quantified the effects of texting on driving behaviors. The current study uses a virtual reality driving simulation (VRDS) to examine the impact of texting while driving on speed and lane management measures.
Participants and Methods: Twenty-nine healthy adults (mean age= 21.4 yrs) with more than 1 year driving experience were included. Using VRDS, all participants were administered: 1) baseline drive (route without distractions), 2) challenge drive (same route as baseline but with the addition of distractions and 3) neuropsychological tests. Distractions included typing and sending two text messages of varying complexity and a radio-tuning task. Participants were allowed to use their personal cell phones. Data on speed and lane management performance was automatically collected by VRDS.
Results: Paired-samples t-test results indicated that texting affected both speed maintenance and lane deviation compared to the baseline drive; the speed drivers maintained had significantly more variability while sending a text message, $t(28) = -2.431$, $p = .022$, and lane deviation increased significantly while texting as well, $t(28) = -2.839$, $p = .008$.
Conclusions: These results provide evidence that texting while driving has a direct negative effect on behaviors that are inextricably related to the safety of the driver and others on the road. Relationships between these driving measures and cognitive tests are explored. These findings, supported by further analysis, may help effect policy changes regarding driving behavior.
Correspondence: *Joshua D. McKeever, B.A., Clinical Psychology, Drexel University, 4232 Spruce St., #4, Philadelphia, PA 19104. E-mail: jdm324@drexel.edu*

M.B. MITCHELL, F.M. YANG, L.W. SHAUGHNESSY, S.D. SHIRK & A. ATRI. Relationship of Neuropsychological Test Performance and Cognitive Reserve in Healthy Aging and the AD Spectrum: A Theoretically-Driven Factor Analysis.
Objective: We sought to examine the relational factor structure between neuropsychological tests and measures of cognitive reserve in a group of cognitively healthy older adults and a group of participants with amnestic MCI (aMCI), Possible, and Probable Alzheimer's disease (PoAD & PrAD, respectively).
Participants and Methods: Participants from the Massachusetts Alzheimer's Disease Research Center (MADRC) included a control group of healthy older adults (n = 294, CDR=0) and a group with cognitive impairment or dementia across the AD-spectrum (aMCI-AD, n = 265, CDR ≥ 0.5). Neuropsychological measures from the Uniform Dataset (UDS) and several supplementary measures comprised a battery assessing attention, processing speed, executive function, language, memory, and cognitive reserve. We hypothesized a 4-factor model, including a memory/language factor, an executive/processing speed factor, an attention factor, and a cognitive reserve factor. We used confirmatory factor analysis (CFA) to assess model fit.
Results: Demographics and characteristics were similar to the National UDS data set (Weintraub et al., 2009). The 4-factor model showed excellent fit for the control group (Chi-square = 100.12, df= 78, CFI = .962, RMSEA = .049) and adequate fit for the aMCI-AD group (Chi-square = 1750.02, df= 78, CFI = .932, RMSEA = .085).
Conclusions: These results extend a modified-Siedlecki et al.'s (2009) 4-factor model of cognition and cognitive reserve to a memory-impaired cohort. Factor scores may complement single test scores to provide better measures of cognitive functioning. Integration of factor scores and clinical measures may aid in development of non-invasive biomarkers to detect and track cognitive impairment in early stages.
Correspondence: *Meghan B. Mitchell, Ph.D., Neurology, Harvard Medical School, 51 School Street, Acton, MA 01720. E-mail: meghanbmitchell@gmail.com*

J. NOVITSKI, S. STEELE & C. RANDOLPH. Modified Effort Index for the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): Preliminary Validation.
Objective: In a recent study, Silverberg, Wertheimer, & Fichtenberg (2007) developed an effort index (EI) for the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), based upon performance on the Digit Span and List Recognition subtests. Their index was derived from a mixed clinical sample and validated on a small sample of patients with mild traumatic brain injury (TBI)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

who had failed free-standing effort tests, as well as simulated malingering groups. Good discriminability was demonstrated in these groups. Subsequent attempts to replicate these findings in samples of patients with dementia, however, have reported high false positive rates (Hook, Marquine & Hoelzle, 2009; Barker, Horner, & Bachman, 2010).
Participants and Methods: We derived a modified effort index (MEI) based upon the disparity of free recall to recognition performance, in conjunction with performance on the Digit Span subtest. We then examined the distribution of the MEI in a sample of patients with probable Alzheimer's Disease (AD) and a sample of patients with mild TBI who performed below standard cutoffs on a free-standing measure of effort (Green's Word Memory Test).
Results: The MEI demonstrated much better discriminability than the original EI in separating these two patient populations.
Conclusions: While further validation is necessary, use of a free recall-recognition disparity score may have greater utility in discriminating between "true" memory impairment and malingered/psychogenic impairments.
Correspondence: *Julia Novitski, M.S., Psychology, Rosalind Franklin University of Medicine and Science, 415 Howard St., Apt. 1408, Evanston, IL 60202. E-mail: julia.novitski@my.rfums.org*

S.Y. PATWARDHAN, K.M. FITZGERALD & J.S. WEFEL. Differences in Standardized Scores on Controlled Oral Word Association Based on MAE and Ruff Normative Data.
Objective: Benton et al. (1994) created MAE Controlled Oral Word Association (COWA) norms correcting for age and education, while Ruff et al. (1996) norms correct for age, gender, and education. This study investigated discrepancies between the two normative systems and the impact of demographic factors, which may affect test interpretation.
Participants and Methods: COWA scores of 269 untreated primary brain tumor patients (mean age=47.19±15.19, education=14.99±2.75, female=45%, GBM=37.2%, left hemisphere tumor=65.8%) were examined. Raw scores were converted to standardized scores with MAE and Ruff norms. Correlations, chi-square analyses, and independent sample t-tests were performed.
Results: MAE and Ruff standardized scores correlated significantly ($r=0.94, p<0.01$), but exhibited statistically significant differences ($\alpha 2=278.57, p<0.01$) when performances were classified as low, middle (defined as -1.49 to +1.49 SD), and high. Discrepant classifications were obtained in 54.6% patients and were most common in older ($t=-4.00, p<0.01$) and female ($\alpha 2=7.92, p<0.01$) patients. Ruff norms placed 52.8% of patients in a lower qualitative performance category than the MAE. Ruff and MAE norms classified respectively 35% and 26% of patients in categories of "mild impairment" or below; this discrepancy was not as obvious in upper extremes.
Conclusions: Discrepancies between MAE and Ruff standardized scores are especially common at lower performance levels and in older individuals as well as females. Clinically, caution appears warranted when interpreting performances at the lower extreme of the continuum and in these demographic groups. Given the Ruff system's ability to generate a continuous standardized score that is not as affected by floor effects, this system may be preferred for clinical trials.
Correspondence: *Surabhi Y. Patwardhan, MA, Department of Psychology, University of Houston, 126, Heyne Building, University of Houston, Houston, TX 77204. E-mail: sypatwardhan@uh.edu*

E.G. REESE, A.I. FORD, C.C. PERSAD, P. MARUFF, D.G. DARBY, D.B. HAMMERS & B. GIORDANI. Standard and Computer Test Performance: Changes across Four Administrations in One Day.
Objective: Protocols using neuropsychological assessment, in particular clinical trials, may require multiple test administrations over short periods of time, even during the same day. Because serial administration is employed to measure subtle changes in cognitive functioning as a result of treatment, it is important to assess stability and reliability of chosen measures, which often include computerized cognitive assessment batteries. This study examines changes across repeat cognitive assessments in one day in older adults.
Participants and Methods: Healthy, older adults 70-92 years of age (N=80; Age=78.76±4.43; Education=17.15±2.62; all MMSE>23) were tested across four sessions in one day, each separated by approximately 10 minutes. Tests included Trail Making, Digit Symbol, Hopkins Verbal Learning Test-Revised, and CogState Computerized Battery, with all but Trails including four randomly-administered alternate forms.
Results: Cross-trial changes were noted for all paper-and-pencil measures (all $p<.001$). Increased performance across the first two trials was noted for Trails-A and across three administrations for Trails-B and Digit Symbol. HVLT scores declined significantly across most trials. For CogState, no practice effects were noted for Detection, Identification, One Card Learning, Strategy Learning, or Continuous Paired Associate Learning. Improvements across three administrations were evident for One-Back ($p<.001$) and for the first repetition of Associative Learning ($p<.001$).
Conclusions: Changes in performance across repeated administrations can be seen on standard neuropsychological measures, even using alternate forms, with memory tasks reflecting increased interference. Besides providing sensitive measurement of timed performance, computerized batteries, such as CogState, appear to be more stable with minimal learning and interference effects.
Research support: NIH-NIA P50 AG08671
Correspondence: *Elizabeth G. Reese, M.A., University of Michigan, 2101 Commonwealth Dr., Suite C, Ann Arbor, MI 48105. E-mail: LizaReese@gmail.com*

T.M. ROEBUCK-SPENCER, A.S. VINCENT, R.E. SCHLEGEL & K. GILLILAND. Effect of Test-retest Interval in Computerized Cognitive Testing.
Objective: Computer-based cognitive assessment is widely used for repeated neuropsychological assessment of sports-related concussion and has potential applications for monitoring disease progression of other neurological conditions. However, computerized tests have come under criticism for low reliability and poor understanding of how length of test-retest interval affects psychometrics.
Participants and Methods: The current study examined these issues by administering the ANAM4 General Neuropsychological Screening Battery to college students over varying test-retest intervals. Group 1 took ANAM4 three times: baseline, 1 day and 30 days. Group 2 took ANAM two times: baseline and 30 days. Differences between first and second administrations in each group were examined. The goal was to determine how test-retest interval affects practice and test-retest reliability, two primary variables used to calculate a reliable change index (RCI). Performance was also examined at 30 days in each group to determine the effect of prior test exposure.
Results: Results demonstrated that with few exceptions reliability did not differ as a result of test-retest interval. Additionally, practice effects did not differ as a result of test-retest interval. Overall, reliability coefficients were highest for the 1 to 30 day interval observed in Group 1.
Conclusions: This study revealed that for the first re-test of ANAM4, psychometrics changed minimally, indicating that RCIs may be quite stable regardless of length of test-retest interval. However, repeated exposure to the test did improve psychometrics. This suggests that RCIs may change accordingly, and that RCIs based on an initial retest may be overly conservative when used for subsequent testing sessions.
Correspondence: *Tresa M. Roebuck-Spencer, Ph.D., Department of Psychology, University of Oklahoma, 1317 Bay Bridge Court, Edmond, OK 73034. E-mail: tresa_roebuck@hotmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

B.C. SACHS, B.K. RUSH & O. PEDRAZA. Validation of the NAB Naming Test in a Consecutive Clinical Series.

Objective: The Neuropsychological Assessment Battery (NAB) Naming Test is a novel 31-item measure used to assess confrontation naming. Despite good psychometric properties provided by the test publisher, there is limited independent validation. In this study, we investigated the validity and reliability of the NAB Naming Test in adults who were clinically referred for neuropsychological evaluation.

Participants and Methods: Potential participants included consecutive outpatient referrals for neuropsychological evaluation at Mayo Clinic Florida. Approximately 85% of those invited agreed to enroll in the study. Participants (n=200) ranged from 27 to 91 years of age, had 8 to 20 years of education, and were excluded if their primary language was not English or they had a Dementia Rating Scale raw score < 90. The NAB Naming Test (Form 1) was administered following standardized instructions from the manual. Construct (convergent/discriminant) validity was evaluated by the magnitude of correlations between the NAB Naming Test and the Boston Naming Test (BNT), phonemic/semantic fluency, and Trails B. Internal consistency was established using Cronbach's alpha coefficient.

Results: NAB Naming Test scores ranged from 13-31, and correlated highly with BNT ($r > .70$) but not Trails B ($r < .40$). NAB Naming also correlated more strongly with semantic ($r > .50$) than phonemic fluency ($r < .20$). NAB Naming showed adequate internal consistency (Cronbach's alpha > .70).

Conclusions: The current results demonstrate adequate-to-good validity and reliability for the NAB Naming Test in a clinical sample of outpatient adults. To our knowledge, this represents the largest independent validation of the NAB Naming Test to date.

Correspondence: *Bonnie C. Sachs, Ph.D., Psychology & Psychiatry, Mayo Clinic, 4500 San Pablo Road, Jacksonville, FL 32224. E-mail: sachs.bonnie@mayo.edu*

K. SAWYER, T. KANE, J.E. CARON, B.C. BAUGHMAN, J.C. YOUNG & N.T. YEHYAWI. Reliable Digit Span in Older Adult Outpatient Clinical Groups.

Objective: Studies have generally shown that a Reliable Digit Span (RDS) of 7 or less has acceptable specificity characteristics. The RDS does not use age-corrected scores, however, and was primarily validated on younger adults. Declines in perceptual, motor, and executive control after the sixth decade of life can negatively impact verbal working memory (VWM). The RDS is calculated from a commonly used measure of VWM, so it was hypothesized that it would have poor specificity for older adults being evaluated for cognitive concerns.

Participants and Methods: This study retrospectively examined RDS scores in 87 non-litigating older adults (mean age = 75.01, SD = 8.03) who were referred for outpatient neuropsychological testing. Patients were evaluated with a standard battery of tests and given diagnoses based on DSM-IV criteria. The specificity of the RDS was examined in patients diagnosed with mood disorder (depression or adjustment disorder, n=27), mild cognitive impairment (MCI, n=17), and dementia (Alzheimer's, vascular, or mixed Alzheimer's/vascular; n=43).

Results: Patients with dementia (mean RDS=6.7, SD=1.6) had a significantly lower RDS than patients with MCI (mean=7.9, SD=1.8) or a mood disorder (mean=7.6, SD=1.5). RDS did not differ between the MCI and mood groups. Even though the MCI and mood groups had a mean RDS above 7, all groups were found to have unacceptable specificity rates using the RDS (Dementia=0.26, MCI=0.65, Mood=0.52; all participants combined=0.41).

Conclusions: Results suggest the risk of a false-positive finding is high when using the RDS to assess effort in older adults with depression, MCI, or dementia.

Correspondence: *Kathryn Sawyer, Mental Health, Memphis Veterans Affairs Medical Center, 1030 Jefferson Ave., Memphis, TN 38105. E-mail: kathryn.sawyer@va.gov*

V. SHARMA & C. GOLDEN. The effect of increasing FSIQ scores on verbal and perceptual indices of the WAIS-III.

Objective: Cattell-Horn-Caroll theory suggests that verbal IQ (VIQ) and perceptual IQ (PIQ) measures on the WAIS-III are broadly related to crystallized and fluid intelligence respectively. Yet literature suggests distinctions between the overlap of perceptual and verbal cognitive strategies applicable for easier versus more difficult questions. This study seeks to investigate the relationship between FSIQ scores and verbal and perceptual indices.

Participants and Methods: Results were compared from 169 participants ages 18-55 (M=27.7, SD=7.9) with FSIQ 84-151(M=115.7, SD=13.8) from an adult normal population tested at a local university training center. The sample was 41% male, 71% Caucasian and 86% right-handed. Range of education was 12-22 (M = 15.6, SD = 2.12). WAIS-III composite scores for FSIQ, VIQ and PIQ were used.

Results: Pearson correlation indicated that FSIQ was significantly ($r=0.234$, $p = 0.02$) related to the absolute difference between VIQ and PIQ. A linear regression model explained 4.9% of the variance between FSIQ scores and the absolute value of VIQ and PIQ score differences.

Conclusions: Findings support the hypothesis that perceptual and verbal skills cannot be significantly distinguished by basic questions on subtests that comprise VIQ and PIQ indices of the WAIS-III. These findings support the practice of interpreting verbal and perceptual IQ separately for individuals with high FSIQ, and that FSIQ alone may not be an appropriate measure for these individuals when used for educational or occupational decisions.

Correspondence: *Vivek Sharmaa, B.A., Nova Southeastern University, 3301 College Avenue, Fort Lauderdale-Davie, FL 33314-7796. E-mail: vs338@nova.edu*

S. SISCO, C. PRICE, A. FREEDLAND, H. CUNNINGHAM, M. OKUN & D. BOWERS. Assessing Interference Independent of Processing Speed on the Stroop test in a Parkinson's Disease Sample.

Objective: Processing speed can distort scores on traditional methods of measuring interference on the Stroop test, especially among populations for whom processing speed is impaired. In a sample of Parkinson's disease (PD) patients, the present study compared the utility of traditional interference measures (Jensen's, Golden's) with three alternative measures (relative, ratio, residualized) designed to assess interference independent of processing speed.

Participants and Methods: 72 healthy controls (mean age=70.4, mean education=15.7 years, 38% female, mean MMSE=29.3) and 76 PD patients (mean age=66.8, mean education=15.5 years, 28% female, mean MMSE=28.5) completed the Stroop test as part of a larger neuropsychological battery. Hierarchical linear regression was used to identify group differences in processing speed (word reading, color naming) and interference scores (Jensen's, Golden's, relative, ratio, and residualized interference), after accounting for differences in age, education, and gender.

Results: PD patients were significantly slower than controls during word reading ($p=.01$) and color naming ($p=.001$). Jensen ($p<.001$) and relative ($p=.045$) interference scores both reflected significantly higher interference in controls compared to patients, whereas the Golden method ($p=.045$) indicated significantly higher interference in PD patients. The ratio and residualized interference methods, in comparison, identified no group differences in interference scores. Jensen's score was correlated with processing speed ($p<.001$) while other interference scores generally were not.

Conclusions: PD-control group differences on traditional measures of interference for the Stroop test appear to be at least partly influenced by processing speed. The ratio and residualized scoring methods may more adequately assess interference in populations with impaired processing speed.

Correspondence: *Shannon Sisco, M.S., Clinical and Health Psychology, University of Florida, 101 S. Newell Drive Rm 3151, Gainesville, FL 32610. E-mail: ssisco@phhp.ufl.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

E. MITCHELL, D. VAN DE KREEKE & D. GOLDSTEIN. Effort Indicators Embedded Within the California Verbal Learning Test-II (CVLT-II) in a Sample of Criminal Adults.

Objective: The purpose of this investigation was to cross-validate in a sample of criminal defendants a previously proposed equation of variables derived from the California Verbal Learning Test-II (CVLT-II; Wolfe et al., 2010) used to distinguish effort groups in a sample of Traumatic Brain Injury (TBI) patients.

Participants and Methods: Felony defendants consecutively referred to a court clinic underwent comprehensive effort and neurocognitive assessment, including the CVLT-II, and were subsequently classified into optimal and suboptimal effort groups. Confirmatory binary logistic regression was conducted using effort rating as the dependent variable and Long Delay Free Recall (LDFR), Total Recall Discrminiability (RD) and d-prime as covariates. Computed probability estimates were subsequently entered into the linear function to predict probability of effort group membership using Wolfe et al.'s cut-off rating of >.50 versus <.50 to define optimal and suboptimal effort. Identical exploratory analyses were conducted for comparison.

Results: Wolfe et al.'s proposed 3-variable formula failed to adequately discriminate between effort groups in our sample of felony defendants. Findings from exploratory analyses are discussed.

Conclusions: Wolfe et al's proposed 3-variable CVLT-II formula failed to adequately predict effort group membership among our sample of felony defendants. The applicability of the proposed model for this population and underlying differences between investigations is discussed. These findings contribute to the literature regarding measures of embedded effort within standard neurocognitive tests

Correspondence: *Diana Van De Kreeke, M.S., IIT, 1480 W Grace St #2, Chicago, IL 60613. E-mail: d.vandekreeke@gmail.com*

J.N. WELLMAN, A.L. WONG, B.P. COLEMAN, T. PARSONS, S.D. MARION & A. RIZZO. Evaluation of a Visual Serial Addition Task in a Virtual Environment.

Objective: The use of virtual reality has increased greatly in the past decade—its early potential has blossomed into a viable method for assessing neurocognitive functioning in an ecologically-valid and controllable environment. The current study was designed to evaluate a visual serial Virtual Reality (VR) attention task known as the Checkpoint task. We compared it to standardized measures of attention, including the Paced Auditory Serial Addition Test (PASAT), and a auditory VR PASAT-like task.

Participants and Methods: This study was conducted as part of a larger project piloting the Virtual Reality Cognitive Performance Test (VR-CPT). Twenty-one healthy adults aged 18 to 52 years completed the Checkpoint task in which they serially added numbers flashing on the virtual sky while also completing a decision-making task.

Results: Results indicated that the Checkpoint task was not correlated with any other serial addition task (VR version, r = .26, p = .26; standardized PASAT, r = .13, p = .59). However, it was correlated with several other standardized attention measures including Trails A (r=.52, p=.02), Trails B (r=.62, p=.004), and Stroop/Color Naming (r=.60, p=.005).

Conclusions: These findings indicate that the Checkpoint task is a viable measure of visual attention. It was highly correlated with other, standardized measures of attention that are visually mediated. It did not correlate with the standardized or VR versions of the PASAT. Together, this indicates good divergent validity from the PASAT and good convergent validity with other measures of attention.

Correspondence: *Jonathan N. Wellman, BA, Clinical Psychology, Fuller Graduate School of Psychology, 262 N Los Robles, 119, Pasadena, CA 91101. E-mail: jnwellman@gmail.com*

Forensic Neuropsychology

C.M. BAILEY, B.A. MARCOPULOS, C.M. TUSSEY, J.A. KENT & A.H. GROVE. The Utility of Symptom Validity Tests with Psychiatric Inpatients: Evidence for the Need of Convergent Validity.

Objective: The current project examined the utility of symptom validity tests (SVTs) among psychiatric inpatients.

Participants and Methods: In addition to personality and aptitude measures, 53 psychiatric inpatients (59% male; 53% forensic) were administered several SVTs (Test of Memory Malingering, b Test, Dot Counting Test, and Structured Inventory of Malingered Symptomatology). Suspected malingerers were identified based on individual SVT performance. Binomial analyses were conducted to compare the proportions of identified suspected malingerers using the TOMM as a reference. The utility of the measures in combination was also explored by comparing the global cognitive performance (Kaufman Brief Intelligence Test, 2nd Edition) of patients who failed varying numbers of SVT's.

Results: The proportion of suspected malingerers did not differ relative to the TOMM (6%) for either of the b Test (4%) or DCT (9%), though a significantly larger proportion failed the SIMS (64%; p<.001). KBIT-2 performance did not differ when comparing participants who failed 1 or more SVT (M=85.03, SD=13.36) relative to those who did not fail any SVT (M=90.28; SD=9.63). KBIT-2 performance was significantly (t(51)=2.31, p<.05) stronger for those who failed 1 or fewer SVT's (M=88.28; SD=12.34) relative to those who failed 2 or more (M=77.14; SD=7.80).

Conclusions: Relative to other SVT measures, the SIMS showed the least specificity suggesting that it may not be appropriate for use with psychiatric inpatients at its current cutoff. The need for convergent validity among SVT's was also supported, with differences in global cognitive performance being noted only in inpatients who failed 2 or more SVT's.

Correspondence: *Christopher M. Bailey, Ph.D., Neurology, University Hospitals Case Medical Center, 11100 Euclid Ave, Mail Stop HAN 5040, Cleveland, OH 44106. E-mail: christopher.bailey3@uhhospitals.org*

K.C. BORJA & F. OSTROSKY. The Relationship Between Early Trauma and Psychopathy in Male Convicts.

Objective: Psychosocial variables play an important role in the development of psychopathy. Early traumatic experiences (i.e. environmental violence, physical, emotional and sexual abuse) are commonly reported among individuals with violent conducts. The purpose of our study was to determine the relationship between traumatic events and the expression of the interpersonal, affective and antisocial impairments shown by male psychopaths.

Participants and Methods: 280 inmates (mean age 34.5 years) were interviewed and grouped according to their degree of psychopathy using the PCL-R, yielding low (n=124), medium (n=89) and high (n=50) psychopathy. The frequency and variety of traumatic events experienced before age 18 were derived from the Early Trauma Inventory.

Results: An association between traumatic events and psychopathy was observed, stressful events were correlated with the interpersonal and affective component of psychopathy (R2 =0.06, Beta=0.29: p< 0.00) and physical abuse along with stressful events were correlated with the antisocial component (R2 =0.15, Beta=0.22:p< 0.00). Additionally, emotional abuse and the totality of early traumatic events contributed to the PCL-R score (R2 =0.57, Beta=0.17; p< 0.01). Inmates with high degree of psychopathy suffered more traumatic events than those with medium and low psychopathy (F=14.4; p < 0.00).

Conclusions: Early traumatic events suffered during childhood potentate the manifestation of psychopathy in adults. Living in hostile environments may contribute to the affective and interpersonal impairments, and physical abuse may facilitate violent and antisocial acts that psychopaths elicit. Finally, emotional abuse and the frequent experience of adverse events during childhood are important predictors of psychopathy in vulnerable populations

Correspondence: *Karina C. Borja, Bachelor, Neuropsychology and Psychophysiology, UNAM, 3004 Universidad Av., D-11, 2nd floor, Col. Copilco-Universidad, Mexico 04510, Mexico. E-mail: borja83@yahoo.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

J.J. DAVIS, T. MCHUGH, A. BAGLEY, B. AXELROD & R. HANKS. Utility of Picture Completion as an Embedded Effort Measure.

Objective: A subset of items on the Picture Completion (PC) subtest of the Wechsler Adult Intelligence Test-Third Edition (WAIS-III) has recently been proposed as an embedded effort measure (Boone, 2010). The present study examined PC scaled score as an effort measure in a sample referred for independent medical examination at a private neuropsychology practice.

Participants and Methods: Inclusion criteria were age (>18), history of mild traumatic brain injury, and administration of at least two independent effort measures (e.g., reliable digit span, Recognition Memory Test, etc.). The sample (N = 118) was 38% female, 77% Caucasian, 90% right-handed, averaged 45 years of age and 13 years of education. Performance on effort measures yielded groups that passed all (PASS; n = 38), failed one (FAIL-1; n = 41), and failed two or more (FAIL-2; n = 39) effort measures. The PASS and FAIL-2 groups were not different in age, gender, ethnicity, or handedness. A minor, but significant, difference was noted in average years of education (PASS = 13.5; FAIL-2 = 12.2).

Results: Participants in the PASS group performed better on PC than those in the FAIL-1 and FAIL-2 groups, which did not differ from each other. ROC analysis was used to determine a PC cut-score to differentiate PASS from FAIL-2 groups. The PC cut score (< 5) correctly classified 92% of PASS and 31% of FAIL-2 cases.

Conclusions: A PC cut-score (scaled score < 5) showed adequate specificity but insufficient sensitivity for use as a stand-alone effort measure; it may be useful as an adjunctive effort measure.

Correspondence: *Jeremy J. Davis, Psy.D., Rehabilitation Psychology & Neuropsychology, Rehabilitation Institute of Michigan, 261 Mack Avenue, Detroit, MI 48201. E-mail: jdavis4@dmc.org*

T. MCHUGH, J.J. DAVIS, A. BAGLEY, B. AXELROD & R. HANKS. Utility of Letter-Number Sequencing as an Embedded Effort Measure.

Objective: The Letter-Number Sequencing (LNS) subtest of the Wechsler Adult Intelligence Test Third-Edition (WAIS-III) appeared to be a promising embedded effort measure in previous research using a simulated malingering design. The current study examined LNS scaled score in a sample referred for independent medical examination at a private neuropsychology practice.

Participants and Methods: Inclusion criteria were age (>18), history of mild traumatic brain injury, and administration of at least two independent effort measures (e.g., reliable digit span, Recognition Memory Test, etc.). The sample (N = 101) was 43% female, 80% Caucasian, 89% right-handed, averaged 45 years of age and 13 years of education. Performance on effort measures yielded groups that passed all (PASS; n = 33), failed one (FAIL-1; n = 32), and failed two or more (FAIL-2; n = 36) effort measures. The PASS and FAIL-2 groups were not different in gender, age, or handedness. Differences were noted in ethnicity (PASS = 6% African American; FAIL-2 = 31% African American) and years of education (PASS = 13.5; FAIL-2 = 12.2).

Results: Performance on LNS in the PASS group was better than the FAIL-1 group, which was better than the FAIL-2 group. ROC analysis was used to determine a LNS cut-score to differentiate PASS from FAIL-2 groups. The LNS cut score (< 6) correctly classified 100% of PASS and 44% of FAIL-2 cases.

Conclusions: A scaled score cut-off (< 6) on the LNS subtest of the WAIS-III showed good specificity. Sensitivity was low for independent use, but it may be useful as an adjunctive effort measure.

Correspondence: *Jeremy J. Davis, Psy.D., Rehabilitation Psychology & Neuropsychology, Rehabilitation Institute of Michigan, 261 Mack Avenue, Detroit, MI 48201. E-mail: jdavis4@dmc.org*

B.M. DOANE, K.L. SALEKIN, K.A. HEDGE & N.W. NELSON. MSVT Performance in Adults with Mild Intellectual Disability.

Objective: While symptom validity research has proliferated in recent decades, relatively few studies have examined effort performances of individuals with intellectual disability (ID). Some researchers have expressed concern that select symptom validity tests may be contraindicated in ID samples related to high false positive rates. Consequently, response validity testing in Atkins evaluations and other forensic assessments for mental retardation remains controversial. The current study presents preliminary Medical Symptom Validity Test (MSVT) normative data for adults with mild ID and their community-based caregivers and compares their performances against published cutoffs for implausible/suspect effort profiles.

Participants and Methods: Using a quasi-experimental design, this study obtained MSVT performances from 28 adult participants with mild ID and their 30 caregivers within a community residential setting. Participants were instructed to try their best on the MSVT and all acknowledged having done so following completion of the measure.

Results: Using traditional MSVT cutoffs for profile interpretation, 50% of the individuals with mild ID and 100% of their caregivers "passed" the primary subtests. Of the 50% of individuals with ID who "failed" the primary subtests, 35.71% obtained Genuine Memory Impairment profiles and 14.28% obtained implausible/suspect effort profiles.

Conclusions: Results indicate that within the mild ID sample, the traditional MSVT cutoffs for interpretation yielded a 14.28% false positive rate. Recommendations are presented concerning use of the MSVT and interpretation of implausible performances within the context of forensic assessments for mental retardation/intellectual disability. Further research is needed to elucidate the construct validity of the MSVT, which may function as much as a memory test as an effort measure in ID populations.

Correspondence: *Bridget M. Doane, Ph.D., Psychology, Minneapolis VA Health Care System, 2300 Lexington Ave. S, Apt. 305, Mendota Heights, MN MN. E-mail: bmdoane@gmail.com*

M. EISENHARD & B. CANNON. Strategies Employed by Memory Malingerers on Forced-Choice Recognition Tasks.

Objective: Forced-choice measures of effort often are employed in order to distinguish individuals who have true memory impairment from individuals who are malingering. To date, the strategies that individuals use to malinger have yet to be fully explored. The current study compared simulated malingering by groups receiving direction to feign amnesia either before initial presentation of stimuli or before recall. It was predicted that those receiving instruction prior to stimuli presentation would perform more like true amnesics than those receiving instruction prior to recall.

Participants and Methods: Forty undergraduate students were randomly assigned to receive malingering instructions either prior to test stimuli presentation or to recall on the TOMM and the CVLT-II, based on the procedure outlined by Flowers, Bolton, and Brindle (2008). Participants were also asked for their actual memory of the test items following the simulation and questioned regarding the strategies they employed to feign amnesia.

Results: In general, simulated recall did not differ between the groups. However, during the "true" recall phase, the group receiving the instruction after stimuli presentation recalled more items than the group instructed to malinger prior to stimuli presentation. Different malingering strategies were endorsed by the two groups.

Conclusions: This study failed to replicate the findings of Flowers, Bolton, and Brindle (2008). The addition of the true recall trial, however, suggests that the group receiving instructions after stimuli presentation was more likely to truly recall more items. Their strategies required intentional suppressing of truly recalled information, whereas the other group appears to have utilized a strategy to prevent encoding at the outset. Thus, neuropsychologists giving tests of effort would be advised to ensure that clients are paying as close attention as possible at the time of encoding in order to better determine sub-optimal effort on testing.

Correspondence: *Matthew Eisenhard, M.A., Psychology, Marywood University, 3334 South Front St., Whitehall, PA 18052. E-mail: meisenhard@m.marywood.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

L.K. HECHT & A.E. LANSING. Investigating Theory of Mind and Empathy in Conduct Disordered Delinquents.

Objective: To investigate theory of mind (ToM) and empathy in conduct disordered delinquents. Conduct Disorder (CD) is often considered a precursor to antisocial personality disorder and sometimes psychopathy, with deficits related to inferring another person's mental state (ToM-construct) hypothesized to lead to antisocial behavior. However, few ToM studies include adolescent delinquents and virtually none sample girls.

Participants and Methods: Thirty-eight detained delinquents (87% female) were assessed with the Conduct Disorder Questionnaire (CDQ), Faux Pas Task (FPT: ToM measure) and Interpersonal Reactivity Index (IRI: empathy measure). All youth had CD, at least one aggressive CD symptom, and were grouped into aggressive-remorseless (n=17) and aggressive-remorseful (n=21) subtypes.

Results: Delinquents were significantly better able to interpret everyday social interactions than situations containing a social faux pas ($t = -3.57$, $p<.01$). No significant ToM differences emerged between aggressive-remorseless and aggressive-remorseful subtypes. Delinquents as a group had a similar response pattern on the IRI and FPT to reports in the literature on incarcerated adult psychopaths, but were significantly better at inferring the listener's mental state ($t = 4.66$, $p<.01$). Empathy on the FPT was correlated with the IRI's Perspective-Taking Scale ($r2 = .112$, $p<.05$). Significant ToM differences also arose along racial/ethnic lines.

Conclusions: These data suggest that incarcerated delinquents: 1) have problems with mentalizing that cannot solely be attributed to cognitive-processing difficulties and may not be specifically related to remorse/psychopathy, 2) have similar theory of mind abilities to adult psychopaths, and 3) may differ in theory of mind abilities along ethnic/cultural lines, at least in a sample including aggressive girls.

Correspondence: *Lisa K. Hecht, B.S., University of California, San Diego, 9500 Gilman Dr. M/C 0949, La Jolla, CA 92093. E-mail: lhecht@ucsd.edu*

D. HEYANKA, V.L. HOBSON, R. ADAMS & J. SCOTT. Resistance of Subtle Learning and Memory Tasks to Incomplete Effort.

Objective: It is well established that the most frequently implemented memory measures are susceptible to artificial reduction. However, little empirical support considers the imperviousness of subtle, or implicit, learning/memory tasks to poor effort. The current study analyzed the implication of effort on score patterns from obvious and subtle learning/memory tasks.

Participants and Methods: Data were derived from an ongoing clinical database at the University of Oklahoma Health Sciences Center Neuropsychology Laboratory. Sample consisted of 280 subjects with mixed neurological diagnoses partitioned into good (n =176) and poor (n =104) effort groups based upon clinical judgment (e.g., disinterest in evaluation, more "I don't know" answers than normally expected). The obvious learning task was the Rey Auditory Verbal Learning Test (RAVLT) and the subtle learning task was the Tactual Performance Test (TPT). Two MANCOVAs, controlling for age and education, were implemented. Discrimant Function Analyses (DFAs) were run on significant MANCOVA variables.

Results: MANCOVAs demonstrated the poor effort group was significantly worse on all trials of the RAVLT, excluding the False Positive score, while groups were equal on all TPT variables, excluding Memory and Location. DFAs successfully classified the groups on all variables significant from the MANCOVAs.

Conclusions: Results suggested subtle tasks may be valuable in quantifying a patient's learning/memory capabilities regardless of effort. These results are especially important in litigation cases as they may provide clinicians with alternative means of assessing actual learning/memory capabilities. Furthermore, the mixed neurological nature of the sample accentuates the utility of integrating a subtle learning/memory measure into a test battery.

Correspondence: *Daniel Heyanka, M.A., Nova Southeastern University, 12117 Heritage Park Road, Apartment 105, Oklahoma City, OK 73120. E-mail: Heyanka@nova.edu*

J. HOELZLE, N. NELSON, K. MCGUIRE, A. FERRIER-AUERBACH, M. CHARLESWORTH, B. DOANE & S. SPONHEIM. Factor Analysis of Cognitive and Psychological Response Validity Measures in a Sample of U.S. Veterans.

Objective: Recent efforts have been made to integrate symptom validity measures with broadband personality validity scales to enhance detection of exaggerated cognitive and psychological symptoms. However, the extent of construct overlap between cognitive and psychological response validity scales is not clear. The current study evaluates constructs underlying symptom validity tests, embedded effort indicators derived from standardized neuropsychological measures, and select MMPI-2/RF validity scales.

Participants and Methods: The sample included 117 veterans evaluated in forensic and research settings. Principal components analyses were conducted and factor retention was determined by parallel analysis and Velicer's minimum average partial procedure.

Results: Empirically supported retention procedures supported extraction of two moderately correlated components ($r = -.27$). One dimension reflected performances on symptom validity tests and embedded effort indicators and the other reflected exaggerated self-report of cognitive complaint, emotional distress, and health concerns. The Symptom Validity Scale (FBS) is unique from other MMPI-2/RF validity scales because it had moderately large loadings on each dimension. It is notable that the Response Bias Scale (RBS), developed specifically to detect exaggerated cognitive difficulties, did not load with performance-based measures.

Conclusions: Findings suggest that clinicians should exercise caution interpreting RBS and FBS elevations as necessarily signifying diminished task engagement on neuropsychological measures.

Correspondence: *James Hoelzle, Ph.D., Psychology, Marquette University, PO Box 1881, Milwaukee, WI 53201-1881. E-mail: james.hoelzle@marquette.edu*

L. JASINSKI, J. HARP & D.T. BERRY. Detection of Malingered Adult Attention Deficit/Hyperactivity Disorder (ADHD) Using the Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2 RF).

Objective: The purpose of the study was to assess the ability of the MMPI-2 RF in detecting malingered ADHD among college students. Further, the MMPI-2 RF scales were examined for their ability to differentiate college students with ADHD from those with a mood disorder.

Participants and Methods: Participants included 110 undergraduate students, divided into 5 groups. Two groups of students with no mood disorder or ADHD were randomly assigned to respond honestly (HON n=28) or feign symptoms of ADHD (MAL n=22) while completing the MMPI-2 RF. Two groups with a diagnosis of ADHD were asked to complete the measure by responding honestly (ADHD-H n=20) or exaggerating their symptoms (ADHD-E n=18). Finally, a group of students with a mood disorder (MOOD n=22) was asked to honestly complete the MMPI-2 RF.

Results: The F-r, Fp-r, and Fs validity scales showed promise in differentiating honest ADHD students and normal malingerers, with moderate effect sizes (mean d=.81), and strong specificity ($M = 91.7$). Sensitivity was low ($M = 47.0$). The FBS performed poorly. Importantly, participants in the MOOD group also elevated several of these validity scales, resulting in low specificity values (MOOD group M=71.5). The MMPI-2 RF clinical and specific problem scales were not sensitive to symptoms of ADHD, although the somatic and internalizing scales may hold some usefulness in differentiating ADHD from a mood disorder.

Conclusions: Given the high comorbidity rates among ADHD and mood disorders, the inclusion of a measure of psychopathology in a routine ADHD evaluation may be beneficial. Overall, the MMPI-2 RF validity scales hold some promise in detecting feigned ADHD in a college student sample. Several clinical and specific problem scales may also aid in differential diagnosis of ADHD and mood disorders, and alert the clinician to the need for further assessment. In general, MMPI-2 RF scales are not sensitive to symptoms of ADHD alone, and are not recommended as a diagnostic tool for ADHD at the present time.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Lindsey Jasinski, Psychology, University of Kentucky, 109A Kastle Hall, Lexington, KY 40506. E-mail: lindsey.jasinski@gmail.com*

S.M. KIRKLEY & S. BRODSKY. Malingering Mild Traumatic Brain Injury: Juror Awards and Implications for the Forensic Neuropsychologist.

Objective: Forensic neuropsychologists are frequently asked to testify in personal injury cases involving mild traumatic brain injury (mTBI). While literature suggests a relation between prolonged symptom complaint in mTBI and potential for secondary gain, there is scarce empirical research on the impact of malingering evidence on juror decisions. This study sought to address this gap in the literature.

Participants and Methods: Undergraduate participants (N = 251) were randomly assigned to one of four conditions in a 2x2 design: cognitive impairment evidence present or absent and malingering evidence present or absent. All participants read a case background explaining: (a) the plaintiff had sustained a mTBI in a motor vehicle accident; (b) the defendant was at fault; (c) the plaintiff reported persistent cognitive impairment; and (d) in addition to actual damages, the plaintiff was requesting compensation for a cognitive disability. Participants then viewed a DVD of a psychologist testifying on the neuropsychological test results and providing an expert opinion. Following the testimony, participants rendered an award decision and completed personality questionnaires. A multifactor general linear model was conducted.

Results: Results indicated that evidence of cognitive impairment significantly increased award decisions [F (1, 225) = 17.99, p Λ0.01] and evidence of malingering had an adverse effect, but not to the degree expected [F (1, 225) = 21.21, p Λ0.001]. African American participants awarded significantly more compensation than Caucasians [F (2, 246) = 4.77, p Λ0.01].

Conclusions: The implications of these results for forensic neuropsychologists were explored and directions for future research were suggested.

Correspondence: *Shalene M. Kirkley, PhD, Clinical Psychology, Argosy University, 2233 W. Dunlap Avenue, Fourth Floor, Phoenix, AZ 85021. E-mail: skirkley@argosy.edu*

M. KRISHNAN & J. DONDERS. Embedded Assessment of Effort Using the Continuous Visual Memory Test in Patients with Traumatic Brain Injury.

Objective: This study attempts to evaluate an embedded measure of symptom validity for the Continuous Visual Memory Test.

Participants and Methods: A retrospective review of a consecutive patient series consisting of 115 patients referred for neuropsychological examinations for traumatic brain injury was undertaken. Performance on two validated tests of symptom validity, the Test of Memory Malingering (TOMM) and the Word Memory Test (WMT), was used for classification purposes.

Results: Individuals who failed the TOMM or WMT were 5.8 times more likely to fail the CVMT validity criteria. The addition of compensation seeking increased this odds ratio to 9.8. The area under the curve for the latter classification was 0.742. Maximum likelihood ratio optimization of the CVMT validity test cutoff score indicated sensitivity of 0.25 and specificity of 0.99 at a lower cutoff of <12 items. Classification accuracy was 91%. The original cutoff score of <14 items also performed acceptably, with a classification accuracy of 90%.

Conclusions: While low sensitivity argues against the use of the embedded CVMT symptom validity test in isolation, the proposed measure has utility in conjunction with other established effort measures.

Correspondence: *Mohan Krishnan, PhD, Psychology, Mary Free Bed Rehabilitation Hospital, 235 Wealthy St SE, Grand Rapids, MI 49503-5299. E-mail: mohan.krishnan@maryfreebed.com*

A. LANSING, L.K. HECHT & D.C. DELIS. Differences in Creative Relative to Verbal Intellectual Ability in Life-Course Persistent Delinquent Youth.

Objective: To assess differences in creative problem solving (executive functioning) relative to verbal intelligence (VIQ) in 16-18 year old life-course persistent delinquents (LCPD). Recent data indicate a subset of youth demonstrate superior executive skills relative to VIQ performance, which represents abilities most often assessed in standardized achievement tests. In contrast, executive strengths represent flexibility in mental set and critical thinking which may facilitate optimal achievement across functional domains (education, occupation) yet tend to be overlooked in formative academic settings.

Participants and Methods: Participants were 54 LCPD youth (30 female, 24 male). Youth were administered the Delis-Kaplan Executive Function System (DKEFS) and Wechsler Abbreviated Scale of Intelligence (WASI). Entire sample, gender and racial/ethnic (26% African American, 39% Caucasian, 35% Latino) comparisons were made between WASI VIQ performance and a DKEFS Executive Function Quotient (EFQ) comprised of scores tapping verbal (Category Fluency Switching Accuracy), visuospatial (Design Fluency Switching) and integrated verbal-visual processing (Color Word Inhibition Switching, Card Sort Recognition Description, Trails Number Letter Switching) executive skills.

Results: Subsets of LCPDs had ≧1.0 S.D. EFQ-VIQ discrepancies: 26% demonstrated EFQ>VIQ while only 4% demonstrated VIQ>EFQ. No significant gender (α^2=4.21, df=2, p=.12) or racial/ethnic (α^2=1.61, df=4, p=.81) differences were observed.

Conclusions: These data suggest that a substantial subset of LCPD youth demonstrate superior EFQ relative to VIQ. While executive deficits are reported in some delinquent samples, EFQ may represent an important cognitive strength for a subset of LCPD youth which should be fostered in educational programming. These findings underscore the need to assess and support EFQ skills in school-aged youth.

Correspondence: *Amy Lansing, PhD, Psychiatry, University of California, San Diego, Laboratory of Cognitive Imaging, 8950 Villa La Jolla Drive, Suite C212, La Jolla, CA 92037. E-mail: alansing@ucsd.edu*

A. LANSING & L.K. HECHT. Verbal Fluency, Executive Function, Verbal Intellectual Ability and Bilingual Status in Life-Course Persistent Delinquents.

Objective: To compare bilingual to monolingual life-course persistent delinquents (LCPDs) on verbal fluency, executive functioning and verbal intelligence (VIQ). Data indicate bilinguals score lower on verbal fluency tests and some youth demonstrate superior executive, relative to VIQ, performances. While VIQ represents abilities tapped by standardized achievement tests, executive functions represent problem solving abilities – a cognitive domain typically overlooked in early education.

Participants and Methods: Fifty-four 16-18 year old LCPDs received the Delis-Kaplan Executive Function System (DKEFS) and Wechsler Abbreviated Scale of Intelligence (WASI). Monolinguals and Spanish-English bilinguals (28%) were compared on Verbal Fluency, the WASI and Executive Function Quotient (EFQ: DKEFS Category Switching Accuracy, Design Fluency Switching, Color Word Inhibition Switching, Card Sort Recognition Description, Trails Number-Letter Switching).

Results: Bilinguals performed comparably to monolinguals on Letter and Category Fluency, but produced fewer correct responses and were less accurate at switching on DKEFS Category Switching. No differences emerged on non-fluency EFQ subtests, EFQ, WASI subtests, VIQ, Performance or Full Scale IQ. While the between-group EFQ-VIQ differences were not significant, 33% of bilinguals demonstrated EFQ>VIQ (≧1.0 SD) while none demonstrated VIQ>EFQ. In contrast, 23% of monolinguals demonstrated EFQ>VIQ and 5% showed VIQ>EFP.

Conclusions: These data suggest that among LCPDs 1) bilingual decrements in verbal fluency are limited to switching conditions, 2) bilinguals perform comparably to monolinguals on the WASI and non-fluency EFQ tasks and 3) subsets of monolingual and bilingual LCPDs have relative executive strengths worth exploring from an education perspective. These findings underscore the need to assess for neurocognitive strengths, particularly among bilinguals, when developing targeted interventions.

Correspondence: *Amy Lansing, PhD, Psychiatry, University of California, San Diego, Laboratory of Cognitive Imaging, 8950 Villa La Jolla Drive, Suite C212, La Jolla, CA 92037. E-mail: alansing@ucsd.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

J.B. MILLER, S.R. MILLIS, L.J. RAPPORT, R.A. HANKS, J.R. BASHEM & B.N. AXELROD. Detection of Insufficient Effort Using the Advanced Clinical Solutions for the Wechsler Memory Scale, Fourth Edition.

Objective: This study investigated the ability of the Wechsler Memory Scale-4th Edition (WMS-IV) and the Advanced Clinical Solutions (ACS) package to distinguish poor performance due to intentional response bias among simulators of traumatic brain injury (TBI) from poor performance due to actual TBI. The capacity of the new Word Choice Test (WCT) to discriminate poor effort alone and in combination with the other ACS measures was also evaluated.

Participants and Methods: Participants were 45 survivors of moderate to severe TBI and 39 healthy adult coached to simulate TBI. All participants were administered the WMS-IV and ACS measures, as well as several independent symptom validity tests. Three logistic regression models were fit using the ACS variables as predictors and group membership as the outcome. Diagnostic efficiency was evaluated using receiver operating characteristic curves (ROC), and the added discriminability of including the WCT was assessed by comparing the change in predictive accuracy via likelihood ratio tests and comparison of model fit statistics.

Results: Logistic regression indicated that a five-variable model containing all the ACS variables, a four-variable model that excluded the WCT, and a single-variable model using only the WCT were statistically reliable. Comparing predictive accuracy of each model found that adding the WCT to the ACS increased predictive accuracy. Diagnostic efficiency for the full ACS model was considered "excellent" according to interpretive guidelines.

Conclusions: The findings support use of the ACS for discriminating analog simulators from persons with actual TBI. In addition, the WCT demonstrated that it adds to predictive accuracy, supporting its inclusion in the ACS.

Correspondence: *Justin B. Miller, Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI, MI 48202. E-mail: justin.b.miller@gmail.com*

J.B. MILLER, J.R. BASHEM, L.J. RAPPORT & R.A. HANKS. Verbal Paired Associates Recognition Discriminability as an Indicator of Response Bias.

Objective: Recognition discriminability represents a quantification of a respondent's ability to differentiate targets from foils on a forced-choice recognition task; its use as an embedded indicator of response bias has been documented with other recognition memory measures. This study evaluated the ability of the discriminability score from the Verbal Paired Associates (VPA) subtest of the Wechsler Memory Scale, 4th Edition (WMS-IV) to function as a measure of response bias.

Participants and Methods: Participants were 41 survivors of moderate to severe traumatic brain injuries (TBI) and 41 healthy adults coached to simulate TBI; all participants were administered the WMS-IV, the California Verbal Learning Test, 2nd Edition (CVLT-II), and several symptom validity tests. Discriminability scores for both VPA and the CVLT-II were correlated using Pearson product-moment correlations. Logistic regression and receiver operator characteristic (ROC) curves were used to determine the diagnostic efficiency of each score.

Results: Correlations revealed a significant positive relationship between recognition discriminability scores from VPA and the CVLT-II for the TBI group (r = .34) and simulator group (r = .71). Logistic regression indicated that both scores were reliable predictors of group membership individually, with moderate classification accuracy for each score (AUC = .72). Model fit statistics showed positive preference for CVLT-II discriminability.

Conclusions: Discriminability scores from VPA and the CVLT-II were significantly associated, more so among TBI simulators than actual TBI. Although both scores reliably differentiated between cases of actual and simulated TBI, the diagnostic efficiency was too low to be considered useful in a clinical setting in the absence of other indicators.

Correspondence: *Justin B. Miller, Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI, MI 48202. E-mail: justin.b.miller@gmail.com*

K. O'MAHAR, J. SCOTT, D. MORGAN, J. WOODHOUSE, J. LINCK & R. ADAMS. Rates of negative response bias on the Effort Index (EI), TOMM, FBS, and RBS by patient litigation and diagnostic status.

Objective: The purpose of the present study was to examine negative response bias as measured by the Effort Index (EI) of the RBANS, TOMM, MMPI-2 FBS, and MMPI-2 RBS. Rates of negative response bias were examined by patient diagnostic and litigation status.

Participants and Methods: An archival data set including an outpatient clinic sample was used [N=97; age=50.91(12.56), range=18 to 78 years; 53% male; 87% Caucasian; 31%=12 years of education, 19%=16 years of education; 25%=litigation cases]. Conclusions as to diagnosis and the presence/absence of brain damage (brain damaged=9%, not brain damaged=66%, inconclusive brain-damage=17%) were based on a comprehensive battery of tests as well as medical records and patient interview. Conservative cutoffs for identification of negative response bias were used.

Results: Across the entire sample, 65% did not fail any response bias measure, 23% failed one, 8% failed two, 2% failed three, and 2% failed four. Rates of negative response bias for each measure were as follows: EI=12%, TOMM=10%, FBS=21%, RBS=10%. For patients involved in litigation (n=24), rates of negative response bias were the following: EI=13%, TOMM=8%, FBS=25%, RBS=4%. Rates of negative response bias for patients not involved in litigation (n=73) were: EI=12%, TOMM=11%, FBS=19%, RBS=12%. Among TBI patients (n=15; 47% of which were involved in litigation), negative response bias rates were as follows: EI=20%, TOMM=27%, FBS=20%, RBS=20%. For patients with a mixed etiology of neurological problems (n=20; MCI, Alzheimer's disease, vascular disorder, seizure disorder; none of which were involved with litigation), rates consisted of the following: EI=15%, TOMM=5%, FBS=15%, RBS=0%.

Conclusions: Results indicated that patients demonstrated response bias for exaggeration of cognitive and emotional symptoms. Additional information about the convergence and divergence of these measures within this sample is provided. This study demonstrates the importance of utilizing a range of response bias measures.

Correspondence: *Kerry O'Mahar, PhD, University of Oklahoma Health Sciences Center, 4201 W Memorial Rd #8302, Oklahoma City, OK 73134. E-mail: komahar@luc.edu*

R.W. SCHROEDER, C.P. PECK, B.A. BOATWRIGHT, R.J. HEINRICHS & L.E. BAADE. Validity of the RBANS Effort Index with a Geriatric Inpatient Sample.

Objective: Effort testing helps neuropsychologists assess the validity of test performance. The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) is commonly used in geriatric populations. In 2007, Silverberg, et al. created an RBANS Effort Index (EI); however, there is little research examining the EI in a neurologically impaired geriatric population.

Participants and Methods: Archival data from 114 geriatric inpatients with no incentive to feign was examined: Vascular Dementia = 9, Alzheimer's Dementia (AD) = 35, Dementia NOS = 27, No Neurological Diagnosis = 43. Individuals without neurological diagnoses were diagnosed with Depression = 32, Psychosis = 6, Anxiety = 2, Substance Abuse = 1 and No Diagnosis = 2. Patients with delirium were excluded from this study. The patients completed the RBANS Form–A as a part of a dementia screen.

Results: The recommended IE cutoff score of >3 misclassified 46‰ of the AD group, 19‰ of the Dementia NOS group, 11‰ of the Vascular Dementia group, and 7‰ of the No Neurological Diagnosis group. A cutoff score of >5 was needed to obtain a specificity rate above 90‰ for the Dementia NOS group. A cutoff score of >6 was needed to obtain a specificity rate above 90‰ for the AD group. A cutoff score of >8 was needed to obtain a specificity rate above 90‰ for the Vascular Dementia group.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Overall, the recommended RBANS EI score of >3 achieved a specificity rate greater than 90‰ for geriatric inpatients without neurological diagnoses. However, this score misclassified a large number of patients who have dementia.

Correspondence: *Caleb P. Peck, Psychiatry and Behavioral Sciences, University of Kansas School of Medicine, 143 N. Sedgwick Street, Wichita, KS 67203. E-mail: calebppeck@yahoo.com*

P. RUPPERT & M.V. OLIVERI. Subjective Memory Complaints and Performance on Symptom Validity Indicators.

Objective: This study examined the association between different types of subjective memory complaints and performance on symptom validity tests.

Participants and Methods: The sample consisted of 73 mixed clinical and medicolegal cases who completed the Memory Complaints Inventory - Short Form (MCI-SF; Green, 2003), Victoria Symptom Validity Test (VSVT; Slick et al., 1995), and Word Memory Test (WMT; Green, 2003) in the course of a neuropsychological evaluation. The sample was 52% male, with a mean age of 46, and an average of 14 years of education. Five scales were computed for the MCI-SF, including *Verbal Memory Problems*, *Pain Interferes with Memory*, *Memory Interferes with Work*, *Impairment of Remote Memory*, and a *Total Composite* summed score.

Results: MCI-SF scores were moderately related to symptom validity test (SVT) accuracy scores on the VSVT (r = -.23 to -.47) and WMT (r = -.24 to -.36) and to a lesser extent to VSVT response latencies (r = .27 to .32). Examinees who failed both the VSVT and WMT endorsed a significantly greater degree of memory complaints on the MCI-SF than those examinees who passed both SVTs. The MCI-SF Total Composite score most significantly differentiated these groups.

Conclusions: In conclusion, report of subjective memory complaints frequently coincides with cognitive response bias. The Total Composite score appears to be the most sensitive score on the MCI-SF to atypical performance on response bias measures. Self-ratings of memory problems need to be viewed with considerable caution.

Correspondence: *Phillip Ruppert, Rush University Medical Center, 1345 N. Maplewood Ave. Apt 1, Chicago, IL 60622. E-mail: philliпruppert@gmail.com*

C. REESE, J. SUHR, G. LARRABEE & K. RASMUSSEN. Third Party Observation Effects on Credible and Non-Credible Performance.

Objective: Third party observation impedes performance on memory measures in neuropsychological evaluations. However, little is known about the observation effect on examinees who intend to perform with non-credible effort. We investigated how third party observation affects credible and non-credible performance on the Word Memory Test (WMT).

Participants and Methods: University students with a history of mild TBI were recruited to participate in one of four randomized conditions: observed or non-observed malingerer and observed or non-observed controls. Students asked to malinger read a scenario about simulating impairment; controls were asked to perform their best. Observation was done by video camera (which participants thought was recording the session).

Results: On WMT immediate recall, there was a significant group by observation condition interaction (p=.000). Results showed that overall, malingerers performed worse than controls, but within the malingering participants, observed malingerers performed better than unobserved malingerers (p = .002). Similar findings were observed on WMT delayed recall. Using standard WMT cutoffs for detection of malingering, 76.9% of observed malingerers failed, while 100% of non-observed malingerers failed (p=.05). Only 1 of the controls (observed condition) failed.

Conclusions: Although additional research and larger sample sizes are needed, results suggest third party observation did not affect the performance of controls on the WMT, but did affect those asked to malinger, in that malingerers became harder to detect on the WMT. Results have implications for use of observation during neuropsychological assessment, especially for forensic purposes.

Correspondence: *Julie Suhr, Psychology, Ohio University, 200 Porter Hall, Athens, OH 45701. E-mail: suhr@ohio.edu*

C. SULLIVAN, J. MOSES, L. HUTSON, B. BELSHER, A. HULL & J. POOLE. Does compensation status influence effort on neuropsychological measures in OEF/OIF veterans with polytrauma?

Objective: Symptom validity within the veteran system is a growing concern as the rates of compensation continue to rise. The current study explored whether compensation seeking status affects performance on embedded neuropsychological effort measures in a sample of OEF/OIF veterans. Base rates of cognitive feigning and psychological factors predicting poor performance were also evaluated.

Participants and Methods: Seventy-nine OEF/OIF veterans with a median age of 30 screened positive for TBI and were referred for assessment at the VA Palo Alto Polytrauma Neuropsychology Site. Forty-two (53%) participants were seeking compensation. A MANOVA was performed to investigate whether compensation-seeking veterans perform worse on reliable digit span (RDS) and RBANS Effort Index (EI). Regression analyses were performed to determine whether self-report psychological measures (Beck Depression Inventory-PC, Beck Anxiety Inventory, PTSD Check List-Civilian) predict poor effort.

Results: There was no significant difference between those seeking compensation and those not on effort measures F (4, 76) = 0.99, p=.67, partial eta squared = .01. Twenty-six percent of veterans seeking compensation failed one measure and 5% failed two. Self-reported symptoms explained 13% of the variance for poor effort on the RBANS EI, F(3, 78) = 3.8, p <.01. Scores on the BAI significantly predicted poor effort (t = 2.9, p <.005) and contributed 10.2% to the variability.

Conclusions: Compensation status did not influence effort on neuropsychological measures in OEF/OIF veterans. These findings are discrepant with civilian studies, suggesting that there may be an inherent difference in compensation processes between veteran and civilian samples. In general, base rates of effort were consistent with preliminary VA studies. Finally, results suggest that veterans endorsing elevated anxiety are more likely to fail the RBANS EI.

Correspondence: *Campbell Sullivan, MA, MS, VA Palo Alto, 3801 Miranda, Palo Alto, CA 94034. E-mail: cspsyd@gmail.com*

N. TORRENCE & K. KLEBE. Depression and Cognitive Functioning in Criminal Offenders Over a One-year Period.

Objective: The effects of depression on cognitive functioning in inmates have not been established. The purpose of this study is to explore the relationship between changes in depression and cognitive functioning over time in inmates. It is hypothesized that inmates with more depression symptoms will have lower cognitive functioning at baseline. Additionally, if depression improves cognitive functioning will improve, if depression gets worse cognitive functioning will decline, and if depression stays the same cognitive functioning will stay the same over one year.

Participants and Methods: Male inmates (N=167) were given neuropsychological and psychological well-being measures, every three months for one year. We used the Beck Hopelessness scale, a 20-item measure of depression; the Saint Louis University Mental Status (SLUMS), an 11-item cognitive screen; and the Trail Making Test (TMT) parts A and B completion times.

Results: Bivariate correlations assessed the relationship between depression and cognitive functioning. The BHS was negatively related to the SLUMS (p <.01) and the BHS was positively related to the TMT parts A (p <.01) and B (p <.05). Three 3x5 mixed design ANOVAs assessed cognitive functioning in inmates whose depression improved, stayed the same, and worsened over one year. All three groups performance improved on TMT A, F(4, 672)=8.19, p<.001 and B, F(4, 656)=24.77, p<.001, and the SLUMS F(4, 688) = 29.10, p<.001, at the same rate.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results demonstrated that more depression symptoms are related to lower cognitive functioning and cognitive functioning improves over one year regardless of changes in depression. These changes are likely due to practice effects.
Correspondence: *Nicole Torrence, B.A., University of Colorado at Colorado Springs, 1670 Dublin Blvd Apt. 206, Colorado Springs, CO 80918. E-mail: torrence.nicole@gmail.com*

J.C. YOUNG, B.L. ROPER, B.C. BAUGHMAN & N.T. YEHYAWI. Correspondence of Digit Span derived effort indices with Word Memory Test performance.
Objective: Reliable Digit Span (RDS) is a frequently employed embedded measure of effort. However, Spencer et al. (2010) have suggested that incorporating the new digit sequencing trial into the traditional RDS formula (ERDS) improves sensitivity and specificity. This study reports on the operational characteristics of the ERDS, RDS, and age-corrected scale scores (ACSS) when utilizing a well-validated external criterion measure of effort.
Participants and Methods: Archival data was collected from 83 veterans (Age M=46.6, SD=14.2; Education M=13.2, SD=2.5) who completed the WAIS-IV Digit Span subtest and WMT. Seventy-four percent (n=61) were completed within an outpatient neuropsychological evaluation, 18% (n=15) were administered within a compensation evaluation, and 8% (n=7) were administered during inpatient hospitalizations. Thirty-six percent of the total sample failed IR, DR, or CNS of the WMT.
Results: WMT Pass/Fail groups did not significantly differ on RDS, ERDS, or ACSS scores. Utilizing recommended cut-offs on the RDS and ERDS, we achieved moderate sensitivity (47%/40%, respectively) but poor specificity (72%/66%, respectively). Greater specificity (87%/91%) was achieved when adopting more conservative cut-offs for both the RDS (≤6) and ERDS (≤9), at the cost of lower sensitivity (13%/20%). Operational characteristics of the ACSS were essentially equivalent to the ERDS.
Conclusions: Although Spencer et al. (2010) found that ERDS displayed improved operational characteristics relative to the RDS in prediction of TOMM performance, the present investigation did not find that WMT pass/fail groups differed on RDS, ERDS, or ACSS. As discussed by Boone (2009), this study provides support for the need to assess effort in multiple cognitive domains, including memory and attention.
Correspondence: *John C. Young, Ph.D., Memphis VA Medical Center, 399 Reksten Cove, Cordova, TN 38018. E-mail: john.young5@va.gov*

J.C. YOUNG, B.L. ROPER, B.C. BAUGHMAN, N.T. YEHYAWI & P.W. HELMER. The Repeatable Battery for the Assessment of Neuropsychological Status Effort Index: Validation with the Word Memory Test.
Objective: The RBANS–Effort Index (RBANS-EI; Silverberg et al., 2007) is an embedded measure of response bias within a frequently employed neuropsychological screening battery. While it has been criticized for inadequate specificity in older non-litigating samples (Hook et al., 2009; Wagner et al., 2010), the RBANS-EI has yet to be further investigated in an adult veteran sample composed primarily of non-elderly patients. The purpose of the present study was to further validate the RBANS-EI in adult samples using a well validated external criterion (WMT; Green, 2003) and assess the appropriateness of the originally recommended cut-score.
Participants and Methods: Archival data was collected from veterans who completed the RBANS and WMT within either a routine neuropsychological evaluation (n=41) or compensation evaluation (n=12), with 58.5% of the total sample failing the WMT. Mean age of sample was 55.3 years (SD=10.9). Operational characteristic of the RBANS-EI was examined at the recommended cutoff of >3 as well as alternative cutoffs.
Results: The RBANS-EI significantly predicted WMT pass/fail status (Wald α2=10.74, p=.001, OR=2.48). Regarding operational characteristics, RBANS-EI displayed modest sensitivity (32%) yet perfect specificity (100%) at the recommended cutoff. PPP was excellent (1.0) and NPP was .51. At the more inclusive cutoff of >2, sensitivity markedly improved (64.5%) while maintaining a relatively high level of specificity (86%). PPP was .87 and NPP was .63.
Conclusions: Current findings indicate that the RBANS-EI is useful in the detection of response bias and that a lower, more inclusive cutoff of >2 may improve sensitivity with little change in specificity. Clinicians using the RBANS as a neuropsychological screening instrument should consistently examine RBANS-EI in conjunction with other measures of response bias.
Correspondence: *John C. Young, Ph.D., Memphis VA Medical Center, 399 Reksten Cove, Cordova, TN 38018. E-mail: john.young5@va.gov*

D. ZAMORA & P. DONOVICK. Expressive and Receptive Language as Predictors of Verbal Intelligence in a Prison Population.
Objective: Our previous research indicates that prisoners referred to neuropsychological testing show low levels of intelligence. They have more difficulty with expressive than receptive language as measured by the Expressive Vocabulary Test (EVT) and Peabody Picture Vocabulary Test-III (PPVT-III) respectively. Present goals were to determine the relationship between expressive and receptive language as predictors of verbal IQ. We also examined the relationship of the WAIS-III vocabulary subtests to both the EVT and PPVT-III.
Participants and Methods: Participants were 151 incarcerated males from two state prison mental health units referred for neuropsychological evaluations. They were administered the EVT, PPVT-III and WAIS-III as part of a larger battery. On average, prisoners were 39 years old and had 10 years of education. Average scores included: EVT=67(19.5), PVT-III-77(16.8), VIQ=78(13.6), PIQ=78(14.5) and FSIQ=76(13.7).
Results: A multiple regression analysis indicated that EVT and PPVT-III contributed to a substantial portion of the variance on VIQ (Rsquared=.68), but PPVT-III was a better predictor (Beta=.50, p=.001) of verbal IQ than EVT (Beta=.42, p=.001). Additional multiple regression analyses revealed that WAIS-III Vocabulary and Similarities moderately predicted EVT scores while Vocabulary and Arithmetic moderately predicted PPVT-III scores.
Conclusions: Prisoners in this sample had more difficulty with expressive than receptive language. Our measure of receptive language (PPVT-III) was a better predictor of verbal IQ than our measure of expressive language (EVT). WAIS-III Vocabulary and Arithmetic subtests were moderate predictors of receptive language. Knowing the best predictor of verbal performance can be helpful when examiners are confronted with testing time constraints.
Correspondence: *Diana Zamora, MA, Psychology, SUNY-Binghamton University, 426 Clubhouse Road, Vestal, NY NY. E-mail: nyzamora@aol.com*

D. WHITESIDE, D.M. WALD & M. BUSSE. Classification Accuracy of the Benton Facial Recognition Test.
Objective: Recently, many cognitive measures have been studied as embedded symptom validity tests (SVT). While memory measures have received considerable attention (Boone, 2007), visual spatial measures have much less research. For example, Iverson (2001) studied the Judgment of Line Orientation Test (JLO; Benton, Sivan, Hamsher, Varney, & Spreen, 1994) as an SVT, but no studies were found examining the Benton Facial Recognition Test (FRT; Benton et al. 1994) as an SVT. Thus, the current this study was designed to investigate whether the FRT would be appropriate to use as an SVT.
Participants and Methods: Participants (N=445) were consecutive neuropsychological referrals who met the study criteria, which required the participant to be at least 18 years of age and completed the FRT and the criterion measure, the Test of Memory Malingering (TOMM; Tombaugh, 1996). Participants were assigned to either a Biased Responding groups (BR=42), or an unbiased responding group (UR=403) based upon their performance on the TOMM.
Results: Results indicated that the BR group was significantly lower on FRT than the UR group (Mann-Whitney U=9071.5, z=4.198, p<.001). Additionally, ROC analysis indicated that the RFT had acceptable classification accuracy of .72, and a cut-off of a raw score of 39.5 resulted in sensitivity=40% and specificity=90%. With 10% base rate, Positive Predictive Power (PPP) = .32, and Negative Predictive Power (NPP) = .69.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: These results indicated slightly better sensitivity and approximately equivalent specificity to JLO. The implication of the results is that FRT could be used cautiously as a SVT, but only in combination with other SVT's.
Correspondence: *Douglas Whiteside, Ph.D., Clinical Psychology, Argosy University, 2601-A Elliott Avenue, Seattle, WA 98121. E-mail: dwhiteside@argosy.edu*

TBI (Adult)

D. WHITESIDE, J. GALBREATH, J. TURNBULL & M. BROWN. Scale Elevations of the Personality Assessment Inventory (PAI) in Mild Traumatic Brain Injury.
Objective: The Personality Assessment Inventory (PAI) has been studied in many populations including chronic pain and inmates (Karlin et al., 2005; Hopwood et al., 2008; Guriel-Tennant & Fremouw, 2006; Walters, Diamond, & Magaletta, 2010; Walters, 2007). However, similar studies of the PAI in mild traumatic brain injury (mTBI) populations have not been conducted. Thus, the purpose of this study was to evaluate the PAI validity and clinical scales in mTBI patients.
Participants and Methods: Participants (N= 75) were adults consecutive referrals who had presenting complaints of mild TBI and completed a comprehensive neuropsychological assessment including PAI. It was hypothesized that somatic distress, depression, anxiety, and symptom exaggeration scales would be elevated.
Results: Results indicated that several PAI scales were significantly elevated compared to the standardization sample. In particular, NIM ($t(1073)=5.32$, $p<.0001$), SOM ($t(1073)=10.10$, $p<.0001$), ANX ($t(1073)=6.07$, $p<.0001$), ARD ($t(1073)=3.80$, $p<.001$), DEP ($t(1073)=10.73$, $p<.0001$), SCZ ($t(1073)=7.88$, $p<.0001$), BOR ($t(1073)=4.80$, $p<.0001$), STR ($t(1073)=4.81$, $p<.0001$, and RXT ($t(1073)=4.73$, $p<.0001$) were all significantly elevated. Effect sizes (Cohen's d) for SOM and SCZ were large, while NIM, ANX, BOR, STR, and RXR had medium effect sizes, and DEP and ARD had small effect sizes. Selected subscale analysis indicated that ARD-T ($t(1063)=5.84$, $p<.0001$) was the only ARD scale to reach statistical significance (large effect size), while SZC subscales SCZ-T ($t(1063)=8.17$, $p<.0001$, and SCZ-S ($t(1063)=4.67$, $p<.0001$) were significant (with medium and large effect sizes, respectively).
Conclusions: Results supported PAI use in mTBI populations. Results also supported the hypothesis that scales measuring anxiety, depression, somatization, and symptom exaggeration were commonly elevated in this population.
Correspondence: *Douglas Whiteside, Ph.D., Clinical Psychology, Argosy University, 2601-A Elliott Avenue, Seattle, WA 98121. E-mail: dwhiteside@argosy.edu*

M. AMICK, C.B. FORTIER, L. MORRA, J. VENNE, A. KENNA, A. RASMUSSON, W. MILBERG & R. MCGLINCHEY. Affective attentional bias shifts as posttraumatic stress disorder severity worsens.
Objective: Individuals with posttraumatic stress disorder (PTSD) demonstrate an attentional bias towards threatening information, attributed to inhibitory dysfunction. This attentional bias towards stimuli with negative valence may be exacerbated when traumatic brain injury (TBI) co-occurs with trauma exposure, due to additional brain injury-related inhibitory deficits. The current study examined the relative impact of PTSD and TBI severity upon affective information processing in OEF/OIF service members, who are at increased risk for both diagnoses.
Participants and Methods: A computer-administered affective go-no-go task measured decision latencies and errors to stimuli with positive or negative valence in service members (n=33). The Clinician Administered Assessment of Posttraumatic Stress (CAPS) was administered to capture current symptom severity. Incidents of brain injury and severity [including blast-exposures], as well as associated duration of altered mental status, and loss of consciousness were measured with the Blast and Lifetime TBI Semi-Structured Interview.
Results: Decision latencies and commission errors were not associated with CAPS scores (ps >0.10), however as CAPS score severity increased, participants showed increasing numbers of omissions of positive relative to negative stimuli ($r=.48$, $p = 0.005$). Re-experiencing, avoidance, and hyperarousal symptom severity showed the same pattern of association with omission errors (rs >.38, ps <0.05). By contrast, there were no significant correlations between indices of TBI severity and affective go-no-go performance variables (ps >0.10).
Conclusions: In OEF/OIF service members, attentional bias shifts away from
positive-valence stimuli towards negative-valence stimuli as PTSD symptoms worsen. In this sample, proxies for TBI severity did not influence affective information processing.
Correspondence: *Melissa Amick, PhD, VA Boston Healthcare System, 150 S. Huntington Ave (151C), Boston, MA 02130. E-mail: Melissa.Amick@VA.gov*

C. BLOCK, B. BAGLEY, J. HANNAH, S. CAMP, N. HARTMAN MINDINGALL, D. LABBE, K. LOKKEN & K. FABRIZIO. Assessment of Veteran and Caregiver Misperceptions of Mild Traumatic Brain Injury in a VA Medical Center.
Objective: Despite the prevalence of TBI, a variety of studies since 1980 have consistently revealed misperceptions about TBI held by both the public and providers. Given the increased attention on TBI in the military and VA setting, our objective was to examine the level of knowledge about TBI (specifically mild TBI or mTBI) in veterans and their friends/family at a southeastern VAMC. It was hypothesized that the majority of veterans and their friends/family sampled would inaccurately identify common mTBI symptoms and symptom duration, as well as mistakenly differentiate mTBI and concussion.
Participants and Methods: 150 participants (100 veterans, 50 friends/family) completed a brief questionnaire while in waiting rooms across various clinics at the Birmingham VAMC. Descriptive and inferential statistics were completed, including percentage of misperceptions about physical, cognitive, and mood symptoms of mTBI as well as typical recovery and treatment provided for mTBI.
Results: Substantial levels of misperceptions were discovered across all domains, including endorsement of unusual physical, cognitive, and mood symptoms that are typically unrelated to mild TBI (e.g., drooling, tremors, and racing thoughts). Two out of three participants were unable to identify mTBI and concussion as the same phenomenon, and nearly half believed that survivors of mTBI would still be experiencing symptoms at 2 years post-injury, with a greater number endorsing worsening symptoms over time. However, the majority of individuals accurately endorsed that mTBI was more commonly treated than moderate or severe TBI within the VA system. Only one in five veterans endorsed receiving prior head injury education while in the military.
Conclusions: Misperceptions of mTBI persist and are a real concern, potentially affecting patient expectations, symptom presentation, and recovery. Results of the present study could potentially assist in head injury education within the military and VA system to ultimately improve outcomes for those with mTBI.
Correspondence: *Cady Block, MS, Psychology, University of Alabama at Birmingham, 3067 Tyler Crest Circle, Hoover, AL AL. E-mail: cblock@uab.edu*

D.B. COOPER, R. VANDERPLOEG, K. MANNING, M. KOLODZIEJ, C. FOX, J. WILKEN & A.O. BOWLES. Factors associated with neuropsychological functioning in OEF/OIF Service Members in post-deployment settings.
Objective: Cognitive complaints are common in military personnel following deployment in support of OEF/OIF, although potential etiologies for these difficulties remain unclear. The current study examined the impact of several potential factors, including mild traumatic brain injury (mTBI), Posttraumatic Stress Disorder (PTSD), and effort on neurocognitive functioning in a sample of post-deployment Service Members with cognitive complaints.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Service members who presented to a large military medical center for evaluation of suspected mTBI underwent a detailed clinical interview, medical evaluation, and cognitive testing. Ninety individuals with complete data on the measures of interest for the current study (demographic, injury characteristics, symptom self-report, and neurocognitive functioning) were included.
Multiple regression analyses were used to determine the variance in RBANS Total Score accounted for by the various predictor variables (demographic, mTBI diagnosis, blast etiology, HIT-6, PCL-M, NFI, and RBANS Effort Index).
Results: Collectively, predictor variables accounted for 56.1% of the variance in RBANS performance ($F(8,81)=12.96$, $p<.001$). The most potent predict was the RBANS Effort Index, uniquely accounting for 20.3% of the variance ($p < .01$). Symptom severity measures (HIT-6, PCL-M, NFI) were also statistically significant, accounting for 6.0% of the variance in RBANS performance ($p < .05$). However, injury characteristics uniquely accounted for only 1.4% (non-significant) and demographic factors uniquely accounted for 1.6% (non-significant) in RBANS Total Score.
Conclusions: Findings suggest that neither presence nor absence of mTBI or etiology (blast vs. non-blast) were significant predictors of RBANS performance. Rather, the most potent predictors of cognitive performance were validity/effort and concurrent symptomatology.
Correspondence: *Douglas B. Cooper, PhD, Dept of Orthopedics & Rehabilitation, Brooke Army Medical Center, 3851 Roger Brooke Drive, Ft. Sam Houston, TX 78234. E-mail: douglas.b.cooper@us.army.mil*

D.B. COOPER, R. VANDERPLOEG, M. KOLODZIEJ, C. FOX, K. MANNING, J. WILKEN & A.O. BOWLES. Relationship between mechanism of injury and neuropsychological functioning in OEF/OIF Service Members with mild traumatic brain injuries.
Objective: Military personnel deployed to the combat theaters in Iraq and Afghanistan are at risk of sustaining mild traumatic brain injuries (mTBI) from a number of potential causes including improvised explosive devices, motor vehicle accidents, and falls. Despite the high incidence of mTBI in deployed personnel, questions remain about the effects of blast-related versus non-blast-related mTBI on both acute and long-term sequelae.
Participants and Methods: Retrospective review of service members who presented for evaluation of suspected mTBI and underwent neurocognitive screening evaluation. MTBI diagnosis was made by semi-structured clinical interview. Only those individuals in which mechanism of injury could be determined (blast versus non-blast) were included. Exclusion criteria included: incomplete data on the variables of interest (age, gender, time since injury, PCL-M, or RBANS); scores below empirically derived cut scores for poor effort on the RBANS. Sixty individuals were included in the final sample; 32 with mTBI from a blast, and 28 with non-blast mTBIs.
Results: There were no differences between the blast related and non-blast-related mTBI groups on age, gender, time since injury, or PCL-M scores. Analysis of variance showed no significant between group differences on the RBANS total performance score or any of the five subscales.
Conclusions: Although speculation remains that the effects of primary blast exposure are unique, the results of this study are consistent with prior research (Belanger, et al., 2009) suggesting that blast-related mTBI does not differ from other mechanisms of injury with respect to cognitive sequelae.
Correspondence: *Douglas B. Cooper, PhD, Dept of Orthopedics & Rehabilitation, Brooke Army Medical Center, 3851 Roger Brooke Drive, Ft. Sam Houston, TX 78234. E-mail: douglas.b.cooper@us.army.mil*

Z. DELAWALLA, R. MELROSE, M. ETTENHOFFER, J. GHIAM, S. CASTELLON & A. OKONEK. Contribution of Posttraumatic Stress Disorder and Processing Speed Deficits to Functional Status in OEF/OIF Veterans with TBI.
Objective: Traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD) have been referred to as signature injuries of OEF/OIF veterans. Previous research has documented processing speed deficits among individuals with TBI, as well as information processing biases among individuals with PTSD. This study examined the contributions of processing speed deficits and PTSD symptoms in predicting functional status in this population.
Participants and Methods: Participants were 19 clinic-referred OEF/OIF veterans with TBI who completed neuropsychological measures including WAIS-III Digit-Symbol Coding and Symbol Search (used to compute PSI score) and the PTSD checklist- military(PCL-M). All participants were judged to have credible effort, and received DSM-IV Global Assessment of Functioning (GAF) ratings of their overall functioning.
Results: GAF scores were significantly correlated with both WAIS-III PSI, $r(17)=.45$, $p<.05$, and PCL-M scores, $r(17)=-.64$, $p<.01$. Hierarchical regression showed that PSI explained 20% of the variance in GAF scores, $R2=.20$, $F(1,17)=4.27$, $p<.06$. However, when PCL-M was also entered into the model, it accounted for an additional 25.7% of the variance in GAF scores, $R2=.46$, $F(2,16)=6.75$, $\geq=-.55$, $p<.01$, and PSI was no longer a significant predictor, $\geq=.24$, p = NS.
Conclusions: Although both processing speed deficits and PTSD symptoms are highly correlated with clinician ratings of functional outcome among OIF/OEF veterans with TBI, PTSD symptoms appear to account for the bulk of this relationship. These findings highlight the role of psychiatric distress, above and beyond the role of neuropsychological deficits, in predicting functional outcome in this group.
Correspondence: *Zainab Delawalla, PhD, Psychology, The Greater Los Angeles Healthcare System, West LA VA, 11301 Wilshire Blvd., Psychology 116B, Los Angeles, CA 90073. E-mail: zainab.delawalla@va.gov*

K.D. FARBOTA, D.G. MCLAREN, S. APARNA, G. XU, E.K. KASTMAN, L. NEWMAN, B.B. BENDLIN, H. ROWLEY, A. HAWLEY, A. WILLETTE & S.C. JOHNSON. Longitudinal Volume Changes Following Traumatic Brain Injury: A Tensor Based Morphometry Study with Neuropsychological Correlates.
Objective: The objective of this study is to determine if patterns of volume loss differ in the first year following traumatic brain injury (TBI) compared to subsequent years, and determine whether volumetric changes can be predicted by neuropsychological testing.
Participants and Methods: 17 TBI patients and 13 controls were scanned on a 3T MRI system and administered neuropsychological assessments at approximately 2 months, 1 year and 4 years after injury (and at equivalent intervals for controls). Tensor based morphometry (TBM) was used to create maps showing the amount of volumetric change each subject experienced during each of the two intervals, I1 and I2. Statistical analyses were performed in SPM8.
Results: Repeated measures analyses showed a group by interval interaction in temporal, parietal, and orbitofrontal cortices as well as hippocampus, corona radiata, internal capsule and cerebral peduncle. The TBI group exhibited greater contraction in temporal, anterior cingulate and orbitofrontal cortices at I1 compared to I2 and in the internal capsule, corona radiata and cerebellum at I2 compared to I1. Poorer performance on Trails A, a visuomotor speed task, at 2 months post-injury predicted greater contraction in the cerebral peduncle and cerebellum at both I1 and I2 within the TBI group.
Conclusions: Early phase cortical contraction is likely due to removal of tissue damaged at impact, while late phase white matter contraction may be due to continuing reorganization. Subjects with lower initial scores on Trails A likely had greater damage to relevant motor areas in the brain, and therefore experienced subsequent atrophy in these regions.
Correspondence: *Kimberly D. Farbota, University of Wisconsin, Madison, 311 Norris Court, Apt. 2-S, Madison, WI 53703. E-mail: kim.farbota@gmail.com*

G.E. GETZ, H.T. SCHOFIELD, J. NELSON & M. FACCIANI. Correlation of the BRIEF-A and performance on executive functioning measures in TBI.
Objective: It is well documented that executive functioning (EF) is often impaired following a traumatic brain injury (TBI). However, stud-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ies have indicated that the Behavioral Rating Inventory of Executive Functioning, Adult (BRIEF A-Self Report) in individuals who sustain a TBI do not consistently indicate that these individuals report experiencing executive functioning impairment. The current preliminary study compares performance on objective measures of EF with the BRIEF A -Self report following a TBI.

Participants and Methods: A retrospective chart review at a Neuropsychology Clinic on 30 individuals following TBI was conducted. The mean age of participants was 40.13 years old with a range of 20-63 years. There were 13 women and 17 men. The mean amount of education was 13.67 with a standard deviation of 2.2. The subscale scores from the BRIEF were correlated with performance on the Wisconsin Card Sorting Test, Trail Making Test and Stroop Color Word test.

Results: Multiple Pearson product-moment correlation coefficients were conducted examining the BRIEF-A with the performance on the objective test measures. Results revealed no statistically significant correlations among the measures ($r = .310$; $p > .10$ in all cases).

Conclusions: These preliminary results indicate that there are no statistically significant correlations between the BRIEF and objective performance on traditional measures of EF following a TBI. There are multiple plausible explanations for these findings. For example, there may a lack of insight in the patients following TBI. Further, it is possible that some patients with TBI may have less insight into recognizing EF difficulty. It is also possible that the BRIEF-A is examining different constructs as compared to the objective measures. The results suggests that clinicians should be cautious when interpreting self report of EF skills as it relates to objective cognitive findings in TBI.

Correspondence: *Glen E. Getz, Ph.D., Dept. of Psychiatry, Allegheny General Hospital, Four Allegheny Center, 8th Floor, Pittsburgh, PA 15212-5234. E-mail: ggetz@wpahs.org*

D.B. HAMMERS, R.J. SPENCER, H.A. TREE, P.H. PANGILINAN & L.A. BIELIAUSKAS. Limited Clinical Utility Of The Rey Complex Figure Organization Scale Among Veterans With And Without Mild Traumatic Brain Injury.

Objective: Memory and executive functioning complications are frequently reported among individuals with mild traumatic brain injury (mTBI). Similar to studies evaluating individuals with obsessive-compulsive disorder and other clinical populations, the current study sought to examine the impact of organization on visual spatial memory in veterans with and without a diagnosis of mTBI, via the Organization scale derived from the Rey-Osterrieth Complex Figure Test (Rey-O).

Participants and Methods: Participants were 78 veterans (40 clinical controls; 38 mTBI) seen in a VA TBI clinic, with diagnoses established via clinical evaluation and brief neuropsychological testing. Reliability (internal consistency), criterion validity, and predictive analyses of the Rey-O Organization scale were performed.

Results: Similar to previous research, our results suggest that the Organization scale has modest internal consistency (alpha = .65), but displays relatively poor criterion validity; no differences existed between groups using ANOVA for any Rey-O scale, including copy, immediate memory, or organization, nor within specific Organization items. Across both groups, the organization score was lower (3.6, 1.9SD) than typically observed for control groups in the literature. Using regression analyses, the Organization scale was predictive of immediate memory performance, with two items accounting for all the prediction.

Conclusions: The Organization scale displayed modest internal consistency, and was predictive of immediate memory performance, suggesting that it likely has moderate utility in measuring the impact of organization on visual memory. In this sample of veterans, no Rey-O performance measure was able to discriminate between those with mTBI from clinical controls; instead, both groups performed comparably to clinical groups in most others studies.

Correspondence: *Dustin B. Hammers, Ph.D., Psychiatry, University of Michigan, 2101 Commonwealth Blvd., Suite C, Ann Arbor, MI 48105. E-mail: hammersd@med.umich.edu*

D. HOOFIEN, O. BARAK, N. BAR-LEV, D. WEISSMAN & T. SHUSHAN. Selection Biases and Efficacies of Three Neuropsychological Rehabilitation Programs: Comprehensive Interdisciplinary Day-Center, Pre-Vocational Workshops and Individually Tailor-Made Programs.

Objective: To proactively compare selection biases and efficacies of three post-acute neuropsychological rehabilitation programs (NPR): Comprehensive Interdisciplinary Day Center (CDC); Prevocational Rehabilitation (VR) and Individually Tailor-made (ITM) programs, while controlling for the effects of socio-demographic variables.

Participants and Methods: Ninety five patients with various ABIs participated in the study. CDC (29 patients) followed the common procedure of comprehensive NPR milieu programs. VR (22 patients) included intensive participation in prevocational workshops. ITM (49 patients) was delivered on an hourly basis (1-4 h/w). An extensive battery of interviews and questionnaires was used to measure the pre-post treatment effects (Repeated measures ANOVAs). The battery was delivered to the patients in complete isolation from the selection and the on-going clinical decision-making procedures.

Results: At admission, ITM patients functioned at the relative highest level and VR patients at the lowest, with CDC patients at the intermediate range. At conclusion of the programs the participants in all three programs showed significant gains with an advantage of CDC upon the other two programs. This advantage was revealed by significant time X program interaction effects in quality of life, integration in the community and productivity.

Conclusions: NPR programs at the late post acute stage of ABI are relatively effective. CDC is more effective than the other two programs.

Correspondence: *Dan Hoofien, The Hebrew University of Jerusalem, Mount Scopus, Jerusalem 91905, Israel. E-mail: mshoofi@mscc.huji.ac.il*

B. JOHANSSON & L. RÖNNBÄCK. Mental fatigue - not an ordinary tiredness.

Objective: Mental fatigue occurs frequently and is one of the most disabling consequences of traumatic brain injury, stroke, infection or inflammation in the Central Nervous System. Mental fatigue may be present immediately after the injury or disease. The symptoms often decline gradually. However, some people may experience long-lasting symptoms affecting work and everyday activities. The disorder is characterized by pronounced mental fatigue following mental activity. A long recovery time is required in order to return to normal energy levels. There is currently no known effective treatment for the disorder.

Our hypothesis originates from the fact that skull trauma or brain disease causes neuro-inflammation. Intense mental activity associated with high glutamate signalling can lead to astrocyte swelling, especially if accompanied by impaired glutamate uptake capacity.

Participants and Methods: The self-assessment scale we have developed was used for the assessment of mental fatigue in different diagnoses affecting CNS, and was correlated to neuropsychological tests.

Results: Significant decreases in information processing speed and attention capacity were reported in persons suffering from mental fatigue, and these findings correlated to the findings of the self-assessment scale for mental fatigue. It is also of the utmost importance to distinguish between mental fatigue and depression

Conclusions: If the self-assessment scale is assessed alongside neuropsychological tests to measure attention and information processing speed, it is then possible to carry out a more accurate assessment of the mental fatigue picture for each individual. (Read more about this hypothesis and about the self-assessment scale at www.mf.gu.se).

Correspondence: *Birgitta Johansson, PhD, Department of Clinical Neuroscience and Rehabilitation, Institute of Neuroscience and Physiology, Per Dubbsgatan 14, 1tr, Gothenburg SE 413 45, Sweden. E-mail: birgitta.johansson2@vgregion.se*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

C. KASSEN, S. KASHLUBA & C. PANIAK. WJ-III and WRAT-4: An Investigation of Reading Comprehension Measures in an Adult Brain Injury Population.

Objective: To compare the use of the WJ-III and the WRAT-4 in assessing reading comprehension in an adult brain injury sample. The WJ-III (2001) Passage Comprehension (PC) and the WRAT-4 (2006) Sentence Comprehension (SC) tests are two widely used measures that assess reading comprehension through use of the cloze technique. To our knowledge, no studies have compared the WJ-III PC and the WRAT-4 SC tests in a brain injured sample. We hypothesized that reading comprehension scores would differ between the WJ-III and the WRAT-4 in our brain injury sample given that these measures were derived from different normative groups. Results from this study may assist clinicians in the selection of a reading comprehension measure after brain injury.

Participants and Methods: Fifty-two prospectively chosen subjects within an Adult Outpatient Brain Injury Clinic completed the WJ-III PC and the WRAT-4 SC tests. Subjects had moderate to severe brain injuries. The measures of interest were given at the start of each assessment in a counter-balanced fashion. In addition to quantitative analysis of the data, qualitative analysis of Grade Equivalents (GE) was conducted across 6 age intervals and 3 Standard Score (SS) ranges to further examine potential differences between the measures.

Results: No statistically significant differences were found for SS or GE between the measures. Specifically, a within-sample t-test revealed no significant difference between SS, and a Wilcoxon signed rank test showed no significant difference between GE ($p>0.05$). However, qualitative analysis of SS between tests yielded differences in GE by age for SS falling in the low average range.

Conclusions: Similar SS produced substantially lower GE on the WJ-III compared to the WRAT-4 for scores in the low average range. The WJ-III PC subtest may be a more clinically useful measure of reading comprehension at both the upper (i.e. GE >12.9) and lower ranges (i.e. GE <4) given its higher ceiling and lower floor.

Correspondence: *Shauna Kashluba, Psychology Service, Glenrose Rehabilitation Hospital, 10230-111 Ave, Edmonton, AB T6C 2Z9, Canada. E-mail: Shauna.Kashluba@albertahealthservices.ca*

R.J. KIERNAN. Vestibular System Trauma and the Post-Concussion Syndrome.

Objective: Minor head injuries frequently result in the post-concussion syndrome (PCS), a constellation of symptoms that include headaches, dizziness, nausea, irritability, imbalance and problems with concentration and memory. Symptoms of vestibular system trauma, estimated to occur in up to 65% of head injuries, are seldom differentiated from PCS in the evaluation of minor head injury. Yet, three of the above PCS symptoms, dizziness, imbalance and nausea, are more likely to result from a traumatic vestibulopathy than from a mild brain injury.

Participants and Methods: Three cases of minor head injury are presented in which the vestibular component is identified and treated. Each case was evaluated by vestibular rehabilitation specialists using clinical procedures designed to assess problems with both the vestibulo-ocular reflex (VOR) and the vestibulo-balance reflex (VBR). The diagnostic confusion surrounding their persistent PCS symptoms was resolved with increased understanding of the vestibular syndrome.

Results: One patient was found to have evidence of peripheral vestibular system involvement, Benign Paroxysmal Positional Vertigo (BPPV), that was easily treated with a repositioning maneuver. All three patients had evidence of impaired central vestibular system functioning on balance testing and demonstrated VOR abnormalities that resulted in blurred vision and difficulty reading.

Conclusions: The three patients in this study all improved with vestibular rehabilitation, and one patient recovered completely even though treatment was not initiated until four years after the accident. These cases underscore the importance of recognizing vestibular system symptoms in diagnosing and treating confusing and persistent PCS cases.

Correspondence: *Ralph J. Kiernan, Ph.D., Stanford University, 200 Middlefield Road, Suite 100, Menlo Park, CA 94025. E-mail: margolies-kiernan@sbcglobal.net*

R. KRISHNA M.D., M. GRINN & N. GIORDANO. The Utility of Diffusion Tensor Imaging In The Diagnosis of Mild Traumatic Brain Injury.

Objective: To report the diagnostic utility of diffusion tensor imaging (DTI) in a patient with symptoms consistent with mild traumatic brain injury (MTBI) due to a minor motor vehicle accident (MMVA).

Participants and Methods: An educated, previously healthy 37-year-old male was involved in a MMVA, resulting in MTBI. Following the MMVA, he complained of irritability, decreased attention span, sexual dysfunction, and cognitive dysfunction.

The patient was seen due to persistent complaints 4 years post MMVA for a bedside neurological exam (BNE) and a non-contrast MRI scan of the brain. Upon further complaints, he was seen for a neuropsychological exam, which was followed by DTI.

Results: The BNE shows normal results whereas the neuropsychological exam was abnormal for frontal/executive functions. He also shows low average to impaired range of function in the frontal region on measures of psychomotor speed/information processing, attention, memory, demonstrated a decrease in academic abilities, and mood and awareness based on common neuropsychological exam criteria.

Specifically, the frontal/executive function test results are: WAIS III Similarities and Matrix Reasoning: Impaired range; WAIS III Digital Symbol and Symbol Search: Impaired range; Trails B: unable to complete; Stroop Interference: Impaired range

These findings are consistent with the DTI scans which show fractional anisotropy (FA) images that demonstrate heterogeneous lower FA regions in the frontal white matter. Quantitative analysis with comparison to a normal control group confirms several foci in the left frontal lobe where FA is significantly lower. The non-contrast MRI is grossly normal.

Conclusions: This case report highlights the use of DTI for a patient with clinical symptoms of MTBI who showed normal non-contrast MRI images, had a normal BNE, but the neuropsychological exam showed positive frontal lobe abnormalities; this was confirmed by abnormal DTI images that anatomically conformed to the neuropsychological exam localization.

Correspondence: *Ranga Krishna M.D., MD, Methodist Hospital, 1513 Voorhies avenue, Brooklyn, NY 11235. E-mail: rkrishna@pol.net*

R. KRISHNA M.D., M. GRINN, N. GIORDANO, M. THIRUNAVUKKARASU & P. TADI. A Patient Presenting with Mild Traumatic Brain Injury Diagnosed Using a Novel Approach, Utilizing Diffusion Tensor Imaging of the Brain for Confirmation: A Case Report.

Objective: Traumatic brain injury (TBI) is a form of acquired brain injury resulting from sudden trauma to the head. Specifically, mild TBI (MTBI) is a clinical diagnosis that can have significant effects on an individual's life, but is difficult to identify through traditional imaging techniques. Nationally, MTBI accounts for 75-90% of the annual TBI cases (1.5 million) in the U.S, of which 17.3% are due to motor-vehicle accidents.

This is the case of a 68-year-old, previously healthy African American female who was involved in a motor vehicle accident (MVA) in which she suffered head trauma and loss of consciousness. Following the accident, she experienced symptoms suggestive of MTBI and sought neurological consultation when her symptoms did not subside. She was evaluated with a series of examinations: Neurological examination was normal, neuropsychological evaluation concluded a diagnosis consistent with post-concussion syndrome and adjustment disorder with mixed anxiety and depressed mood, acute concussion evaluation diagnosed the patient with concussion w/o loss of consciousness, and CNS Vital Signs memory testing profiled the patient with very low scoring in all test do-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

mains, except for reaction time examinations, which were average. Diffusion Tensor Imaging (DTI) of the brain (type of functional MRI) was used to confirm the diagnosis, which revealed decreased fractional anisotropy (FA) in the region immediately adjacent to both lateral ventricles. These results indicate posttraumatic gliosis and was undetected by routine MRI of the brain. The patient was treated with cognitive therapy.

In order to enhance our diagnostic capability of MTBI, we propose looking at utilizing DTI of the brain, a method that produces in-vivo images of biological tissues weighted with the local micro-structural characteristics of water diffusion. The higher information content gleaned from DTI makes it extremely sensitive to identify subtle pathology in the brain tissue.

Participants and Methods: N/A

Results: N/A

Conclusions: N/A

Correspondence: *Ranga Krishna M.D., MD, Methodist Hospital, 1513 Voorhies avenue, Brooklyn, NY 11235. E-mail: rkrishna@pol.net*

J.A. DEMERY, M.J. LARSON, N.K. DIXIT, R.M. BAUER & W.M. PERLSTEIN. Operating Characteristics of Executive Functioning Tests Following Traumatic Brain Injury.

Objective: The frontal lobes are disproportionately susceptible to damage following traumatic brain injury (TBI) frequently leading to deficits in executive functions. Tests of executive functions show a wide range of operating characteristics (e.g., sensitivity, specificity, predictive power), with tests having a large processing speed component showing the most reliable associations with TBI symptoms. The primary purposes of this study were to determine if controls, mild, and moderate/severe (M/S) TBI participants performed differently on a battery of executive functioning tests and to identify the operating characteristics of executive functioning tests.

Participants and Methods: Participants included individuals with mild (n = 20) or M/S TBI (n = 26) and 24 demographically-matched control participants. Participants completed the Wisconsin Card Sorting Test, Stroop Test, Trail Making Test, Digit Span Test, Paced Auditory Serial Addition Test, and Digit Symbol Test in counterbalanced order.

Results: One-way ANOVAs showed that mild TBI participants performed worse than controls on the Trail Making Test Part B and that M/S TBI participants consistently performed worse than either group across all executive function measures. There was a wide range of operating characteristics on study measures. Predictive values were better for individuals with M/S TBI than mild TBI. The Digit Span backward test and Trail Making Test Part B showed the strongest operating characteristics across TBI groups, with odds ratios for accurate diagnosis exceeding 3.77 for mild TBI and 9.80 for M/S TBI.

Conclusions: Findings provide information regarding the diagnostic accuracy of executive functioning tests in TBI and should assist clinical neuropsychologists in accurately identifying individuals with brain dysfunction.

Correspondence: *Michael J. Larson, Ph.D., Department of Psychology, Brigham Young University, 244 TLRB, Provo, UT 84602. E-mail: michael_larson@byu.edu*

A. MCGUIRE, R.J. SPENCER, L.L. DRAG, S.J. WALKER, H.A. TREE, P.H. PANGILINAN & L.A. BIELIAUSKAS. Effort drives the association between self-reports of cognitive function and neuropsychological test performance among returning combat veterans.

Objective: Clinicians often inquire about patients' self-reported cognitive functioning. However, the subjective nature of self-report may limit its utility in the absence of objective corroboration. This study examined whether self-report of cognitive impairment predicts neuropsychological test performance among combat veterans.

Participants and Methods: Combat veterans reporting possible head injuries completed a neuropsychological battery as part of a medical evaluation in a Polytrauma Support Clinic. Instruments included psychiatric symptom questionnaires and tests assessing attention, memory, processing speed, as well as a measure of effort, the Test of Memory Malingering (TOMM). Patients rated cognitive functioning on five-point Likert scales. Correlational analyses examined the relation between self-report and performance on neuropsychological measures.

Results: Relative to those who failed the TOMM, patients passing the TOMM had fewer cognitive complaints and better neuropsychological test performances. Correlations

between cognitive self-reports and test performances were small among all veterans, with self-reports accounting for between 1 and 12% of the variance in test performance.

Among those who passed the TOMM, self-reports accounted for between 0 and 7% of the variance. Self-reported cognitive impairment had a moderate correlation with

depression and anxiety.

Conclusions: Self-reports of cognitive impairment was not associated with performance on objective cognitive measures and may more accurately be regarded as manifestations of emotional distress. Effort testing is positively related to increased subjective cognitive complaints and poorer performance on objective tests. In veteran populations with cognitive and psychiatric risk factors, effort testing can improve the accuracy of cognitive assessment beyond self-report, and decrease the likelihood of overdiagnosis.

Correspondence: *Adam McGuire, Current Undergraduate Student, Neuropsychology, University of Michigan, 315 Packard St., Apt #3, Ann Arbor, MI 48104. E-mail: amcguire22@gmail.com*

D. RITCHIE, A. STEVENS, A. DONNELL & W. MITTENBERG. Incidence of Insufficient Effort in Combat Related Head Trauma Examinations.

Objective: Head trauma is frequent among military personnel in Afghanistan and Iraq. These injuries are often characterized as concussions caused by explosive blasts, and may be related to subsequent disability claims. This study examined the base rate of insufficient effort in a series of these cases referred for neuropsychological examination.

Participants and Methods: The TOMM was administered to 76 veterans (aged M=32, s=8) an average of 3.8 years after head trauma due to explosive blast (74%), blunt impact (9%), MVA (11%), or gunshot (5%) during military deployment. 75% had no disturbance of consciousness or brief disorientation, 5% were unconscious for more than 30 minutes, and 15% had abnormal brain imaging. Neuropsychological examination included measures of intelligence, memory, executive function, and processing speed.

Results: Insufficient effort was present in 35.5% of cases using published TOMM cutoffs, with mean scores of 32 (s=8) on Trial 2 and 34 (s=8) on Retention. Poor effort was associated with reported PTSD (r=.26), and lower WASI IQ (r=.3), CVLT delayed recall (r=.35), BVMT delayed recall (r=.46), and slower Trails A (r=.27), Stroop (r=.3), and Grooved Pegboard (r=.37) completion times.

Conclusions: Rates of insufficient effort in neuropsychological examinations following combat related head trauma are consistent with those previously reported in civilian mild head injury and disability claims in non-combat contexts. This base rate is also consistent with the incidence of poor effort in combat related cases in prior studies that used the Medical Symptom Validity Test. Insufficient effort is associated with more reported symptoms and reduced neuropsychological test performance.

Correspondence: *Wiley Mittenberg, Ph.D., Center for Psychological Studies, Nova Southeastern University, 3301 College Ave, Ft Lauderdale, FL 33314. E-mail: wiley@nova.edu*

L. MORRA, C. FORTIER, M. AMICK, L. GRANDE, W. MILBERG & R. MCGLINCHEY. Assessment of Mild Traumatic Brain Injury in OEF/OIF Service Members: Blast and Lifetime TBI Semi-Structured Interview (BLT).

Objective: Mild Traumatic Brain Injury (mTBI) is the signature injury of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). How mTBI is defined and operationalized will have significant consequences on its behavioral and neural characterization (acute & chronic), and in the determination of long-term outcome.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Thirty-three OEF/OIF military service members served as participants and were administered the BLT, which is a semi-structured clinical interview designed to characterize and diagnose mTBI during a service member's lifetime. TBI is assessed during three lifetime epochs: pre-deployment, deployment (blast and blunt force traumas), and post-deployment. TBI criteria: alteration of mental status, post-traumatic amnesia, and loss of consciousness are evaluated through detailed recall of the events before, during, and after injury. mTBI are then graded (I, II, III) according to a hybrid classification system.
Results: Seventy percent of the participants were found to have TBI (n=23). The majority of deployment TBIs was a result of blast exposure (n=10) compared to non-blast TBI (n=5). Deployment-related TBI frequently co-occurred with PTSD (52%, n=12). Finally, pre-deployment TBIs were common among this group.
Conclusions: mTBI in OEF/OIF veterans is most frequently associated with blast-related injuries and is twice as common in individuals with PTSD than without PTSD. This may reflect the horror associated with blast exposures. Many service members have sustained TBI prior to military service that may have an impact on long-term outcome from military-related TBI.
Correspondence: *Lindsay Morra, B.A., VA Boston Healthcare System, 150 S. Huntington, JP182, Boston, MA 02130. E-mail: lmorra@heartbrain.com*

L.T. WHITTINGTON, D.G. NEMETH, T.W. OLIVIER, J.R. HAMILTON, A.P. STEGER & A. GREMILLION. Normal Aging vs. Dementia vs. Motor Vehicle Accident Sequelae.
Objective: With senior citizens still working and driving, an increasing number experience Traumatic Brain Injury (TBI) secondary to Motor Vehicle Accidents (MVA). It is not uncommon for neuroimaging studies to render negative findings, which are used to release senior citizens to return to work. Yet, presenting symptoms of memory/concentration problems, indecision, multi-tasking difficulties, and depression/anxiety continue to interfere with normal functioning. The complexities of separating issues of normal aging versus dementia versus brain injury are often left to the clinical neuropsychologist to address.
Participants and Methods: With senior citizens still working and driving, an increasing number experience Traumatic Brain Injury (TBI) secondary to Motor Vehicle Accidents (MVA). It is not uncommon for neuroimaging studies to render negative findings, which are used to release senior citizens to return to work. Yet, presenting symptoms of memory/concentration problems, indecision, multi-tasking difficulties, and depression/anxiety continue to interfere with normal functioning. The complexities of separating issues of normal aging versus dementia versus brain injury are often left to the clinical neuropsychologist to address.
Results: Preserved measured intelligence with reduced functional intelligence; no evidence of dementia; evidence of mild traumatic brain injury; and evidence of affective and behavioral sequelae were found. All malingering measures were negative.
Conclusions: Heaton et al., 1991 (as cited in Howieson et al., 2004, p. 300) noted that, advanced age is often associated with impairment on concept formation/mental flexibility tests. Haaland, Vranes, Goodwin, & Garry, 1987, (as cited in Howieson et al., 2004, p.300) concluded that, in "healthy older people," these problems may not be noticeable until the 80s. In these two elderly case studies measures of concept formation and/or mental flexibility offered considerable assistance in making differential diagnoses.
Correspondence: *Darlyne G. Nemeth, Ph.D., M.P., A.B.M.P., The Neuropsychology Center of Louisiana, LLC, 4611 Bluebonnet Blvd, Ste. B, Baton Rouge, LA 70809. E-mail: dgnemeth@gmail.com*

M.R. YACOVELLI, A.R. RABINOWITZ & P.A. ARNETT. Validity of an Affective Verbal Memory Test in a College Athlete Sample.
Objective: Research has demonstrated that verbal memory tests are sensitive to concussion. Concussion may lead to transient changes in affect as well. This study was designed to measure the validity of the Affective Verbal Memory Test (AVLT) as an indicator of both verbal memory and affective state.
Participants and Methods: The AVLT was administered to 237 non-injured college athletes at baseline, as part of a neruopsychological test battery. The AVLT is a verbal list-learning task, in which 15 affectively-loaded words are presented orally. Immediate and delayed recall were assessed. The HVLT-R, RBMT Story Memory, ImPACT Verbal Memory Composite, VIGIL, Stroop Test, and BDI were examined to assess convergent and discriminant validity.
Results: Analyses revealed that the AVLT immediate and delayed recall indices exhibit medium to large correlations with indices of verbal learning (ranging from r=.24, p<.001 for the RBMT story memory test to r=.51, p<.001 for the ImPACT Verbal Memory Composite), and non-significant to small correlations with tests of attention (ranging from r=.03, p=.63 for the PSU Cancellation Task to r=.24, p<.001 for the Vigil). The AVLT immediate and delayed affective bias ratings exhibit small to medium correlations with athletes' rating of motivation (r=.18, p<.005) and anhedonia (r=-.21, p<.005).
Conclusions: These results suggest the AVLT is a valid measure of verbal memory, and a promising indicator of emotional state. A measure that can provide information about both cognitive and affective consequences of head-injury would prove useful in analyzing the severity of a concussion and the recovery progress of an athlete.
Correspondence: *Amanda R. Rabinowitz, M.S., Psychology, Pennsylvania State University, 1651 Highlandon Court, State College, PA 16801. E-mail: arr200@psu.edu*

C.V. RESENDIZ, A. WIKE, E. ROMERO, C.A. SIDERS, D.L. MCARTHUR, J.R. ALGER, D.A. HOVDA, P. VESPA & M.J. WRIGHT. Early Prediction of Functional Outcome of Traumatic Brain Injury by the Neurobehavioral Rating Scale-Revised.
Objective: Our goal was to determine if Neurobehavioral Rating Scale-Revised (NRS-R) composite scores obtained at three and six months post-injury could predict Disability Rating Scale (DRS) scores at 12 months.
Participants and Methods: Our sample (n=52) was comprised by 33 participants with severe TBI, 8 with moderate TBI, and 11 with mild TBI, as indicated by Glasgow Coma Scale scores. Seventy seven percent of the TBIs were due to acceleration-deceleration events. Participants were administered both the DRS (12 months post-injury) and the NRS-R (three and six months post-injury).
Results: Stepwise regression showed that the three month post-injury NRS-R scores accounted for 63% of the variance in DRS scores. This was primarily driven by the Negative Symptoms score (R2=.56), although the Oral/Motor score (R2=.07) also contributed significantly to the model. Six month NRS-R scores accounted for 77% of the variance in participant DRS scores. This model was mainly driven by the Oral/Motor score (R2=.63), while the Negative Symptoms (R2=.07) and the Executive/Cognitive (R2=.07) scores played a lesser, but significant role in the model.
Conclusions: The results demonstrate support for the predictive validity of the NRS-R at three months and six months post-injury. The Negative Symptoms score at three months and the Oral/Motor score at six months were most predictive of total DRS scores at 12 months post-injury.
Correspondence: *Claudia V. Resendiz, MA, Loma Linda University, 322 E Dryden st #4, Glendale, CA 91207. E-mail: cresendiz@llu.edu*

D. RITCHIE, S. RUSSO & S. QUINTANA-MARIKLE. How Are Student Athletes Really Feeling? Utilizing the 21-item Post-Concussion Scale on Athletes With No Reported Concussion History.
Objective: Assessment and intervention of sport related concussion relies heavily on the self-report of symptoms reported by the athlete. The current paper examines the base rate of self-reported symptoms in healthy athletes without sustaining prior concussions.
Participants and Methods: Participants for the study were 192 student athletes (79 male, 113 female) within a National Collegiate Athletic Association (NCAA) Division-II athletic program located within the

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Southeastern United States. Participants completed the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT), a computerized neuro-cognitive screening tool. ImPACT also includes a Post-Concussion Symptom Scale measuring 22 symptoms associated with concussions.
Results: Of the current sample, 65% reported at least one symptom of any intensity. Symptoms ranged from 28% to 2% for any level of intensity with the most common symptoms including: fatigue (28%), headache (26%), hyposomnia (25%), feeling more emotional (19%) and trouble falling asleep (18%). Within the sample, 36% of the athletes reported at least 5 symptoms, 14% reported at least 11 symptoms with 7% reporting at least 16 out of 22 symptoms. Additionally, 11% of the healthy athletes included in the current study endorsed symptoms consistent with the diagnosis of Post Concussion Syndrome as defined by the ICD-10 classification.
Conclusions: Results indicate markedly lower endorsement in the current study from other studies of healthy undergraduate samples who report significantly higher PCS symptoms. These findings illustrate the importance in baseline testing athletes in order to make more accurate post-injury treatment plans for returning the athlete to competition safely.
Correspondence: *David Ritchie, M.A., Center for Psychological Studies, Nova Southeastern University, 3301 College Avenue, c/o Stephen Russo, Fort Lauderdale, FL 33014. E-mail: dritchie@nova.edu*

A.J. SZABO, T. STRATTON, P. LONG, L. DENT, C. WELLS & J. GUNSTAD. Prevalence of Invalid Performance on the IMPACT in Division I Football Players.
Objective: Many student-athletes are assessed using computerized test batteries due to the ease of administration and relatively complete screen of cognitive functions. The widely-used ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) describes two types of suspicious assessments: "sand-bagging", or faking bad with the possible intent of not appearing impaired post-concussion, and invalid responses due to a lack of attention to testing. No study has determined the prevalence of these responses.
Participants and Methods: For the current study, baseline measures from a division I collegiate football team were examined to determine the frequency of invalid profiles. Baseline testing was conducted during pre-season practices in group format. A total of 290 baseline assessments were collected over three seasons and some athletes are represented more than once. Average age was 20.3 ± 1.37 years.
Results: Analyses revealed that 73.8% of assessments were valid, as 12.1% of assessments suggested invalid responding and 22.1% sand-bagging. One measure (i.e. Visual Memory Composite) identified 17% of the profiles as invalid. Approximately 72.9% of assessments were valid prior to education on the importance of concussion and 76.3% after.
Conclusions: In summary, although most student-athletes produce valid results on IMPACT testing, the current findings raise concern about valid responding and sand-bagging during baseline assessments. This pattern may complicate interpretation of post-concussion testing and place athletes at risk for subsequent injury. Future studies should develop strategies to improve effort during testing and indices to clarify invalid scores.
Correspondence: *Ashley J. Szabo, M.A., Kent State University, PO Box 5190, Kent, OH 44240. E-mail: aszabo6@kent.edu*

K.R. THOMAS, A.M. GREGORY, R.E. WILLIAMS, D.C. DELIS, M.W. BONDI & E.W. TWAMLEY. Cognitive Efficiency in Veterans with TBI is Reduced by Psychiatric Symptom Severity, Not Post-Concussive Symptoms.
Objective: Traumatic brain injury (TBI) in veterans is frequently comorbid with psychiatric symptoms. We examined the correlations between neuropsychological performance and post-concussive symptoms (PCS), post-traumatic stress disorder (PTSD) symptoms, and depressive symptoms in returning veterans with mild-to-moderate TBIs.
Participants and Methods: Twenty-eight unemployed Iraq and Afghanistan veterans with a history of mild-to-moderate TBI and diagnosed Cognitive Disorder NOS were administered a battery of neurocognitive measures and psychiatric interviews. Participants were mostly male (n=27), 85% non-Caucasian, with a mean age of 32 and mean education of 13 years. On average, their TBIs occurred 5 years before study enrollment, and their length of loss-of-consciousness was 72 minutes. Eighty-two percent met criteria for PTSD, with moderate-to-severe PTSD symptom severity and moderate depressive symptom severity. Their mean scores were average on tests of attention, processing speed, learning, delayed recall, prospective memory, and executive functioning. However, their mean performance on one processing speed task (Digit Symbol) was below average (mean SS=6.9).
Results: Pearson correlations showed no significant correlation between PCS severity and neuropsychological performance. However, performance on two measures of processing speed (D-KEFS Trails Visual Scanning and Number Sequencing) was significantly correlated with both PTSD symptom severity (r=-.47, p=.012; r=-.43, p=.023) and depressive symptom severity (r=-.41, p=.030; r=-.43, p=.021).
Conclusions: These results suggest that more severe PTSD and depressive symptoms are associated with worse processing speed performance, whereas PCS severity showed no such association. Psychiatric symptom severity may reduce cognitive efficiency in returning veterans with remote histories of mild-to-moderate TBI. Evidence-based treatment of psychiatric symptoms, therefore, may improve neuropsychological function.
Correspondence: *Kelsey R. Thomas, B.S., B.A., Clinical and Health Psychology, University of Florida, 4557 SW 48th Drive, #157, Gainesville, FL 32608. E-mail: krthomas@phhp.ufl.edu*

M.R. NEUMANN, R.J. SPENCER, H. TREE, P.H. PANGILINAN, A.P. MCGUIRE & L.A. BIELIAUSKAS. Sleep devrivation has a small effect on memory among veterans being evaluated for mild traumatic brain injury.
Objective: Insomnia and cognitive dysfunction are commonly reported by veterans undergoing evaluation for possible mild traumatic brain injury (TBI). This study examines the effects of self-reported amount of sleep and sleep satisfaction on neuropsychological test performances.
Participants and Methods: Data were collected from 260 veterans seen for neuropsychological assessment in a TBI clinic. Participants were excluded if they failed a measure of effort, had more than 30 minutes loss of consciousness or 24 hours post-traumatic amnesia. All participants completed measures of depression, sleep satisfaction (the Insomnia Severity Index), and estimated the number of hours they slept the night prior to the assessment. Factor scores of attention and concentration (Trailmaking Test, Digit Span) and memory (Rey complex Figure Recall and RBANS Story Immediate and Delayed Recall) were created using factor analyses. Data were subjected to correlational analyses.
Results: Depression was significantly correlated with sleep satisfaction (r=.55, p<.001) and hours slept (r=-.24, p<.001). Accordingly, when exploring the effects of sleep on cognitive functioning, the effects of depression were controlled for using partial correlations. Using zero-order correlations, both sleep satisfaction (r=-.21, p=.001) and hours slept (r=.25, p<.001) were significantly correlated with memory, but not attention. After controlling for the effects of depression, however, memory was only correlated with hours slept (r=.20, p=.002), and not sleep satisfaction (r=-.06, ns).
Conclusions: Patients' sleep satisfaction might be too heavily influenced by depression to be considered anything but a proxy for mood. Estimations for hours slept, however, appear to affect memory and offers information that is less influenced by overall mood.
Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

S.L. GAJEWSKI, R.J. SPENCER, H. TREE, P.H. PANGILINAN, N. MAGHSOODI & L.A. BIELIAUSKAS. The psychometrics of brief psychiatric screening inventories for veterans undergoing assessment for possible traumatic brain injuries.

Objective: Veterans undergoing assessment for traumatic brain injuries (TBI) often report problems with sleep, post-traumatic stress, and alcohol use. This study examined the prevalence of these problems using three inventories, including the Insomnia Severity Index (ISI), the Post-Traumatic Stress Disorder Checklist – Military Version (PCL-M), and the CAGE.

Participants and Methods: Data were collected from 344 veterans (age = 33.3 [12.0], education = 12.9 [1.5]) being evaluated for TBI in a traumatic brain injury (TBI) clinic. As part of their assessments, participants completed intake screening checklists, including the ISI, PCL-M and the CAGE. Each instrument was examined for 1) internal consistency using Chronbach's alpha and 2) the proportion of individuals with clinically significant pathology, according to published clinical cut-off scores.

Results: Each instrument met accepted standards for internal consistency of screening instrument, with Chronbach alpha coefficients of .90 (ISI), .95 (PCL-M), and .78 (CAGE). There were high rates of psychopathology detected by the instruments, with 65%, 55%, and 33% of individuals reporting clinically significant distress on the ISI, PCL-M, and CAGE, respectively.

Conclusions: Problems with sleep, post-traumatic stress, and alcohol use are common among veterans undergoing assessment for TBI. These conditions often produce problems that masquerade as effects of traumatic brain injuries and must be considered as moderating factors during assessment. The ISI, PCL-M, and CAGE are reliable screening instruments and may provide an efficient means of quantifying these problems and identifying individuals in need of treatment.

Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

N. MAGHSOODI, R.J. SPENCER, H. TREE, P.H. PANGILINAN & L.A. BIELIAUSKAS. The Rey Complex Figure is moderately useful as a screen for poor effort among veterans with possible mild traumatic brain injury.

Objective: Measures of effort assist neuropsychologists in determining the validity of assessment data. Formal tests of effort are often time-consuming, while embedded measures of effort within standard neuropsychological tests require no additional administration time. The current project explores embedded performance cut-offs on the Rey Complex Figure (RCF).

Participants and Methods: Data were collected from 353 veterans seen in a traumatic brain injury clinic. Veterans underwent neuropsychological testing, including the RCF, and two measures of effort: the Test of Memory Malingering (TOMM) and Digit Span (with a scaled score of six or less on Digit Span indicating insufficient effort). Data from 214 veterans established effort cut-offs on three RCF measures: copy accuracy, copy time, and recall accuracy. Chi-Square analyses indicated that only age-corrected copy (Chi-Square = 9.6, p=.002) and recall (Chi-Square = 14.1, p<.001) accuracy scores below the 16th percentile were significantly related to effort. These scores were added into a single index and cross-validated on a second group of 139 veterans who had taken both the TOMM and Digit Span, failure on either of which was considered indicative of suspect effort.

Results: Twenty-four percent of the veterans failed either the TOMM or Digit Span. Among participants with zero, one and two RCF scores below the 16th percentile, 11%, 28%, and 45% had poor effort on either the TOMM or Digit Span.

Conclusions: The RCF contains embedded measures that provide an indication of effort and can be used to identify individuals in need of more comprehensive assessment of symptom validity.

Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

H. TREE, R.J. SPENCER, P.H. PANGILINAN, J.A. SUHR & L.A. BIELIAUSKAS. Informational literature influences symptom expectation following head injury: An analog study.

Objective: Research has shown that symptom expectations affect symptomotology. This study examines the effect of informational literature on symptom expectation on participants considering a hypothetical scenario depicting a concussion.

Participants and Methods: Data were collected from 115 undergraduates (57% female, mean age = 20.3 years [SD = 4.5]). Participants were asked to rate the probable residual physical/cognitive/emotional symptoms from a concussion depicted in a vignette. Participants were assigned to one of three groups. Groups one and two received pamphlets about the effects of concussions and the third group received no pamphlet. The pamphlet given to the first group was a disability focused composite of existing pamphlets on head injury that are commonly given to veterans. The second group received a rehabilitation focused pamphlet highlighting aspects of recovery that prior research has shown reduces misinformation about concussion. No symptoms were explicitly mentioned in either pamphlet. Participants also completed the Michigan Odd Beliefs Scale, a measure of uncritical acceptance of information.

Results: Individuals receiving rehabilitation pamphlets reported less impairment [f (2, 108)= 4.4, p= .02] and attributed fewer symptoms [f (2, 109)= 5.1, p= .01] to concussion. Individuals receiving no pamphlet reported greater impairment and attributed more symptoms to concussion relative to the other groups. Among those receiving the disability pamphlet, greater suggestibility was associated with expectations of greater impairment (r= .42, p= .01).

Conclusions: Pamphlets may affect symptom expectations following concussion. Negative information may have particularly strong effects on those that are more suggestible. Pamphlets can influence symptom expectation for better or worse.

Correspondence: *Heather Tree, PhD, VA Ann Arbor/ University of Michigan, 9868 Tioga Trail, Pinckney, MI 48169. E-mail: htree@med.umich.edu*

R. VILLEMURE, M. HENRY, A. POLISOIS-KEATING, N. LE SAGE & P. NOLIN. Impact of Stressful Life Events on Self-Reported Symptoms Three Months After a Mild Traumatic Brain Injury.

Objective: To examine the impact of stressful life events on quantity and severity of reported symptoms after a mild traumatic brain injury (mTBI).

Participants and Methods: The sample was made up of 365 adults contacted twice by telephone. The objective of the first call was to identify the stressful life events that occurred 12 months preceding the mTBI (Social Readjustment Rating Scale; Holmes and Rahe, 1967). The second call was to evaluate persistent symptoms three months after the mTBI (Rivermead Post Concussion Symptoms Questionnaire; King et al., 1995).

Results: Globally, participants who reported stressful life events also reported symptoms that were significantly more frequent [t(363) = 4.30, p<0.001] and more severe [t(180) = 2.97, p<0.01] than those who didn't report these events. These results confirm the main hypothesis that participants who were exposed to stressful life events would report symptoms that were more frequent and more severe.

Conclusions: Exposition to stressful life events can interfere on the quality of recuperation post-mTBI. On a clinical view, living such stressful life events in months preceding a mTBI could be considered as a an early prognostic indicator of a higher risk of persistent symptoms.

Correspondence: *René Villemure, PhD, Psychology, Université du Québec à Trois-Rivières, 3351, boul. Des Forges, C.P. 500, Trois-Rivières, QC G9A 5H7, Canada. E-mail: rene.villemure@uqtr.ca*

J. WINGO, S. HAN, D. DELIS & M. BONDI. Cognitive Discrepancies by APOE Genotype among Head-Injured Military Personnel.

Objective: Although equivocal, some studies suggest a relationship between TBI and apolipoprotein E and outcomes post-TBI. Cognitive dis-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

crepancy analyses comparing executive function tasks to their fundamental skills have been established as a useful clinical tool. Thus, we examined if military personnel with a mild or moderate head injury show cognitive discrepancy patterns in executive function performance by APOE genotype.
Participants and Methods: Seventy-six active military personnel (79% Caucasian, 93% male) who sustained a mild or moderate closed TBI were recruited from Balboa Naval Hospital or Camp Pendleton. Participants were administered a comprehensive battery of neuropsychological measures and consented to buccal swabbing for APOE genotype analysis approximately one month following injury treatment. Cognitive discrepancy referred to a difference of at least one standard deviation or more between standardized scores. Cognitive discrepancy analyses focused on executive functions, with a particular focus on switching.
Results: APOE genotype analysis yielded 16 X4 carriers and 60 non-X4 carriers. Fisher's exact test analyzed the frequency of cognitive discrepancies on executive function tasks between the participants. No significant differences were observed by APOE genotype among the participants. Post-hoc analyses were conducted to analyze the direction of cognitive discrepancies. There were no significant differences between participants with an X4 allele and those without an X4 allele in the number of positive, negative, and no cognitive discrepancies.
Conclusions: Results suggest cognitive discrepancies in performances on executive functioning measures do not differ by APOE genotype among military personnel who have sustained a mild to moderate head injury. Implications are discussed.
Correspondence: *Jana Wingo, M.A., Loyola University Chicago, 6525 N Sheridan, Chicago, IL 60646. E-mail: jana.wingo@gmail.com*

J. WOODHOUSE, J. LINCK, A. VINCENT & W. RUWE. Efficacy of the Response Bias Scale (RBS) Among OEF/OIF Veterans.
Objective: While the Response Bias Scale (RBS) has shown promise, research is needed to investigate the efficacy of the RBS among OEF/OIF veterans reporting a history of MTBI. The primary aim of this study was to explore the clinical efficacy of the RBS in predicting cognitive response bias among OEF/OIF veterans.
Participants and Methods: Archival data was collected from 58 OEF/OIF veterans referred for neuropsychological assessment on an outpatient basis within a West South Central VA Medical Center from 2003-2009. The sample was 97% male, with a mean of 34 (SD = 8.05) years of age. Eighty-eight percent of the sample was White, seven percent was Black, and 3.4 % was Hispanic. Ninety-one percent of the sample reported a history of primary blast exposure. The majority of subjects did not report a loss of consciousness (i.e., 71%) or posttraumatic amnesia (i.e., 72%). Subjects were included if both an MMPI-2 and TOMM were completed, and were excluded if they had a history of significant head injury prior to joining the military.
Results: Spearman's rho was used to examine the bivariate correlations, which revealed that only the F-scale (rs = -.31, p = .02) and the RBS (rs = -.32, p = .015) were significantly correlated with TOMM Trial 2. To characterize the diagnostic accuracy of the RBS a ROC analysis was performed. Results indicated that the RBS did a poor job of discriminating normal from abnormal TOMM scores, the AUC =.663 (95% CI: .514-.812) was not significant. Likewise, the RBS failed to demonstrate an adequate balance of sensitivity and specificity to be used clinically with this population.
Conclusions: The observed results may reflect that the RBS is not a valid and reliable measure of cognitive response in this population, that the TOMM is an insufficient external criterion of cognitive response bias, or sampling error. In spite of these limitations, results from this study raise concern with respect to the clinical efficacy of the RBS in this population, and suggest that it should be used with caution.
Correspondence: *Jonathan Woodhouse, Psy.D., Department of Psychiatry & Behavioral Sciences, University of Oklahoma Health Sciences Center, 920 Stanton L. Young Blvd., Room WP-3440, Oklahoma City, OK 73104. E-mail: jonathan-woodhouse@ouhsc.edu*

M.J. WRIGHT, C.A. SIDERS, E. WOO, D.L. MCARTHUR, J.R. ALGER, D.A. HOVDA & P. VESPA. Metabolic Crisis-Related Brain Atrophy and Neuropsychological Impairment Following Traumatic Brain Injury.
Objective: We have previously shown that traumatic brain injury (TBI) often results in acute metabolic crisis that is associated with chronic brain atrophy in the frontal and temporal lobes. Our current goal was to determine if acute metabolic crisis-related brain atrophy played a significant role in the neuropsychological sequelae of TBI.
Participants and Methods: We employed positron emission tomography (acute), magnetic resonance imaging (acute and six months post-injury), and neuropsychological assessments (6 and 12 months post-injury) in a sample of 19 TBI survivors. The majority of TBIs were due to acceleration-deceleration forces (~89%) and were moderate to severe (~84%) in nature as indicated by Glasgow Coma Scale scores.
Results: Correlational analyses with Spearman's rho revealed that acute metabolic crisis related-atrophy in the frontal and/or temporal lobes was associated with deficits in attention, executive functioning, and psychomotor abilities at 6 and 12 months post-injury. Poorer performances in nonverbal memory were moderately associated with frontal lobe atrophy at six months post-injury.
Conclusions: Our findings suggest that acute metabolic crisis-related brain atrophy plays a role in the neuropsychological sequelae of TBI. Also, our data indicate that interventions to reduce acute metabolic crisis may lead to improved outcomes for TBI survivors.
Correspondence: *Matthew J. Wright, Ph.D., Psychiatry, Harbor-UCLA Medical Center, 1124 W. Carson St., B-4 South, Rm. 111 (Box 490), Torrance, CA 90502. E-mail: mwright@labiomed.org*

Invited Address: Lasting Traces: How H.M. Shaped the Science of Memory

Speaker: Sue Corkin

3:45–4:45 p.m.

S. CORKIN. Lasting Traces: How H.M. Shaped the Science of Memory.
For 17 years, Henry Molaison (H.M.) had uncontrollable epileptic attacks. After unsuccessful attempts to pinpoint the focus, William Scoville performed an experimental operation: bilateral medial temporal lobe (MTL) resection. Immediately, H.M., age 27, showed a dense global amnesia, which became the topic of scientific scrutiny for 5 decades. Brenda Milner led the initial studies at McGill University, and my lab at MIT extended them.
H.M.'s case firmly established the critical role of MTL structures in long-term memory (LTM). He had a severe and lasting deficit in retrieving events and facts, with poor recall and recognition of stimuli in all modalities; he did not benefit from practice. In contrast, his short-term memory (STM) was intact. He could hold information online for about 20 sec but could not convert information in STM into permanent LTM traces, indicating that different brain systems support STM and LTM.
Milner's finding that H.M.'s errors on a mirror-tracing task decreased over days, despite his having no recollection of doing the test, showed that LTM processes are dissociable. Subsequent research revealed that H.M.'s nondeclarative learning (e.g., motor and perceptual skills, repetition priming) remained intact, but he could not form new declarative memories for events and facts. This distinction indicates that MTL circuits are needed for declarative but not for nondeclarative memory. Further, H.M. could not recall autobiographical episodes from before his operation, but his semantic knowledge of his preoperative world was normal. This extraordinary case left lasting traces on memory research and on us.
Correspondence: ,, . *E-mail:*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Presidential Address: Strategies for Preclinical Detection and Prevention of Alzheimer's Disease

INS President: Stephen Rao

5:00–6:00 p.m.

S.M. RAO. Strategies for Preclinical Detection and Prevention of Alzheimer's Disease.

Neuropathological changes associated with Alzheimer's disease (AD) may begin more than a decade prior to diagnosis. Existing FDA-approved medications for AD provide only mild symptomatic relief, likely because the disease process is too far advanced at the time of diagnosis. There is a growing recognition in the scientific AD community that slowing the neuropathological changes during the asymptomatic, preclinical stage is essential to lowering the prevalence and severity of AD. Possible lifestyle interventions, such as exercise, cognitive stimulation, and diet, as well as pharmaceutical agents administered during the preclinical stage are currently being evaluated in randomized clinical trials. For prevention studies to succeed, however, valid biomarkers are required both for identifying individuals at greatest risk for developing AD prior to symptom onset and for monitoring the short-term changes associated with these interventions. At present, advancing age, family history of AD, and the presence of the apolipoprotein-E (APOE) ε4 allele are the best predictors of the sporadic form of AD, although none accurately identifies at-risk individuals with certainty nor is able to monitor treatment efficacy. Several candidate biochemical, anatomical, and functional biomarkers have shown promise for identifying disease risk or treatment response potential, but vary in their efficacy and invasiveness. This presentation will summarize the evidence for using advanced neuroimaging techniques (task-activated and resting state fMRI, diffusion tensor imaging, anatomical MRI, amyloid PET imaging) as biomarkers in prevention studies.

Correspondence: *Stephen M. Rao, PhD, Neurological Institute, Cleveland Clinic, 9500 Euclid Avenue / U10, Cleveland, OH 44195. E-mail: raos2@ccf.org*

SATURDAY MORNING, FEBRUARY 5, 2011

Paper Session 6: Traumatic Brain Injury

Moderator: Molly Zimmerman

9:00–10:30 a.m.

J. KIM, J. WHYTE, E. EUROPA, S. PATEL & J.A. DETRE. Methylphenidate Modulates Sustained Attention and Cortical Activation in Survivors of Traumatic Brain Injury: A Perfusion fMRI Study.

Objective: Methylphenidate has been reported to improve processing speed and other cognitive functions in survivors of traumatic brain injury (TBI). The neural correlate of this efficacy, however, remains unclear. Using perfusion fMRI, the current study aimed to examine the neural correlates of single-dose methylphenidate administration in a randomized double-blind placebo-controlled study design.

Participants and Methods: Eighteen individuals with moderate to severe TBI were tested on two occasions approximately one week apart. Half of them received methylphenidate (a dose of 0.3 mg/kg) on the first day, the other half on the second. An amplitude-modulated continuous ASL technique was implemented on a 3T scanner for perfusion fMRI. While being scanned, participants performed a simple go/no-go visual reaction-time task tapping into the neural network involved in sustained attention.

Results: Behaviorally, methylphenidate significantly improved both accuracy (d-prime, p=.003) and reaction time (median RT, p=0.016). Voxel-wise whole-brain analysis revealed the presence of a main effect of Drug (methylphenidate vs. placebo) in the pre- and post-central gyri. An interaction effect between Drug and Task Condition (resting vs. task) was identified in the left lateral superior parietal cortex, a part of the default-mode network. The magnitude of drug-related deactivation of this area during the task was correlated with improvement in response speed (r=-0.51).

Conclusions: Single-dose administration of methylphenidate modulates visual sustained attention and cortical activation in chronic survivors of TBI. Normalization of the default-mode network (i.e., suppression of activity) during task performance may be one mechanism by which methylphenidate ameliorates attention impairments in this population.

Correspondence: *Junghoon Kim, PhD, Moss Rehabilitation Research Institute, 50 Township Line Rd., Elkins Park, PA 19027. E-mail: kimj@einstein.edu*

M.E. ZIMMERMAN, N. ACKERMAN, E. GULKO, D. NONGA, A. KRAUSZ, W.F. STEWART, R.B. LIPTON & M.L. LIPTON. Soccer Heading is Associated with Neuropsychological Function in Amateur Players.

Objective: Soccer players repeatedly use their unprotected forehead to control the ball in a practice known as heading. The goal of the present study was to examine the relationship between heading and neuropsychological function in amateur soccer players.

Participants and Methods: Thirty-four amateur soccer players completed a questionnaire designed to ascertain lifetime heading frequency and history of concussion. CogState was used to assess neuropsychological function. Subjects were divided into quartiles based on heading exposure and then dichotomized into two groups: Highest Headers (HH=4th quartile) and Lowest Headers (LH=1st–3rd quartile). History of any concussion was reported as present or absent. Linear regressions were used to examine the relationship among neuropsychological function (dependent variable), heading, and concussion (independent variables).

Results: The sample had an average age of 31 (sd=5.8) and 16 years of education (sd=1.6). Subjects headed the ball a median of 436 times/year. HH subjects headed the ball at least 1186 times/year. Eleven (32%) subjects reported a history of concussion (HH n=1, LH n=10). Age and education were not related to primary variables of interest. HH subjects demonstrated poorer performance on tests of delayed verbal memory ($p<0.01$) and visual motor function ($p<0.03$) compared to LH subjects. Concussion was not related to neuropsychological function and did not change the heading findings.

Conclusions: Soccer players with the highest heading frequency had poorer performance on tests of delayed verbal memory and visual motor function relative to their peers. Heading predicted neuropsychological function independent of concussion in our sample, suggesting that repetitive low level trauma may give rise to cognitive impairment in amateur soccer players.

Correspondence: *Molly E. Zimmerman, Ph.D., Department of Neurology, Albert Einstein College of Medicine, 1165 Morris Park Ave., Rousso Bldg. Room 310, Bronx, NY 10463. E-mail: molly.zimmerman@einstein.yu.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

J. PONSFORD, K. GOULD, L. JOHNSTON & M. SCHONBERGER. Predicting the Development of Psychiatric Disorders Following Traumatic Brain Injury.

Objective: Psychiatric disorders are common and often debilitating following traumatic brain injury (TBI). However, there is little consensus regarding the risk factors for post-injury psychiatric disorders. This study aimed to examine, prospectively, which pre-injury demographic, injury-related and earlier psychiatric factors were predictive of psychiatric disorder one year post-injury, and to identify concurrent factors associated with these disorders.

Participants and Methods: Participants were 122 adults with complicated mild to severe TBI. Lifetime pre-injury, early post-injury and one-year psychiatric diagnoses were determined using the Structured Clinical Interview for DSM-IV-TR Axis I Psychiatric disorders. The Hospital Anxiety and Depression Scale, Coping Scale for Adults and cognitive measures were also administered.

Results: Psychiatric disorders were common both pre-injury (54.1%) and at 12-months post-injury (45.9%). Results of logistic regression analyses indicated that pre-injury use of counselling services, lower IQ and presence of limb injury were significant risk factors psychiatric disorder at 12-months post-injury ($\alpha 2$=22.24, df=4, $p<0.001$).. Slower psychomotor speed in the acute post-injury stage was associated with reduced likelihood of later anxiety. Post-injury psychiatric disorders were associated with concurrent unemployment, pain, poor quality of life, and use of non-productive coping skills. Post-injury depressive disorders were not associated with concurrent measures of cognitive functioning, whereas anxiety disorders were associated with impaired attention and executive functioning.

Conclusions: These findings show that pre-injury history interacts with injury-related factors to produce post-injury psychiatric disorders. Factors such as pain, coping style and cognitive impairments may be addressed in rehabilitation to reduce the likelihood of these disorders.

Correspondence: *Jennie Ponsford, PhD, School of Psychology and Psychiatry, Monash University, Building 17, Wellington Road, Clayton, VIC 3800, Australia. E-mail: jennie.ponsford@monash.edu*

S. MCDONALD, J. RUSHBY, S. LI, A. DESOUSA, A. DIMOSKA, C. JAMES, R. TATE & L. TOGHER. An examination of orientation and engagement in response to emotional faces following severe Traumatic Brain Injury.

Objective: People with severe TBI have deficits in emotional processing ranging from emotion perception through to emotion regulation. They also show reduced affective responsivity to emotionally salient material. What is unclear is whether this reflects a lack or orientation to such material or a more pervasive failure to respond. The current study was designed to address this question by measuring psychophysiological indices of responsivity to emotional material when viewed (i) passively and (ii) given instructions to attend.

Participants and Methods: Eighteen adults with severe TBI and 18 control participants viewed two blocks of facial expressions (8 happy and 8 angry) either (a) passively or (b) when asked to identify the emotional expression (attentive condition). Autonomic responses were indexed as skin conductance (SCR) and evoked cardiac deceleration (ECD) to measure orientation, and skin conductance levels (SCL) as a measure of arousal.

Results: For the passive task the control group showed an increase in SCR as well as increasing SCL over trials when viewing angry compared with happy faces. No differences in SCR were shown for the TBI group who rapidly habituated (SCL) to both expressions. For the attend task, both groups showed similar SCR and relatively increased SCL but the TBI group again habituated to both emotions. ECD was generally lower in the TBI group regardless of condition.

Conclusions: The results support the view that people with TBI do not orientate normally to emotional material. Increasing attentional demands improves their orientation to emotional faces, but not their emotional engagement (arousal).

Correspondence: *Skye McDonald, PhD, School of Psychology, University of NSW, UNSW, Sydney, NSW 2052, Australia. E-mail: s.mcdonald@unsw.edu.au*

R.A. YEO, C. GASPAROVIC, F. MERIDETH, D. RUHL, D. DOEZEMA & A.R. MAYER. A Longitudinal Proton Magnetic Resonance Spectroscopy Study of Mild Traumatic Brain Injury.

Objective: To evaluate longitudinally individuals with mild traumatic brain injury (mTBI) at 13 days and four months post-injury using Magnetic Resonance Spectroscopy (MRS) and neuropsychological assessment.

Participants and Methods: Thirty mTBI patients were matched with 30 healthy controls for sex, age, and education. A comprehensive battery of neuropsychological tests and symptom inventories was administered. MRS was obtained using a Siemens 3T TrioTrim scanner for a supraventricular tissue slab. Neurometabolite concentrations were derived for creatine-phosphocreatine (Cre), glutamate plus glutamine (Glx), and N-acetyl-aspartate (NAA), separately for gray and white matter.

Results: Initial white matter concentrations of Cre and Glx were elevated in the mTBI group, while gray matter concentrations of Glx were reduced. Partial normalization of these neurometabolites and N-acetylaspartate was associated with days post-injury during the semi-acute period of recovery. No differences were seen in neuropsychological performance. Group differences in neurometabolite concentrations were not evident at follow-up. A significant group by time interaction indicated significant recovery in the mTBI group for gray matter Glx and trends in white matter Cre and Glx. An estimate of premorbid intelligence predicted the magnitude of neurometabolite normalization over the follow-up interval for the mTBI group.

Conclusions: Neurometabolite concentrations are systematically altered by mTBI and these changes normalize over a 4 months. White matter neurometabolites were more affected than gray matter. Results suggest subtle alterations in energy metabolism (Cre) and cell signaling (Glx), a somewhat different pattern than is observed in more severe injuries. Further, MRS appears to be more sensitive to mTBI than neuropsychological assessment.

Correspondence: *Ronald A. Yeo, Ph.D., Psychology, University of New Mexico, Logan Hall, Albuquerque, NM 87131. E-mail: ryeo@unm.edu*

M. VERFAELLIE, G. LAFLECHE, A. SPIRO & C. TUN. Long-Term Clinical Outcomes of Blast-Induced Neurotrauma.

Objective: This study examines the effects of blast-induced TBI (bTBI) in returning OIF/OEF veterans on affective and cognitive functioning, with the goal of examining (a) associations between mild bTBI and psychiatric co-morbidities; and (b) contributions of bTBI and PTSD to observed cognitive inefficiencies.

Participants and Methods: Fifty-five OIF/OEF veterans at least 1 year post mild bTBI were evaluated using a structured clinical interview, affective rating scales, and neuropsychological measures of memory, attention, problem solving, and psychomotor speed. Neuropsychological impairment for each domain was defined using a case-based approach, using a cut-off of 2 SD below the norm on a single test, or 1.5 SD below the norm on two tests.

Results: Significant associations were obtained between bTBI and PTSD, but not bTBI and depression. Prevalence of impairment in simple attention and psychomotor speed were no greater than expected by chance, but prevalence of impairment in verbal memory, visual memory and executive function exceeded chance expectation and ranged between 20 and 35%. Neither presence of bTBI or PTSD was significantly associated with cognitive impairment.

Conclusions: Findings are discussed in light of (a) possible mechanisms of association between mTBI and PTSD; and (b) the existence of a minority of OIF/OEF veterans who are vulnerable to deployment-related cognitive impairment, regardless of the presence of bTBI or PTSD.

Correspondence: *Mieke Verfaellie, PhD, Memory Disorders Research Center, VA Boston Healthcare System and Boston University School of Medicine, 150 S Huntington Ave (151A), Boston, MA 02130. E-mail: verf@bu.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Symposium 14: Baby Signing

Chair: Brenda C. Seal

9:00–10:30 a.m.

B.C. SEAL, M. BROWN, H. KOEGLE, Y. AN, C. BAIRD, S. KULSAR & R. DEPAOLIS. Baby Signing.

Symposium Description: Unprecedented interest in baby signing has exploded with video clips on YouTube and numerous private and commercial Internet sites. Descriptive and experimental research also exist, although on a considerably lesser scale than anecdotal support, encouraging parents to offer their babies a language-literacy advantage by signing to them. This symposium offers four papers on baby signing. The first addresses the hype (promises and products) surrounding the baby sign movement and a review of the research literature that fails to support a language advantage clearly attributed to signing. The second presentation offers longitudinal findings from analyses of 9-month-old babies' manual activity during babbling. Support for a manual-vocal relationship is provided in the descriptive analysis of the data. The third presentation involves retrospective research comparing spoken language outcomes (consonant acquisition and onset of first words) of 8 babies exposed to and 8 not exposed to baby sign. Failure to find a signing advantage is tempered with evidence of substantial manual activity in both groups during their babbling. The fourth presentation addresses an experimental approach to test infant perception of signing. A head-turn paradigm is being used with three groups of 10-month-olds (hearing babies not exposed to baby sign, hearing babies exposed to baby sign, and babies of Deaf parents who communicate with their babies in ASL). This symposium should provide audience members with varying perspectives on the baby signing movement and alternative theories about the role of signing in early language acquisition.

Correspondence: *Brenda C. Seal, Ph.D., Hearing, Speech and Language Sciences, Gallaudet University, 800 Florida Ave., NE, Washington, DC 20002. E-mail: brenda.seal@gallaudet.edu*

M. BROWN & B. SEAL. The Hype and Controversy Surrounding Baby Signing.

Objective: A growing number of parents are using signs with their infants to encourage better vocabularies, higher IQs, fewer tantrums, advanced literacy, and earlier spoken language. A recent Google search yielded 122 million hits suggesting the baby sign (BS) movement is unprecedented, yet research supporting the claims of BS is limited to few empirical reports. The literature provides little evidence that BS is either "beneficial, harmful or harmless" (Johnson, Durieux-Smith, & Bloom, 2005, p. 245). In contrast, support for increased attention to baby gesture (not baby sign) has a substantial literature focusing on gestures that emerge at or around 9 to 10 months of age, before and during the acquisition of first words (Iverson & Fagan, 2004), revealing a strong positive correlation between gestures and consonants at 13 to 15 months of age and inventories of words at 18 to 20 months of age. Rowe and Goldin-Meadow (2009) similarly reported that the number of gestures babies used at 14 months of age correlates favorably with vocabulary size at kindergarten, and a contrast between the low gestures used by low SES babies and lower vocabulary at kindergarten with high gestures used by high SES babies and their higher vocabulary at the same time. This presentation will conclude with two points: parents who learn signs for their babies are likely to have already given them a language learning advantage; and (2) parents who encourage manual interactions (clapping, waving, peek-a-boo, etc.) with their babies may have already given them an interaction advantage for language.

Correspondence: *Michelle Brown, Gallaudet University, Washington, DC 20002. E-mail: michelle.brown@gallaudet.edu*

H. KOEGLER & R. DEPAOLIS. Manual Activity and Vocal Activity at 9 Months of Age.

Objective: Evidence of links between an infant's manual and vocal systems suggests they are mutually influential. In an effort to test the stability of early manual activity and its relationship with early vocal activity, we analyzed infant babbling and manual gestures.

Participants and Methods: Eighty-one videotapes of 8 typically-developing 9-month-olds from the University of York Infant and Toddler Language Studies Laboratory were viewed for coding and transcribing manual activity that accompanied their babbling to a point of 2 (of 4) stable consonants.

Results: 97% (s.d. = 3.7%) of the children's vocal activity across occurred with manual activity. Four handshapes were most commonly produced: the 5- and C-handshapes each constituted 33% and A/S-handshapes constituted 16% of all manual gestures, aligning positively with consonants /t,d/ and /p,b/ in 34% and 22% of all the children's consonants. Results coincide with findings from McCune and Vihman's (2001) investigations that t/d and p/b are the most produced consonants in typically-developing infants and common to their earliest words. Findings also revealed these handshapes (C, 5, A/S) as the most produced for each of the 8 children, and while they are not as well reported, they do correspond to Boyes Braem's (1990) most common handshapes produced in infants who sign, and the most common handshapes produced spontaneously by adults when they gesture (McNeill, 1992).

Conclusions: This presentation will conclude by returning to the symposium topic, Baby Signing, with recommendations that promote broader attention to children's manual activity as a developmental alignment that precedes the onset of first gestures and first words.

Correspondence: *Holly Koegler, James Madison University, Harrisonburg, VA 22807. E-mail: koegleha@dukes.jmu.edu*

Y. AN & B. SEAL. Spoken Language Acquisition in Hearing Babies Exposed to Sign and Hearing Babies Not Exposed to Sign.

Objective: Eight babies with no exposure to baby sign (BS) and 8 babies whose parents reported using BS were identified from a larger pool of typically-developing babies at the University of York Infant and Toddler Language Studies Laboratory to determine language milestone differences.

Participants and Methods: The babies' manual activity during babbling was analyzed (same procedures reported in previous session).

Results: No statistical differences were found between manual activity accompanying vocal activity in the two groups; the nonsigning children demonstrated manual activity in 97.1% of their babbling (s.d. = 3.79%) and the signing children averaged 97.5% combined manual and vocal activity (s.d. = 1.23%). No differences were observed across time between their acquisition of a first stable consonant (one vocal motor scheme, VMS) (McCune & Vihman, 2001) to the second VMS. Two vocabulary hallmarks were compared with no differences in the two groups onset of first 4 words or first 25 words, suggesting failure to support a sign advantage. Other measures of manual activity were equally unremarkable, with the predominance of C-, 5-, A-, and B-handshapes paralleling the same predominance observed in the nonsigning children.

Conclusions: These results will be presented with several cautions. First, the signing parents did not indicate quantity of or success with signing, and none of the children demonstrated signs as they interacted with their parents. Second, no information was collected on parents' use of interactive gestures—Patty Cake, Peek-a-Boo, Itsy Bitsy Spider, and other commonly observed exchanges that might have occurred in parents who did not sign with their infants.

Correspondence: *Yekyung An, James Madison University, Harrisonburg, VA 22807. E-mail: anyk@dukes.jmu.edu*

K. STEVEN & C. BAIRD. A Visual Head-Turn Preference Paradigm for Familiar and Unfamiliar Signing in 10-Month Olds.

Objective: The Auditory Head-Turn Preference Paradigm (AHPP) has been used to measure and compare infant looking time between famil-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

iar and novel auditory stimuli in determining the age at which infants are sensitive to their language's speech signal. Hearing infants begin to represent word forms independent of context by 11 months of age. To date, we have no equivalent milestones or protocols for securing the milestones for infants learning American Sign Language (ASL). The purpose of this study is to share procedures and data collected to date from a Visual Head-Turn Preference Paradigm (VHPP).
Participants and Methods: Three groups of 10-month old babies are participating: hearing babies with no exposure to baby signing, hearing babies with exposure to baby signing, and hearing or deaf babies of Deaf parents who use ASL exclusively with their infants.
Results: To date, the 12 hearing babies with no exposure to sign have shown no preference in their head-turn to the familiar and unfamiliar stimuli. Only 1 hearing infant exposed to baby signing and 1 deaf infant with a deaf mother have been tested at this point, but by convention time, our numbers should enable statistical comparison in answering questions about infant perception of signing.
Conclusions: Comparing VHPP expectations to AHPP should also offer important findings about infant language acquisition, particularly for sign language.
Correspondence: *Kulsar Steven, James Madison University, Harrisonburg, VA 22807. E-mail: kulsarst@dukes.jmu.edu*

Symposium 15: Understanding and Assessing the Neuropsychological, Neurological Consequences of Chronic Exposure to Manganese

Chair: Muriel Lezak

9:00–10:30 a.m.

M. LEZAK, D.C. BELLINGER, R. BOWLER, M. HARRIS, Y. KIM & T. GUILARTE. Understanding and Assessing the Neuropsychological, Neurological Consequences of Chronic Exposure to Manganese.
Symposium Description: Manganese (Mn) Neurotoxicity: An overview of Mn induced parkinsonism and Parkinson's disease is presented. Methods of assessing neurological and neuropsychological function in adults and children are elucidated. The impact of anxiety in environmentally exposed residents (n=100) and controls (n=90), chosen at random in two towns in Ohio, on neuropsychological function is described. Mn in blood and air is not associated with neuropsychological dysfunction. Anxiety and Phobic Anxiety significantly predict motor and neurological dysfunction and reported symptoms, diagnosis of Anxiety disorders and anti-anxiety medication use. Tests of executive function in the same sample are examined with confirmatory factor analysis. Structural Equation Modeling (SEM) includes a Hazard Quotient (modeled air/Mn and distance from the source) predicting Planning/Organizing ($p = .01$), Cognitive Flexibility ($p = .04$), but not Attention/Mental Tracking ($p = .81$). Neuroimaging studies show Mn accumulation in the globus pallidus with T1-weighted MRIs, with current fMRI showing biochemical changes in the anterior cingulate cortex associated with cognitive decline. Diffusion tensor imaging also shows microstructural changes in the corpus callosum and frontal white matter, primarily caused by demyelination. fMRI can enable identification of neuronal structures associated with Mn-related functional deficits. A new perspective is offered about Mn-induced Parkinsonism and idiopathic Parkinson's disease (iPD). Further effects of Mn on cognition and neuronal systems and brain regions involved will be described.
Correspondence: *Rosemarie Bowler, Ph.D., Psychology, San Francisco State University, 8371 Kent Dr., El Cerrito, CA 94530. E-mail: rbowl@sfsu.edu*

D. BELLINGER. Exposure to Manganese and Children's Neurodevelopment in Infancy.
Objective: Relatively little is known about the potential developmental neurotoxicity of manganese (Mn). Among the major questions are the shape of the dose-effect relationship (Mn is also an essential micronutrient) and the potential interactions between manganese and other neurotoxic contaminants, such as lead.
Participants and Methods: We studied 448 children born in Mexico City from 1997 to 2000 who participated in a study designed to evaluate lead neurotoxicity. Archived blood samples collected at 12 and 24 months of age were analyzed for Mn using ICP-MS (mean at 12 months: 24.3 μg/L; mean at 24 months: 21.1 μg/L). Children's neurodevelopment was assessed at 6-month intervals between 12 and 36 months of age using the Mental Development Index (MDI) Bayley Scales of Infant Development-Second Edition.
Results: We observed an inverted U-shaped association between 12-month blood Mn level and 12-month Mental Development Index score (i.e., lower MDI among children in the lowest and highest quartiles of Mn). This association was apparent, but diminished in magnitude, at later ages as well. Additional analyses suggested that higher Mn exposure is an effect modifier of the inverse association between lead and MDI score. The inverse slope between lead and MDI was significantly steeper among children in the highest quintile of Mn level than among children in the other quintiles.
Conclusions: These findings suggest a possible biphasic dose-effect relationship between early Mn exposure and infants' neurodevelopment and highlight the importance of conducting analyses that acknowledge that children are exposed to multiple contaminants.
Correspondence: *David Bellinger, 300 Longwood Ave; Children's Hospital Farley Basement Box 127, Boston, MA 02115. E-mail: David.Bellinger@childrens.harvard.edu*

R.M. BOWLER. Manganese Exposure in Adults: An Epidemiologic Study of Symptoms, Mood Effects, Motor and Neurological Function.
Objective: Manganese (Mn) is a neurotoxin associated with mood, medical symptoms, motor and neurological effects. Reports of adverse health effects from occupational exposure to Mn are common but environmental reports of airborne Mn effects are sparse.
Participants and Methods: A random sample of 100 adult Mn exposed residents was studied with a neurological examination, motor function and mood tests, and a comprehensive health questionnaire. Results are compared with 90 randomly selected residents from a demographically similar control town. Mn in blood and air were measured.
Results: Exposed residents reported significantly more sensory, Parkinsonism, and emotional symptoms, and had higher SCL-90-R Phobic Anxiety scores. The Cumulative Exposure Index, based on modeled Mn/air and length of residence, was related to 6 of 9 SCL-90-R clinical scales and 2 of 3 global scales. No differences in Mn in blood between the towns were observed. Anxiety and Phobic Anxiety scores were significant predictors of symptoms, diagnosis of Anxiety Disorder and use of anti-anxiety medications in the whole sample and motor and neurological dysfunction (UPDRS bradykinesia and ADL) in exposed residents only.
Conclusions: Symptoms and measured anxiety and phobic anxiety seem to be the cardinal signs and results in this study. Strong relationships between exposure, symptoms, and mood disturbance add validity to an association with Mn exposure and highlight the importance of measuring Anxiety, Phobic Anxiety and symptoms in relationship to function. The methods of this first epidemiologic study of Mn exposure of adults in the U.S. should be applied to communities with higher levels of Mn exposure.
Correspondence: *Rosemarie M. Bowler, 8371 Kent Dr., El Cerrito, CA 94520. E-mail: rbowl@sfsu.edu*

M. HARRIS. Manganese Exposure and Components of Executive Function in Environmentally-Exposed Adults.
Objective: Manganese (Mn) is a neurotoxin, which in addition to well-documented motor effects, is related to a wide variety of cognitive effects. The effects of Mn exposure on components of executive functioning are not well-studied, particularly with environmental Mn exposure.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: One-hundred adult participants were randomly selected from Marietta, OH, which houses the largest Mn-producing plant in the US. Participants completed a battery of neuropsychological tests. Confirmatory factor analysis of tests supported three factors representing components of executive functioning: Attention/Mental Tracking (ACT, NAB List Learning – Semantic Clustering, and WAIS-III Digits Backwards), Cognitive Flexibility (Trails B-A, Stroop Interference, and Animal Naming), and Planning/Organizing (ROCFT Immediate and Delayed Recall). Air-modeling analyses calculated an estimated level of airborne Mn exposure (Mn/Air) for each participant.
Results: Structural Equation Modeling (SEM) showed strong overall fit ($X^2$35 = 45.071, p = .118; CFI = .968; RMSEA = .044) for a model with Mn/Air significantly predicting Planning/Organizing (p = .01) and Cognitive Flexibility to a lesser degree (p = .05), but not Attention/Mental Tracking (p =.81), with age and education levels accounted for. Error terms for Mental Tracking/Attention and Cognitive Flexibility showed significant covariance with each other (p = .01).
Conclusions: Results indicate that despite low levels of exposure, higher Mn exposure affects planning/organizing and cognitive flexibility, but not mental tracking/attention. This suggests a hierarchy of effect, where Mn has a greater effect on the complex planning/organizing component of executive function, but a smaller effect on attentional/mental tracking processes.
Correspondence: *Matthew Harris, 2625 24th St., Apt 1, San Francisco, CA 94110. E-mail: mharris2@alliant.edu*

Y. KIM. Neuroimaging in Manganese neurotoxicity: From Structural to Functional Neuroimaging.
Objective: This study reports new findings in functional neuroimaging and structural MRI in welders exposed to manganese (Mn).
Participants and Methods: Mn exposure causes bilateral symmetrical increases in signal intensity, mainly confined to the globus pallidus and midbrain, on T1-weighted MRI, with no change on T2-weighted images. Pallidal T1 signal intensities are useful in assessing recent excessive Mn exposure. The increased T1 signals have also been associated with neurobehavioral performance.
Results: Proton magnetic resonance spectroscopy showed a decreased mI/tCr ratio in the anterior cingulated cortex associated with cognitive decline in a group of Mn-exposed welders.
Functional magnetic resonance imaging (fMRI) showed that during the finger tapping task, activation of the bilateral primary sensorimotor cortex, bilateral supplementary motor area, bilateral dorsolateral premotor cortex, bilateral superior parietal cortex, and ipsilateral dentate nucleus was higher in the welding group than in the control group. Within- and between-group analyses revealed that welders showed increased activation in working memory networks during the 2-back verbal working memory task, compared to healthy controls.
Diffusion tensor imaging (DTI) in welders showed microstructural changes in the corpus callosum and frontal white matter, attributable to compromised radial directionality of fibers, primarily caused by demyelination.
Conclusions: Functional neuroimaging could enable the identification of the neuronal structures associated with Mn-induced functional deficits.
Correspondence: *Yangho Kim, Department of Occupational and Environmental Medicine,University of Ulsan College of Medicine, Ulsan 680, Republic of Korea. E-mail: yanghokm@ulsan.ac.kr*

T. GUILARTE. Manganese Neurotoxicity: A New Perspective.
Objective: In the last decade there has been a renewed interest in understanding the behavioral and neurological consequences of chronic exposure to manganese (Mn). This interest stems from the fact that occupational exposures to workers and environmental exposures to human populations are significant and scientists are beginning to discover new aspects of the detrimental health effects of chronic Mn exposure. These advances have been possible because of the use of new and more refined behavioral, neuroimaging and neuropathological methods. This presentation will focus on two important questions about Mn neurotoxicity that are vigorously debated by scientists today. 1) Does Mn exposure cause idiopathic Parkinson's disease (iPD)?; and 2) What are the effects of Mn on cognitive domains and what are the neuronal systems and brain regions involved? Evidence will be presented that Mn-induced parkinsonism is not the result of degeneration of nigrostriatal dopaminergic neurons as it happens in iPD, but it may be associated with dopamine neuron dysfunction. Further, information will be presented that Mn causes deficits in executive function and this effect may be mediated by neurochemical and neuropathological changes in the frontal cortex. The involvement of the frontal cortex in Mn-induced neurological deficits brings to light a new and novel area of investigation in determining the long-term effects of exposure to Mn on neurological health.
[This work was funded by NIEHS grant ES010975 to TRG]
Correspondence: *Tomás Guilarte, Department of Environmental Health Sciences Mailman School of Public Health Columbia University 60 Haven Avenue, B1-108, New York, NY 10032. E-mail: trguilarte@columbia.edu*

Poster Symposium: Language-Independent Cross-Cultural Tests of Executive Effort: 2004 Edith Kaplan Award.

9:00–10:30 a.m.

Executive Functions/Frontal Lobes

M.A. SEDO', L. MALLOY-DINIZ, M. MORENO DE IBORRA, J. SALVADOR & M. SEDO. Language-Independent Cross-Cultural Tests of Executive Effort: 2004 Edith Kaplan Award.
Symposium Description: Rationale
Language-Independent (L-I) Cross-Cultural Tests of Executive Effort (XF) start from a short number of recurrent icons (numbers, fruits) that must to be read several times as a verbal series: as a task of fluent automatic reading; or as an effortful task of decision-making that requires high levels of flexible executive self-control. Items (words) are employed only as additive units that describe the speed and the accuracy of the subject under progressive levels of cognitive demands.
L-I Tests can be administered in different vernacular languages, to directly compare subjects from different socio-academic levels and different cultural environments.
Methods
We present data from Brazilian schoolchildren 4-7; Zapotecan and Spanish-speaking Mexicans 5-11; Venezuelan children 7 to 16 (autistic, ADHD and normal); Venezuelan undergraduate students; and schizophrenic Quechuan-speaking subjects (before and after pharmacological treatment). We will describe two XF instruments, (5Digits and 20Fruits), their psychometric characteristics; correlations with social variables and visualizations of the brain.
Discussion
XF scores measure: multi-sensory integration of automatic reading (that is, reading readiness); and control (or fatigue) in the presence of sustained executive demands (brain insult, dementia, damage, dysfunction). XF tests can be administered to totally illiterate subjects.
Conclusions.
XF tests are independent from past learning and experience, and allow direct comparison across linguistic, cultural, academic and social, differences; and provide differential diagnosis of developmental educational, medical and psychiatric disorders.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Manuel A. Sedo', Ph.D.,, Language-Independent Rapid Reading, 9 Ingleside Rd., Natick, MA 01760. E-mail: manuel@sedo.net*

M. SEDO & G. ALEMAN. Testing Kolla schizophrenics, siblings and neighbours with Language-Independent Neuropsychological Tests (in Quechuan and in Spanish).

Objective: Five Digit (5D) and 20Fruits 20F) are Language-Independent (L-I) Tests of Executive Effort (XF) that use Rapid Recurrent Reading (FiveDigit, 20 Fruits) as a biometric sign of the perceptual-motor readiness of the subjects and their executive self-control. Research used the languages Spanish and Quechuan.

Participants and Methods: Subjects were 30 trios of schizophrenics ("Utiquay") virgin of treatment., siblings (at rusk subjects) and neighbours. Pre-post testing, analysis of variance, discriminant analysis and latent class analysis (ACL) were made. Research involved visualizations of the right dopaminergic areas of the brain.

Results: The use of medication was immediately followed by changes in bradykinesia and in XF (20F). A discriminant equation was made from two factors (executive motor control and length of working memory) which classified accurately 97% of subjects of the three subgroups. Strikingly, dopamine production, motor speed and executive functions covaried with all the other neuropsychological tests (attention, motor sequencing, executive function, language and memory). This dopaminergic motor- mental ability appeared to precede the onset of more abstract sequential functions (reasoning) measured only by the Raven Test of Matrixes.

Conclusions: : 5D and 20F are Language-Independent Tests of Recurrent Rapid Reading appropriate for used in Quechuan and in Castilian; and they are closely related to dopaminergic function. Speed of processing, span and length of attention, inhibition and flexibility covaries with all nauropsychological tests, except abstract reasoning, which appears outside this basic dopaminergic area of motor-and-mental-biological-effort.

Correspondence: *Manuel A Sedo, 9Ingleside Rd, Natick, MA 01760. E-mail: manuel@sedo.net*

C. JAYARO & M. MORENO DE IBARRA. Measurement of Academic Maturity, Executive Control and Pervasive Developmental Diagnosis in Venezuela, Through Rapid Recurrent Reading Tests.

Objective: FIVE DIGIT TEST (5DT) involves rapid recurrent reading of a few visual icons, converting them into series of words: these words are obtained through cognitive rules of increasing cognitive complexity, that explore both the psychomotor readiness of the subjects (parts 1-2) ; and their frontal executive controls. (parts 3-4). The <peaked> and assymmetrical curves of response times add to the discrimination power, sending the scores of control and clinical subjects in opposite directions. The test can also be produced the different languages (English, Spanish., etc) which may be appropriate for multicultural and multilingual comparisons.

Participants and Methods: Tomasetti and Tracanelli (2003), compared the 5DT and the Stroop on 192 schoolchildren 7-to-11 in two social classes; and 24 autistic schoolchildren. Bruno and Kilzi (2010) compared 5 trios of high-functioning autistic, ADAH and normal children with the FDT and the Evaluación Neuropsicológica Infantil (ENI), Ibarra & Javaro (2010) mapped 9 undergraduate students 17 to 20 (including a left-handed subject), examining brain activation during the administration of the four sections of the 5DT.

Results: Scores are strictly related to age and unrelated to social status. Speed scores and accuracy scores are closely related to pathology. Scores are <peaked> and asymmetrical and separate control and clinical scores in two different zones of the scale.

Conclusions: 5DT test is a powerful test of Multisensory Reading Readiness and Executive Effort. It provides valid and reliable information about developmental disorders. It doesn't require from the subjects a particular language or particular linguistic knowledge

Correspondence: *C. Jayaro, Universidad Catolica Andres Bello, Caracas, Venezuela. E-mail:*

A. MOREIRA & J. SALVADOR-CRUZ. Executive functions and reading ability: evidence from language-independent culture-free tests.

Objective: Twenty Fruits (20F) and Five Digits (5D) are language-independent rapid-naming tests of automatic readiness and executive readiness, They have much less academic load than the TMT and the Stroop test, and allow direct comparisons between populations with diverse language, culture, and socio-educational status.

Participants and Methods: (Subjects) We tested 93 boys and girls (aged 4 to 7), excluding children who performed below the 15 percentile at the Raven's Progressive Matrices. [Writing on dictation, the child uses each sign to represent either a syllable; or a single phoneme. This allows observation of phonological maturity at much lower ages.]

(Materials) Speed and accuracy at each subtest were compared to the reading maturity stages of Emilia Ferreiro (which cannot be used in non-transparent systems like English). Student t-scores were calculated.

Results: Whatever their intellectual level, children at the higher Ferreiro level had better scores on: 5D parts 3 and 4; $p < 0.001$) and had lower error scores on parts 3 ($p = 0,02$) and 4 ($p = 0,02$). Phonologically-mature children showed higher speed on all 20F test parts ($p < 0,05$) and smaller errors counts on parts A and B ($p = 0,027$ and $p = 0,04$).

Conclusions: Speed processing, cognitive control, visuospatial search, cognitive inhibition and flexibility are essential for the development of early literacy. Executive function and reading readiness are

Correspondence: *Aline Moreira, Universidad de Minas Gerais, Belo Horizonte, Brazil. E-mail:*

J. SALVADOR-CRUZ & C. ARMENGOL. Multisensory Performance, Working Memory and Executive Performance in Rural and City-Dwelling, Mexican and Zapotecan-Speaking Children 6 To 11.

Objective: TMT diagnoses brain dysfunction by measuring the response time (delayed by visual exploration) of single and dual mental-tracking tasks". "20 Fruits" eliminates the difficulties in manual response (found by some patients) and the lack of academic routines (present in multicultural uses). "20F" uses only the oral naming of four fruits, recombined in lists of 20 numbered fruits, named twice: from automatic routine and from mental redirection. Tasks are appropriate for use in different cultural and linguistic environments.

Participants and Methods: : (Population) The production time and the accuracy of the responses was measured of two samples of children from different socio-academic level (rural and city-dwellers) and sharply different linguistic environments (Spanish and Zapotecan) in Mexico City; and in the State of Oaxaca.

(Materials) 20F was administered in Spanish to 70 city-dwellers aged 6 to 12, in seven age groups: and in vernacular Zapotecan to 70 rural children in the same ages. Speed of automatic and redirected naming helps reflects here: a) language development and educational readiness; b) span of active working memory; and c) mental self-direction and flexibility.

Results: : There were no significative statistical difference beyond the .05 level either on speed or in accuracy of production between the two linguistic and social gropups, tested in Spanish and in Zapotecan.

Conclusions: 20F is an appropriate age-related measure of multisensory work and of working memory and executive skills.

Key-words: cross-cultural, executive functions, language-independent, reading readiness, neuropsychology.

Correspondence: *J. Salvador-Cruz, Universidad Nacional de Mexico, Zaragoza, Mexico. E-mail:*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Poster Session 10: Aging, Cross Cultural Issues, Dementia and Mild Cognitive Impairment

9:00–10:30 a.m.

Aging

P. CERNIN, C. LYSACK & P. LICHTENBERG. Preliminary Support for Ecological Validity of Trail-Making Test B and Health Behaviors in Older African Americans.

Objective: Much has been documented about the ecological validity of executive functioning and functional outcome measures, such as IADLs, but little is known about executive functioning and health promoting behaviors (Hall, Elias, & Crossley, 2006).

Participants and Methods: The current study sample consisted of 65 older African Americans and examined the direct and indirect effects through path analysis of age, WRAT-3 Reading, and CVRFs (cerebrovascular risk factors) on health behaviors (sleep, diet, exercise) through TMT-B.

Results: Path analysis predicted 12% of the variance in sleep, 19% of the variance in exercise, and 15% of the variance in diet. TMT-B was significantly predictive of exercise and diet, such that poorer TMT-B scores predicted poorer diet and fewer days of regular exercise. The relationship between diet and TMT-B emerged only in the context of the path analysis, and appears to be enhanced by lower age and WRAT-3 Reading score.

Conclusions: This study provides preliminary support for the relationship between common executive functioning and health behavior measures in older African Americans and extends the information available on ecological validity of such measures. It also emphasizes the importance of educational quality when interpreting neuropsychological measures.

Correspondence: *Paul Cernin, Ph.D., Geriatric Psychiatry, UCLA, 300 Medical Plaza, Suite 2412, Los Angeles, CA 90095. E-mail: pcernin@mednet.ucla.edu*

A.R. FLORIAN, S.A. ROGERS & D.A. LOWE. Does the Cognitive and Emotional Functioning of Older Adults Vary by Marital Status?

Objective: Previous studies have examined the relationship between social networks, particularly marital status, and cognitive and emotional functioning. Little research, however, has been conducted to investigate the particular areas of cognitive decline, which may help to explain the protective role marriage may provide in maintaining mental acuity. This study explores the relationship between marital status and cognitive functioning among older adults.

Participants and Methods: One hundred and seventy-two older adults (ages 49-104), with an average of 15.55 years of education (SD = 2.62), completed a neuropsychological battery, which included the WAIS-III Block Design, Trailmaking A and B, WMS-III Logical Memory I & II and Visual Reproduction I & II, CVLT-II, ROCF (Copy, 3', & 30'), Boston Naming Test (BNT), and Geriatric Depression Scale (GDS). On a background questionnaire, participants also reported their current marital status.

Results: ANOVA analyses revealed that those with different marital statuses had significantly different scores on Trails A, WMS-III Logical Memory II, CVLT-II Trial 5, ROCF Copy, ROCF 3' Delay, WAIS-III Block Design, BNT, and the GDS, all Fs > 3.08, ps < .04.

Conclusions: Marital status may affect the cognitive and emotional performance of older adults. In general, older adults who are single show the greatest cognitive difficulty, with lower scores in processing speed, verbal memory, and visuospatial reproduction. Older adults who are widowed show better processing speed than those who are single, but their visual memory resembles those who are single. Moreover, their widowed status seems to adversely impact their visuospatial construction, verbal learning, and confrontation naming relative to those who are married. This suggests that marriage, including those that end in divorce, may serve as a buffer against cognitive decline. More research is needed to determine how and when these relationships might play a critical role in maintaining mental acuity later in life.

Correspondence: *Ashley R. Florian, Psychology, Westmont, ms#1388, 955 La Paz Rd., Santa Barbara, CA 93108. E-mail: aflorian@westmont.edu*

R. GAVETT, E. ROGALSKI, M. MESULAM, C. GEULA & S. WEINTRAUB. WAIS-III Profiles in SuperAgers.

Objective: "Having a senior moment" is a euphemism used by many older people to refer to the well-documented, "normal" changes in cognitive function associated with aging. The Northwestern SuperAging program is studying a cohort of individuals over age 80 who have maintained a high level of memory performance and social and intellectual engagement. The present study represents an initial probe into this less-typical cognitive aging trajectory in an analysis of WAIS-III performance to identify cognitive factors related to the exceptional memory in this cohort.

Participants and Methods: 24 individuals aged 80 years or older were included in this study because they obtained episodic memory scores at least average for a 50-year-old and were at least normal for their age on the Boston Naming Test, Categorical Fluency, and Digit Span. SuperAgers (SA) were administered the WAIS-III, and raw scores for each subtest were compared to age-appropriate norms and also to norms for 45-54 year olds (i.e. middle-aged norms) using t-tests.

Results: The SA scored significantly higher than middle-aged and age-appropriate norms on the Vocabulary and Information subtest ($p < .01$). On Arithmetic, Letter-Number Sequencing, Digit Span, Similarities, and Matrix Reasoning, SA scored significantly higher than age-appropriate norms ($p < .01$), but were not significantly different from middle-aged norms. SA scored significantly lower than middle-aged norms on Digit Symbol, Symbol Search, Picture Completion, and Block Design ($p < .01$).

Conclusions: Octogenarians with better than average memory performance exhibit the "normal" age-related decline in processing speed and perceptual organization. However, working memory, executive function, and verbal comprehension scores are similar to normal performance for a 50 year-old suggesting that these domains are important for the maintenance of high levels of memory functioning with aging.

Correspondence: *Rebecca Gavett, Northwestern University, 320 E Superior St., Searle-11-450, Chicago, IL 60611. E-mail: r-gavett@northwestern.edu*

S.J. HEVERLY-FITT, E. STAMBROOK, A. LYON, C.C. PRICE, O. SELNES, S. RATCLIFFE, T. FLOYD & T. GIOVANNETTI. All Vascular Risk Factors Are Not Created Equal.

Objective: This study examined the association between vascular risk factors in older adults and executive control/processing speed. We hypothesized that the sum of vascular risk factors would more strongly predict test performance than any single or subset of risk factor(s).

Participants and Methods: Older adults (n=210; Mage = 75.61; MMMSE = 27.67) meeting criteria for a larger study on aortic stenosis/coronary artery disease were queried for 10 common vascular risk factors (peripheral vascular disease (PVD), hypertension, etc.). Tests of processing speed/executive control were administered: Trail Making Test-B, Mental Control -Boston Revision, COWA, Digit Symbol, Digit Span-Backwards. Two regressions were run for each test: 1) only the total sum of risk factors as the predictor and 2) all 10 individual risk factors as predictors.

Results: Regressions including only the total sum of vascular risk factors did not significantly predict test performance more than regressions involving individual risk factors. Aside from age, which was a significant predictor for all tests (p's < .05), significant vascular risk factors varied by test (Mental Control R2adj = 0.14, sig-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

nificant predictors – age, hypertension, coronary artery disease (CAD), high cholesterol; COWA R2adj = .05, significant predictor - age; Digit Symbol R2adj = 0.31, significant predictors - age, PVD, diabetes; Digit Span backwards R2adj = .06, significant predictors- age, hypertension; Trails B R2adj= 0.31, significant predictors - age, PVD, COPD).
Conclusions: The sum of vascular risk factors is not as critical for explaining cognitive test performance as a subset of specific risk factors, including age, PVD, CAD, and others. Vascular risk factors may explain the most variance for tests of motor/speeded processing (e.g. Digit Symbol, Trails B). The specific subset of vascular risk factors associated with cognitive performance may vary considerably by task, suggesting different risk factors may impair cognition through a variety of neurovascular mechanisms.
Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

A.K. HOLLAND, A. SMITH, S. NEWTON, B. OBI-JOHNSON, J.E. CARMONA & D.W. HARRISON. Examining Changes in Regulation of Parasympathetic Tone as a Function of Age and Performance on a Left-Lateralized Cognitive Task Before and After Undergoing Digestive Stress.
Objective: Diminished capacity of the left hemisphere has been associated with higher systolic blood pressure (SBP). Changes in left cerebral activation as a result of digestive stress exposure as a function of age have not been examined. The current experiment builds on existing knowledge by examining changes in verbal fluency and magnitude of left cerebral activation as a function of age and exposure to digestive stress.
Participants and Methods: Eleven younger (ages 18-26) and 6 older (ages 55-85) completed the Controlled Oral Word Association Task (COWAT) after fasting for a minimum of 4 hours, and 35 minutes after consuming a sandwich. To assess changes in parasympathetic tone, SBP measures were taken before and after each administration of the COWAT.
Results: A main effect for Age was found ($F(1, 15)=19.94$, $p<.005$), indicating that older women had a higher SBP than younger women across the first and second administrations of the COWAT. Moreover, an Age x Condition interaction was found ($F(1, 15)=8.3$, $p=.01$), indicating an increase in SBP for older but not younger women after undergoing digestive stress. For the number of rule violations made on the COWAT, an Age x Condition interaction was found ($F(1, 15)=6.54$, $p<.05$), indicating that older but not younger women showed an increase in rule violations on the COWAT after undergoing digestive stress.
Conclusions: Older adults demonstrated a diminished capacity to regulate sympathetic tone and digestive stress concurrent with verbal fluency performance. These results support that left frontal lobe function changes in dual concurrent task conditions as a function of age.
Correspondence: *Alissa K. Holland, Ph.D., Psychology, University of South Carolina Lancaster, 476 Hubbard Drive, Lancaster, SC 29721. E-mail: akhollan@mailbox.sc.edu*

S. JURICK, G. WEISSBERGER, A. HUYNH, D.C. DELIS, D.P. SALMON & M.W. BONDI. Quantitative and Qualitative Features of List Learning as Predictors of Global Cognitive Decline.
Objective: Alzheimer's disease (AD) causes significant neural dysfunction prior to the manifestation of clinical symptoms and identification of prodromal markers of AD can be important for treatment interventions. Poor episodic memory is a well-established and reliable predictor of subsequent global cognitive decline, but the particular aspects of memory performance underlying this relationship are less well-known. The goal of the present study was to identify quantitative and qualitative measures from the California Verbal Learning Test (CVLT) that predict global cognitive decline by comparing key memory measures in non-demented elderly that did or did not demonstrate subsequent cognitive decline.
Participants and Methods: Decliners (n=18) demonstrated at least a 6-point decline on the Dementia Rating Scale (DRS) within 9-15 months compared to non-decliners (n=32) who did not. Groups were matched on age, gender, education, and DRS total score in the year prior to decline. Group differences on short and long delay free and cued recall, false positive errors in recognition, and number of intrusions were investigated.
Results: Decliners recalled fewer words than non-decliners in the year prior to decline on both free and cued recall conditions ($p<.01$). Decliners also demonstrated more false positive errors on the recognition memory test ($p<.01$). Although non-significant, trends suggested that decliners were more prone to interference and intrusions than non-decliners.
Conclusions: Results demonstrate that both quantitative and qualitative features of list learning performance are associated with subsequent global cognitive decline. Understanding the qualitative processes underlying episodic memory deficits may be useful for preclinical identification of further cognitive decline.
Correspondence: *Sarah Jurick, VA San Diego Healthcare System, 3350 La Jolla Village Drive, 116B, La Jolla, CA 92161. E-mail: smjurick@gmail.com*

H. KELLY & M. FERNANDES. Effect of Encoding Context on Word Recognition in Younger and Older Adults.
Objective: We examined how explicit encoding instructions for visual context information, paired with unrelated target words, affected later recognition of the target words presented alone, in younger and older adults.
Participants and Methods: Experiment 1 and Experiment 2 both had 30 young and 30 older adults.Participants viewed 25 image/word pairs while answering an orienting question about the context. Participants then performed a recognition memory test for the words.
Results: Experiment 1 demonstrated that in both age groups, encoding instructions to explicitly make a link between simultaneously presented context (neutral scenes) and target word enhanced later recognition of the words, compared to deep or shallow levels of processing (LoP) instructions. Results suggest that engaging in elaborative and integrative processes, when encoding neutral contextual and target information, improves memory performance in both younger and older adults. In Experiment 2, when emotionally salient context scenes were paired with target words during encoding, memory was higher overall, compared to Experiment 1, in both age groups. Notably, there was no age difference in memory for words following the shallow and deep LoP conditions, and only in the binding condition did younger adults outperform older adults. Results suggest that emotionally salient context may uniquely assist older adults' memory.
Conclusions: Our study shows that 1) active binding of visual context to target information during encoding enhances memory, and 2) in older adults, emotionally salient visual context, which accompanies target information, readily boosts memory for target information.
Correspondence: *Harm Kelly, University of Waterloo, 91 Concession St, Cambridge, ON N1R 2H2, Canada. E-mail: hkelly@uwaterloo.ca*

L.N. LALWANI, M. JURADO, M. SERRANO, M. MONROY, R. QUISPE & M. ROSSELLI. The Effects of Demographic Variables on Differential Strategy Usage in Addition Problems among Cognitively Normal Adults.
Objective: This study examined the influence of age and gender in the strategy selection for solving simple and complex arithmetic problems. It was hypothesized that older adults would use a similar number of strategies to solve simple problems but fewer strategies to solve complex problems than their younger counterparts. No gender differences were expected.
Participants and Methods: One hundred and thirty two cognitively normal individuals, (86 females,) were grouped into three age groups: <35, 35-55, and >55. Instruments included the Arithmetic WRAT-R, 45 two-digit simple and complex arithmetic problems in which they would self-select strategy use, and additional 32 two-digit problems in which participants were assigned strategies.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Results showed no significant differences between strategies across the age groups for simple or complex problems. Columnar retrieval was used to solve at least 65% of the problems regardless of age group or problem complexity. There were significant gender differences for strategies used on simple and complex problems in the two older groups. Specifically, usage of rounding both operands down and direct retrieval was used more frequently by males. Females in the older age group used columnar retrieval significantly more on simple problems than their male counterparts.
Conclusions: It was concluded that age alone did not limit strategy selection; rather older adults more efficiently used diversified strategies, with females more likely to use a single strategy for problem solving. Limitations of the study are discussed.
Correspondence: *Laxmi N. Lalwani, Florida Atlantic University, 3200 College Avenue, Davie, FL 33314. E-mail: llalwan1@fau.edu*

A.K. LEE, L.K. PHILLIPS, J.R. WOLKIN, A. HOLLIS, L. KAPUST & M. O'CONNOR. The 90 Year Old Driver: The "Oldest Old" is the New "Old"
Objective: Life expectancy studies have highlighted an emerging group of very old adults. Research studies have shown that the oldest-old (over age 90) are unique and that factors predictive of mental deterioration in younger adults cannot be extrapolated for use in the oldest-old. To date, investigations of driving fitness have not included the oldest-old driver. We cannot be certain that decision rules used to determine driving competence in younger individuals apply to this group. In this study, we examine whether 90+ year-old drivers differ substantively from their 80-year-old counterparts using cognitive and motor tests predictive of road test outcome.
Participants and Methods: Twenty participants age 90 years or above (Oldest-Old) were compared with 20 participants age 80 to 85 years (Young-Old). Individuals with neurological problems, other than cognitive decline, were excluded. Groups were matched on MMSE. Participants were seen in the DriveWise Clinic at BIDMC, which provides a functionally oriented assessment of driving fitness. Specific domains of MMSE, Trailmaking Test and brake reaction time test were examined in relation to road test outcome.
Results: Results indicated a higher pass rate on the road test in the Oldest-Old. The MMSE orientation score was specifically related to outcome in the Oldest-Old but not the Young-Old. Trails B time was associated with pass/fail outcome in both groups.
Conclusions: The higher pass rate suggests that individuals who live to age 90 and who are still driving are robust from both cognitive and physical perspectives. These findings support our belief that advanced age does not preclude safe driving. Previous investigations have not supported the MMSE as a useful predictor of driving performance. However, we found that MMSE orientation items discriminated between safe and unsafe Oldest-Old drivers. These data underscore the need to focus on MMSE items. A simple set of orientation questions may identify potentially unsafe drivers who need further evaluation with a road test.
Correspondence: *Athene K. Lee, MA, MSSc, Psychology, Suffolk University, 41 Temple Street, Donahue Building, Boston, MA 02114. E-mail: athene.lee@suffolk.edu*

I.F. LEVY, M. BENJAMIN, S.D. TOWLER, J. TRINASTIC, J. SELBST, L. SEEDS & B.A. CROSSON. Semantic Inhibition in Older and Younger Adults.
Objective: Neuroimaging and behavioral studies have indicated frontal cortical areas and the basal ganglia as playing key roles in modulating inhibitory processes (Allen et al., 2008; Castner et al., 2007). This study examines inhibitory language processes and age related changes through use of a sentence completion task similar to the Hayling test (Burgess & Shallice, 1997).
Participants and Methods: Old (n=15; Mean age=76) and young (n=15; mean age=23) healthy adults underwent a neuropsychological assessment and fMRI while performing a sentence completion task. Reaction time (RT) while completing the sentence with an appropriate word (i.e. initiation task) was compared to performance when providing an unconnected response thought to require inhibition of the related words (i.e. inhibition task). Analysis of RT for the individual tasks and the number of errors was compared between groups.
Results: The old group performed significantly slower ($t=3.029$; $p<.01$) than the young group for the inhibition task although not for the initiation task. Interestingly, the old group also made significantly more errors ($t=2.093$; $p<.05$) during the inhibition task.
Conclusions: As predicted no group differences were found in the initiation task. In contrast, during the inhibition task, the old group demonstrated significantly slower performance generating unrelated responses and greater difficulty inhibiting responses related to the sentences as compared to the young group. This pattern of performance suggests that levels of brain activity and the networks involved in inhibitory language tasks may differ between these groups as well. Analysis of fMRI data is ongoing and results will supplement these findings.
Correspondence: *Ilana F. Levy, MS, Clinical & Health Psychology, University of Florida, P.O. Box 100165, Gainesville, FL 32610-0165. E-mail: ilevy@phhp.ufl.edu*

J.R. MAHONEY, J. VERGHESE & R. HOLTZER. Differential Effects of Sensory Cueing in Young and Old Adults: A Modified Attention Network Test (ANT) Study.
Objective: The differential effect of attentional-cues, presented through visual, auditory, or somatosensory modalities on reaction time (RT) has not been determined. Using a modified version of the Attention Network Test (ANT) we examined whether presenting alerting and orienting cues via visual, auditory, or somatosensory modalities differentially affected RT performance in young and old individuals.
Participants and Methods: 18 old (M=76.5 years) and 18 young (M=19 years) individuals participated in the current study. Participants were determined to be non-demented and without any medical or psychiatric conditions that could affect their performance. Participants received randomly presented visual targets (arrows pointing leftward or rightward) that were preceded by auditory, visual, or somatosensory alerting or orienting cues, and were instructed to make left or right foot-pedal responses according to the direction of the target arrow.
Results: Repeated-measures ANOVAs revealed a main effect for alerting ($p<0.05$). Contrast-analysis revealed that auditory-alerting cues ($p=0.01$) and visual-alerting cues ($p=0.03$) enhanced RT performance in both groups, whereas somatosensory-alerting cues ($p=0.37$) did not. There was a main effect for orienting cues ($p=0.005$). Further, auditory-orienting cues ($p<0.005$) and visual-orienting cues ($p<0.005$) enhanced performance in both groups, whereas somatosensory-orienting cues ($p=0.52$) did not. The interaction of group x orienting cue was significant ($p<0.001$) and revealed that younger adults benefited more from visual-orienting cues compared to older adults.
Conclusions: Alerting and orienting cues presented through both visual and auditory modalities enhanced performance in both age groups. The effect of visual orienting cues was greater in young compared to old individuals.
Correspondence: *Jeannette R. Mahoney, Ph.D., Neurology, Albert Einstein College of Medicine, Rousso Building - Room 304, 1165 Morris Park Avenue, Bronx, NY 10461. E-mail: Jeannette.Mahoney@einstein.yu.edu*

K. MANNING, E. ROSEMAN, R. MITURA, J. MCKEEVER, D. NEYENS, L. BOYLE & M. SCHULTHEIS. Stopping Behaviors in Virtual Reality Driving: Age Differences and the Relation to Cognition.
Objective: Twenty percent of all motor vehicle crashes occur while the driver is preparing to stop, or fully stopped, in a traffic lane. When tested on-road, age differences in stopping exist; older drivers demonstrate

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

more sudden stopping compared to middle-aged drivers. The cognitive abilities underlying stopping behavior in aging are not understood. The present study aimed to replicate age differences in stopping behavior using Virtual Reality Driving Simulation (VRDS) and to examine the relationship between stopping behavior and cognition.
Participants and Methods: Eight healthy middle aged adults and fifteen older adults were included. Using VRDS, participants encountered a stop sign after exiting a highway. Multiple measures of speed and braking performance were recorded and analyzed as the vehicle approached the stop sign. Cognitive tests administered included the MMSE, Trail-Making Test, Clock Drawing, and Judgment of Line Orientation.
Results: Contrary to on-road investigations, middle-aged drivers demonstrated more sudden braking compared to older drivers ($t(21) = 2.03$, $p = .054$, $d = .83$). However, consistent with prior findings, older drivers were more cautious in their use of speed ($t(21) = 1.84$, $p = .08$, $d = .77$). Correlation analyses revealed Trails A was related to speed management approaching the stop sign ($r = .66$, $p < .001$) in older drivers. No relationship between other cognitive variables and driving performance, including those tested in middle-aged adults, were observed.
Conclusions: Processing speed is related to older driver's speed management at stop signs using VRDS. Differences between variables in VRDS and on-road driving are being further explored.
Correspondence: *Kevin Manning, Drexel University, 226 West Rittenhouse Square, Apt 214, Philadelphia, PA 19103. E-mail: kjm73@drexel.edu*

C.M. PARSEY, M. SCHMITTER-EDGECOMBE, A. HULBERT & D. COOK. Effects of Normal Aging on Instrumental Activities of Daily Living in a Smart Environment.
Objective: To live independently at home, individuals need to be able to complete instrumental activities of daily living (IADL), including preparing meals, managing money and taking medications. This study investigated the ability of healthy older adults to complete eight IADLs (e.g., sweeping and dusting, cooking) within a "smart environment".
Participants and Methods: Participants were categorized into three groups: middle-aged (N=22; age 50-59), young-old (N=44; age 60-74) and old-old (N=22; age 75+). Participants were observed completing each IADL and performances were coded for overall accuracy of task completion, overall task quality, and time required completing the task.
Results: We found that the middle-aged group completed the tasks faster than both the young-old and old-old groups. The middle-aged group also showed higher task completion accuracy than the young-old group, who in turn were more accurate than the old-old group. Task quality ratings were poorer for the old-old group compared to the middle-aged group. Evaluation of qualitative task error types, which led to inaccuracy in task completion, revealed differences across the groups as well.
Conclusions: Results of this study suggest that normal aging negatively affects the quality of IADL performance in healthy older adult populations. A closer examination of the types of errors being made while completing IADLs by older adults may better inform interventions.
Correspondence: *Carolyn M. Parsey, Washington State University, 1700 NW Lamont St, Pullman, WA 99163. E-mail: carolyn.parsey@email.wsu.edu*

R.S. PRAKASH, S. HEO, M.W. VOSS, A.F. KRAMER & A. DELEON. Default-mode Network Dysfunction in Aging: Implications For Cognitive Performance.
Objective: The discovery of a coherent set of cortical regions showing activation during rest and deactivation during task has reignited an old debate in the field of neuroscience, one that questions the reflexivity of the human brain and provides evidence towards a more intrinsic functional architecture. The default-mode network (DMN) comprising of such consistent cortical regions has become a topic of increasing interest in both healthy and diseased populations. In this study, using a well-examined version of the verbal n-back task, interleaved with periods of rest blocks, we investigated whether the activation and deactivation of the cortical regions comprising the DMN moderates individual differences in cognition in a group of older adults.
Participants and Methods: 25 younger and 25 older adults were recruited for the current study and were presented with blocks of the n-back task inside the scanner, with varying levels of load, interleaved with periods of fixation. All participants also completed a neuropsychological battery to determine cognitive functioning. Activity in the DMN during periods of rest and task performance was examined for associations with cognitive functioning on the nback task and on neuropsychological measures.
Results: A direct comparison of the young and the older participants revealed both a reduction in the recruitment of the cortical regions involved in the DMN during rest and a reduction in the deactivation of these areas during active task performance in the elderly. Better performance on the n-back task, in older adults was associated with greater task-induced deactivations in the DMN during task blocks and performance on measures of general cognition was associated with greater activation in the DMN during blocks of fixation.
Conclusions: This study adds to the existing gamut of aging literature, providing evidence that the activity of the DMN is critical to cognitive functioning in older adults.
Correspondence: *Ruchika S. Prakash, PhD, Psychology, Ohio State University, 1835 Neil Avenue, Columbus, OH 43220. E-mail: prakash.30@osu.edu*

J. RAO, J. JIANG, T.M. HARRISON, S. WEINTRAUB, M. MESULAM & E. ROGALSKI. Personality Factors Associated with Preservation of Episodic Memory in SuperAgers.
Objective: SuperAgers are 80+ year old individuals who do not follow the age-associated downward trajectory in episodic memory. Examining SuperAgers' personality profiles may provide insight into their preserved cognitive abilities. Higher levels of Neuroticism are associated with an accelerated rate of cognitive decline in healthy older adults. Cross-sectional studies using the five factor model of personality (NEO-PI) find that the oldest old (80+ year olds) have different personality profiles than adults in their 50s. Conscientiousness scores on the NEO-PI have also been found to predict early stage Alzheimer's disease. In this study, we examined NEO-PI subscale scores in a cohort of SuperAgers. We hypothesized that their personality profile would be more similar to cognitively intact adults in their 50s than those in their 80s.
Participants and Methods: Twelve SuperAgers (mean age = 83; 11 females), who performed equivalently to 50-year-olds on episodic memory tests, completed the NEO-PI-R. Domain scores were compared to previously reported norms for persons in their 50s and 80s.
Results: SuperAgers demonstrated significantly less Neuroticism and greater Extraversion than has been reported for persons in their 80s. Their scores on the Extraversion and Openness scales closely resembled those of persons in their 50s.
Conclusions: In light of previous findings demonstrating a relationship between age-appropriate memory loss and changes in personality functions, we observed a dual preservation of both memory function and personality traits in our cohort of SuperAgers. It is conceivable that SuperAgers' low levels of Neuroticism and high levels of Extraversion and Openness may contribute to their preservation of episodic memory performance into very old age.
Correspondence: *Julia Rao, B.S., Clinical Psychology, Northwestern University, 320 E Superior St, Searle 11-467, Chicago, IL 60611. E-mail: jarao@u.northwestern.edu*

A. ROSEN, J. ROSEBERRY, L. GUIDOTTI BRETING, M. LANCASTER & M. SEIDENBERG. Semantic Knowledge and the Temporal Gradient in Older and Younger Adults.
Objective: The temporal gradient (TG) for young and older individuals has been infrequently studied. In this study, a young and older age group were administered a semantic priming task for recognition accuracy of famous names from different time epochs (recent and remote). We examined if semantic knowledge (SK) about the famous name facilitated performance in both young and older individuals.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: 30 young (Mage=26) and 30 older (Mage=73) participants were administered a semantic priming task composed of 48 pairs of famous names which differed by time epoch (recent and remote) and relationship (associative and unrelated). Subsequently, a standardized interview probed for semantic knowledge provided for the associative pairs. Only correct recognition trials were analyzed.
Results: The young group showed increased priming for recent famous name pairs compared to remote pairs, while the older group showed the opposite pattern [F (1,56) = 34.27, p < .001, eta2 = 0.38]. The same pattern was found for SK [F (1,58) = 21.09, p < .001, eta2 = 0.27]. For the young group, semantic knowledge was significantly related to recognition accuracy for both recent and remote names. The older did not show a similar relationship.
Conclusions: Age appears to exert a different pattern for semantic priming for recent and remote famous names. The young group and older groups also differed in the relationships between SK and recognition accuracy. Additional studies are needed to determine if these findings are associated with a general age-related differences in semantic memory access.
Correspondence: *Ariel Rosen, B.A., Psychology, Rosalind Franklin University of Medicine and Science, 3333 Green Bay Rd, North Chicago, IL 60064. E-mail: ariel.h.rosen@gmail.com*

S. VANDERMORRIS, S. SHELDON, G. WINOCUR & M. MOSCOVITCH. Neuropsychological Correlates of Problem-Solving in Normal Aging.
Objective: Functional changes in aging may be related to specific cognitive deficits. A memory deficit may hamper the ability to solve ill-defined problems (e.g., navigating socially awkward situations) that require recall of previously effective solutions. Conversely, an executive deficit may impede effective solution of well-defined problems (e.g., completing a series of errands). The present study examined the relationship of laboratory measures of ill-defined and well-defined problem-solving to episodic memory and executive functioning.
Participants and Methods: Participants were 8 healthy older adult volunteers (mean age=77, education=14.8; MMSE=28.5). Ill-defined problem-solving was assessed using the Means-End Problem-Solving Procedure, and well-defined problem-solving using the Tower of London and the Brixton Task. Clinical measures of executive functioning and memory included Trails B, FAS, Stroop, and HVLT-2. Autobiographical memory was assessed using the Autobiographical Interview.
Results: Correlation analyses revealed medium to large, statistically significant associations between executive measures and well-defined problem-solving, such that higher executive ability was associated with more effective problem-solving. Executive ability was positively associated with ill-defined problem-solving efficacy, but to a lesser degree. Autobiographical memory was positively associated with ill-defined problem-solving efficacy and the quality of detail produced in solving ill-defined problems. Clinical measures of episodic memory were not significantly associated with either type of problem-solving.
Conclusions: Results provide evidence for differential associations between executive and memory measures in relation to specific types of problem-solving tasks in older adults. A more complete understanding of the cognitive determinants of functional change in aging is critical for the development of behavioral interventions targeting preservation of functional ability in at-risk older adults.
Correspondence: *Susan Vandermorris, PhD, Rotman Research Institute, Baycrest, 3560 Bathurst St, Toronto, ON M6A 2E1, Canada. E-mail: svanderhill@rotman-baycrest.on.ca*

T.D. VANNORSDALL, M. CARLSON, Q. YU & D.J. SCHRETLEN. Serum Uric Acid and Mild Cognitive Dysfunction in the Women's Health and Aging Study-II.
Objective: Serum uric acid (SUA) is a powerful antioxidant that may have neuroprotective properties, and some studies have found that greater SUA is associated with better cognition in the elderly. However, SUA is also associated with numerous vascular risk factors that increase risk for dementia. We previously demonstrated that mildly elevated SUA is a biomarker of cognitive dysfunction in the elderly, with associations that are mediated by cerebral ischemic burden. Here we sought to replicate our cognitive findings in a larger sample, while also assessing the potential contribution of inflammatory processes.
Participants and Methods: The Women's Health and Aging Study-II is a prospective investigation of initially healthy, elderly, community-dwelling women who underwent repeated cognitive testing and blood laboratory studies. We examined 364 women whose SUA was in the normal range. In a series of linear regressions using cross-sectional data, SUA was regressed on cognition after controlling for demographics, vascular risk factors, diuretics, and inflammation.
Results: Higher SUA was associated with significantly worse performance on tests of processing speed and divided attention/working memory. Inflammatory markers, while positively associated with SUA, did not add to the prediction of cognitive functioning in these models.
Conclusions: Findings provide further evidence that mildly elevated SUA is associated with poorer cognition in the elderly. Inflammatory processes did not account for the detrimental association of SUA with cognition even after removing the effects of numerous vascular risk factors. Ongoing longitudinal analyses will further clarify the role of SUA as a marker of cognitive decline in late life.
Correspondence: *Tracy D. Vannorsdall, Ph.D., Psychiatry, Johns Hopkins University School of Medicine, 600 N. Wolfe St., Meyer 218, Baltimore, MD 21224. E-mail: TVannor1@jhmi.edu*

S.I. DEV, L.R. CLARK, T.T. LIU, G.G. BROWN, J.T. GRAVANO, A. MCCAULEY, M.W. BONDI & C. WIERENGA. Reduced Cerebral Blood Flow is Associated with Poorer Cognitive Performance in Younger and Older Adults.
Objective: Age-related reduction in cerebral blood flow (CBF) has been reported, but few studies have examined associations between CBF changes and cognition. We hypothesized that reductions in CBF in the aging brain would correlate with neuropsychological measures of cognitive slowing.
Participants and Methods: Whole brain resting CBF was measured using pulsed arterial spin labeling (ASL) MR imaging in 40 older and 17 younger education-matched cognitively normal adults. A voxel-wise group comparison was conducted on quantified gray matter CBF and neuropsychological performance was correlated with CBF in clusters showing significant group differences.
Results: Older adults had decreased CBF in multiple regions. Across age groups, letter fluency was positively correlated with CBF in language-related brain regions, including the right caudate, anterior temporal pole and bilateral medial prefrontal cortex. CBF in these regions, along with bilateral parietal cortex, left posterior cingulate and middle temporal gyrus, was also correlated with improved performance on visuomotor sequencing (Trails B). Verbal list learning was positively correlated with CBF in the left hippocampus and verbal recall/recognition was associated with increased CBF in the left middle temporal gyrus.
Conclusions: Results demonstrated that older adults had widespread reductions in CBF relative to young adults. Decreased CBF in neural regions implicated in language, executive function, and memory was associated with poorer performance in these corresponding cognitive domains. Findings provide support for the role of cerebrovascular function in cognitive aging and the ability to distinguish such changes using ASL.
Correspondence: *Christina Wierenga, Ph.D., UCSD, 3350 La Jolla Village Drive, 151B, San Diego, CA 92161. E-mail: cwierenga@ucsd.edu*

R.F. ZEC, S. FRITZ, S. KOHLRUS, R. ROBBS & T. ALA. Animal Word Fluency: Age Effects and Reliable Change Index Scores.
Objective: The objective was to study the effects of age on animal fluency in a large sample of "non-demented" older adults and to determine

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Reliable Change Index (RCI) scores for participants in four age groups (50-59, 60-69, 70-79, 80-89) who had follow-up testing within 9-15 months of the baseline. RCI scores indicate how much a person's animal fluency score must decrease to be significant at the 95% confidence level.
Participants and Methods: Participants were older adults without dementia. Animal fluency was administered to 1070 "normal" older adults (age 50-89) as part of a comprehensive neuropsychological battery in a study of cognitive aging. The mean age for the entire sample was 68.42 years, percent female=69.5%, mean MMSE=28.9, and mean education=14.6. There were 177 participants in their 50s, 408 in their 60s, 370 in their 70s, and 115 in their 80s. Mean MMSE scores for the four age groups were 29.1, 29.1, 28.9, and 28.4. The mean ages were 55, 65, 74, and 83 years. Mean education was 15.0, 14.5, 14.5, 14.4 years.
Results: Significantly poorer mean animal fluency scores were found with successively older age groups: the mean score for each of the four age decades (50s, 60s, 70s, 80s) were 20.49+/-5.09, 18.97+/-4.93, 17.26+/-4.36, and 15.87+/-4.56. The RCI for the total group was 7.85 indicating that an older adult's animal fluency score must decrease by 8 or more points to be significant, that is, to be 95% confident that the decrease was not due to chance. RCI scores for the four age groups (50s, 60s, 70s, 80s) were 9.20, 8.37, 7.15, and 5.15, respectively. A minimum 10-point decline on animal fluency is needed to reach statistical significance for persons 50-59, 9-point decline for those 60-69, 8 for those 70-79, and 6 for those 80-89.
Conclusions: Significantly poorer mean animal fluency scores were found with successively older age groups. An annual decline of at least 8 points on animal fluency is generally needed for there to be a statistically reliable decline for an individual older adult.
Correspondence: *Ronald F. Zec, Ph.D., Neurology, SIUSOM, P.O. Box 19643, Springfield, IL 62794. E-mail: rzec@siumed.edu*

M. BALSA, R. CORREIA-PASSINHAS, Y. MOLINA, A. NIETO & J. BARROSO. 8/30 Spatial Recall Test as a Useful Tool to Assess Visuospatial Memory and Learning in Normal Aging.
Objective: Visuospatial memory has not been profoundly studied in normal aging, not only because the major importance given to verbal memory, but also due to the lack of available tests to assess it. We aimed to study the utility of 8/30 Spatial Recall in order to firstly identify visuospatial learning and memory déficits in aging. Secondly, we will compare impairment prevalence according to the different indices of the test, as well as analyze the consistency among them.
Participants and Methods: Participants were 77 healthy nondemented persons of 60-84 years old (61% females). The 8/30 SRT, an adapted version of the 7/24 SRT (Barbizet and Cany, 1968) was administered. The following measures were selected: Total learning (correct responses on the five learning trials); Short-term recall (STR); Long-term recall (LTR). Subjects with a z score < -1.5 were considered as impaired
Results: 6,5% of participants were impaired in Total Learning. A significant higher percentage was impaired in STR (19,5%) and LTR (18,2%) [t=3.368; p<0.001; t=3.172; p<0.002, respectively]. We found no differences in the proportion of subjects classified as impaired on STR and LTR (t=0.331; p=0.741). Consistency analysis showed a significant relationship between Total Learning and SRT (α^2= 14.466; p=0.000) and also between SRT and LTR (α^2= 29.438; p=0.000)
Conclusions: 8/30 appears to have utility for detecting visuospatial learning and memory deterioration in nondemented elderly population. Participants with an impaired performance in the learning curve also remain impaired in the later short and long term recalls. Nonetheless, after delay there is an increase in the number of participants showing memory deficits without changes between the short and the long term trials. Thus, the duration of the delay do not affect the participant's recall. It suggests that the information loss take place in an early stage during its rehearsal.
Correspondence: *Jose Barroso, Ph D, University of La Laguna, Facultad de Psicologia, Campus de Guajara, La Laguna 38205, Spain. E-mail: jbarroso@ull.es*

Dementia (Subcortical, Specific Disorders, MCI, etc.)

N. JIMENEZ, R. CORREIA-PASSINHAS, D. FERREIRA, A. NIETO & J. BARROSO. Operationalizing aMCI Amnestic Criterion: a Comparison of Different Verbal Memory Measures (MMSE, CVLT and Logical Memory Tests).
Objective: The memory impairment criterion in aMCI diagnosis has been operationalized in different ways showing considerable variability regarding the applied measures and cutoff scores. We aimed to explore how the prevalence of such a diagnosis might rely on the tests or index used to assess memory function.
Participants and Methods: Folstein's MMSE, the Spanish version of CVLT (TAVEC), and the Logical Memory –LM-subtest (WAIS-III) were administered to 77 literate-low educated elders (60+). We added a delayed recall in MMSE. Fifteen minutes after this test was completed participants were asked to recall the three words previously learned. A semantic guided and a recognition trial followed the spontaneous delayed recall. In every long term measure, a score below -1.5 SD was considered as an impaired performance and thus indicative of aMCI.
Results: MMSE identified 16 participants (22%) as aMCI patients, while TAVEC pointed out 7 (9%) and LM only 3 (4%). Thus while TAVEC and LM did not differ in identifying aMCI patients, MMSE shows a significant greater proportion of memory impaired participants than TAVEC (t72=-2.242; pΛ0.05) and LM (t70=-3.810; pΛ0.05). Moreover, when TAVEC and LM are qualitatively compared it turns that only 1 participant is classified as aMCI in agreement with the two measures.
Conclusions: Our results confirm that aMCI memory impairment criterion depends in such a extent on the test used to assess it. Variability is apparent not only in impaired scores distributions, but also in a low classification agreement. Thus our results claim for an international consensus regarding memory impairment in aMCI diagnosis criteria as the key to reach a reliable research in aMCI diagnosis, characterization and outcomes.
Correspondence: *Jose Barroso, Ph D, University of La Laguna, Facultad de Psicologia, Campus de Guajara, La Laguna 38205, Spain. E-mail: jbarroso@ull.es*

M. BALSA, R. CORREIA-PASSINHAS, A. MACHADO, A. NIETO & J. BARROSO. Operationalizing aMCI Amnestic Criterion Using the Visual Reproduction Subtest from WMS-III.
Objective: Studies on aMCI memory impairment operationalization based in non-verbal memory measures are scant. We aim to study changes in aMCI prevalence according to the different measures of the Visual Reproduction subtest (WAIS-III), as well as the consistency among those indices in classifying participants as impaired or preserved.
Participants and Methods: The sample consisted in 77 older, 47 males and 30 females (ages 60 to 84). Following measures were included in our study: Visual Reproduction I (VR-I; immediate memory), Visual Reproduction II (VR-II; delayed recall) and Visual Recognition (VR-R). Subjects with a z score < -1.5 were assigned to impaired group.
Results: VR-I and VR-II identified 9,10% and 3,9% of participants as aMCI patients respectively. The percentage of impaired subject was similar for both indices (t=1,424; p=0,159) but the consistency analyses revealed that there were no classification agreement between them (α^2= 2.173; p=0.255). Although VR-II and VR-R agreed in the classification into aMCI vs preserved subjects (α^2= 7.826; p=0.044), VR-R shows a significant greater proportion of visual memory impaired participants (aMCI) than VR-II (13,00%)
Conclusions: Our results highlight that in aMCI diagnosis different measures of Visual Reproduction subtest are not exchangeable in terms of aMCI detection. The low classification agreement between the immediate and delayed memory recalls has a major importance. The fact that a recognition measure detects a greater proportion of aMCI subjects is an unusual finding according to verbal memory precedents. Therefore, further research is needed to explain this result. Taken together our findings claim the relevance of including non verbal memory measures when exploring early cognitive signs of aMCI and DTA.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Jose Barroso, Ph D, University of La Laguna, Facultad de Psicologia, Campus de Guajara, La Laguna 38205, Spain. E-mail: jbarroso@ull.es*

R.E. AHL, A. BEISER, S. SESHADRI, S. AUERBACH, P.A. WOLF & R. AU. Defining MCI in the Framingham Heart Study Offspring: Education vs. WRAT-based Norms.

Objective: Psychometric definitions of mild cognitive impairment (MCI) based on a single cross-sectional assessment typically use cut-off levels set at 1.5 standard deviations (SDs) below age- and education-adjusted norms, assuming that the education adjustment accounts for pre-morbid abilities. However, non-cognitive factors impact educational attainment, potentially leading to incorrect categorization as MCI. We examined whether using an adjustment based on reading performance (Wide Range Achievement Test [WRAT] Reading) improved MCI diagnostic accuracy.

Participants and Methods: 2,485 Framingham Offspring (mean age 62 + 9; 54% F) underwent tests of Memory (Logical Memory + Visual Reproductions), Executive Function (Trails B), and Abstraction (Similarities) as part of a neuropsychological test battery. Domain-specific test scores were regressed onto age and WRAT score, or education (as four categories), to define MCI (standardized residuals < -1.5). Survival analyses were used to relate baseline MCI to incident dementia.

Results: The two MCI definitions differed most for tests of Memory and Abstraction, and for the lowest and highest education groups. For Memory, 9.6% of participants without high-school diplomas and 4.7% of college graduates were identified as MCI by only one method. For Abstraction, corresponding figures were 7.3% and 4.9%, respectively. Memory and Executive Function MCI were associated with incident dementia using either definition. MCI-level Abstraction performance was associated with incident dementia using the WRAT definition (HR = 4.4, p = .008), but not the education definition (HR = 1.6, p = .529).

Conclusions: WRAT-based norms may improve MCI diagnostic accuracy, especially among those with either low or high levels of education.

Correspondence: *Richard E. Ahl, Framingham Heart Study/Boston University, 17 Forest St, Apt #24, Cambridge, MA 02140. E-mail: rahl@bu.edu*

M. AMICK & A. CRONIN-GOLOMB. Web-based assessment of visual and visuospatial symptoms in Parkinson's disease.

Objective: The majority of individuals with Parkinson's disease (PD) experience visual and visuospatial dysfunction that negatively impacts functional independence. To promote assessment of these often overlooked symptoms, we developed an on-line survey and evaluated its reliability and validity.

Participants and Methods: The PD Vision Questionnaire, a self-report measure of visual and spatial symptoms in PD, was adapted for internet administration. The questionnaire was administered in both paper and web-based formats within two months to 23 non-demented patients with PD of mild to moderate motor severity (Hoehn and Yahr stages 1.5-3) and 19 normal control adults (NC). Reliability was assessed by comparing responses across formats. Participants also completed objective measures of basic vision (acuity, contrast sensitivity, and motion perception) and visuospatial cognition (judgment of line orientation, line bisection, and map reading) to evaluate content validity.

Results: Overall, individuals with PD endorsed more severe visual and visuospatial symptoms than did NC (p =0.016). Across groups, responses on the web- and paper-administered questions were significantly correlated (r=0.51, p =0.001). Self-reported vision and visuospatial impairment was negatively correlated with performance on objective measures of vision and spatial cognition (p <0.01 for each).

Conclusions: The findings suggest that web-based administration is a reliable and valid method of assessing visual and spatial symptoms commonly endorsed by individuals with PD. Web-based administration may be especially useful in expanding the research pool of individuals with PD as well as normal older adults to include those who are not able to participate in lab-based research because of time constraints or mobility issues.

Correspondence: *Melissa Amick, PhD, VA Boston Healthcare System, 150 S. Huntington Ave (151C), Boston, MA 02130. E-mail: Melissa.Amick@VA.gov*

P. BATISTA, J. CEREJEIRA, H. FIRMINO & M. SIMÕES. Misplacing Objects in Mild Cognitive Impairment: the role of the Misplaced Objects Test.

Objective: Misplacing objects is a common complaint both in elderly healthy subjects and in patients with pre-clinical dementia. Currently there are no systematic descriptions of this symptom and the neuropsychological domains implicated in this disturbance remain poorly understood. The Misplaced Objects Test (MOT) is a computerized task of object location recall, developed to assess visual memory processes involved in everyday life. The objectives of this study were (1) to assess the utility of MOT in discriminating subjects with early stages of cognitive impairment from normal elderly subjects; and (2) to clarify the cognitive processes underlying misplacing.

Participants and Methods: 20 consecutive patients, aged between 55 and 85 years with a diagnosis of Mild Cognitive Impairment (MCI) and 20 aged-matched controls, were recruited at Psychiatric Department of Coimbra University Hospitals. Each participant in the study was assessed with MOT and with a comprehensive neuropsychological battery.

Results: Patients with MCI performed significantly worse than controls in MOT (9.90±2.05 vs. 15.80±2.09) with a lower rate of retrieval in trial 2 (28% vs 82%). Scores on the MOT significantly correlated with the MMSE in control group as well as with Paired Associated Learning Test and with Digit-Symbol Coding. In MCI group MOT performance correlated with Verbal Fluency Tests.

Conclusions: MOT discriminated patients with MCI from normal elderly subjects. In MCI, performance in MOT involves verbal memory, executive functions and psychomotor speed, depending mostly on controlled processing and attention.

Correspondence: *Pedro Batista, Psychiatry, Coimbra University Hospitals, Praceta Mota Pinto, Coimbra 3000, Portugal. E-mail: batista.ph@gmail.com*

B.M. BETTCHER, T. GIOVANNETTI, P. BRITNELL, A. SIDEROWF, M. GROSSMAN & D.J. LIBON. Neurodegenerative Disorders and Everyday Error Monitoring: A Pilot Study Comparing Parkinson's Disease, Parkinson's Disease Dementia, and Alzheimer's Disease.

Objective: Error monitoring is bolstered by several neural substrates and neuropsychological processes, with recent studies identifying the mesencephalic dopaminergic system as an important component of the action error handling process. This study aimed to evaluate error monitoring in individuals with Parkinson's Disease (PD) and PD Dementia (PDD); results were compared to patients with Alzheimer's Disease (AD).

Participants and Methods: PD (n=18), PDD (n = 20) and AD (n = 20) participants performed three everyday tasks (e.g. make toast, coffee, etc). Videotaped performances were coded for the following monitoring variables: Proportion of Errors Detected, Proportion of Errors Corrected (of the one's detected), and Error Correction Time Frames (e.g. Preemptive, Immediate, Delayed).

Results: PD participants generated fewer errors (controlling for age; F(1,35) = 11.25; p = .00), and also detected (F (1,35) = 5.43, p = .02) and subsequently corrected more errors (t = 2.29, p = .03) than participants with AD. PDD patients also demonstrated a trend toward detecting fewer errors than individuals with PD (Proportion Detected MPDD = 38.50%, MPD= 49.91%;; p = .16), but more errors than individuals with AD (M = 26.93%, p = .08). Although PDD and AD participants did not differ in error correction time frames, PD participants produced proportionally more immediate corrections than PDD and AD participants (t = 1.79, p = .08; t = 2.25, p = .03), and fewer delayed corrections than PDD participants (t = -2.14, p = .04).

Conclusions: Differential diagnostic presentations may affect the action error handling processes uniquely; although dementia patients with

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

dopaminergic dysfunction (PDD) evidenced low error detection rates, AD participants demonstrated the most impoverished error monitoring profile (relative to PD and PDD). These findings underscore the importance of tailoring error monitoring interventions to specific underlying deficits and/or specific neurodegenerative disorders.
Correspondence: *Brianne M. Bettcher, PhD, Temple University, 1210 Bellevue Ave, #207, Burlingame, CA 94010. E-mail: bettcher@temple.edu*

O. BEZDICEK, T. NIKOLAI, M. VYHNALEK, M. PREISS, J. BELACEK & E. RUZICKA. Rey Auditory Verbal Learning Test Differentiates between Normal Aging, Amnestic MCI, Alzheimer's and Parkinson's Disease Dementia.

Objective: To prove that performance in verbal learning and memory test (Rey's Auditory Verbal Learning Test – RAVLT) is a useful marker of different types of dementia and amnestic MCI.

Participants and Methods: RAVLT was administered as part of a complex neuropsychological battery in 244 elderly control subjects (NC), 94 subjects with amnestic Mild Cognitive Impairment (aMCI), 34 subjects with mild Alzheimer's disease (AD), 36 subjects with Parkinson's disease without dementia (PD) and 16 subjects with PD dementia (PD-D). Performance on RAVLT was compared between groups after removing the variance for age, education and gender (ANCOVA).

Results: NC performed better than did patients with aMCI, AD, PD and PD-D on several measures of RAVLT: 1) immediate recall ($p < 0.001$ for aMCI, PD-D and AD; $p < 0.05$ for PD); 2) verbal learning ($p < 0.001$ for aMCI and AD; $p = 0.38$ for PD, and 0.12 for PD-D); 3) verbal forgetting ($p < 0.05$ for aMCI, AD and PD; $p = 0.35$ for PD-D); 5) learning curve ($p < 0.001$ all clinical groups and trials); 6) retention ($p < 0.01$ all clinical groups).

Conclusions: These findings indicate that RAVLT may help to distinguish between specific memory performance patterns in NC, aMCI, AD, PD and PD-D.

Acknowledgment: Supported by Charles University grants GAUK No. 251196 118410 and VZ0021620849.
Correspondence: *Ondrej Bezdicek, M.S., Dept. of Neurology, Charles University in Prague, 1st Faculty of Medicine and General Teaching Hospital, Katerinska 30, Praha 128 21, Czech Republic. E-mail: ondrejb@yahoo.com*

J. SMITH, K.A. NIELSON, J.L. WOODARD, P. ANTUONO, M. SEIDENBERG, S. DURGERIAN, M.D. VERBER, A.M. BUTTS, N.C. HANTKE, M.A. LANCASTER & S.M. RAO. Physical Activity is Associated with Enhanced BOLD Semantic Memory Activation in Amnestic Mild Cognitive Impairment.

Objective: Recent evidence suggests that physical activity (PA) may help preserve semantic processing in older adults diagnosed with mild cognitive impairment (MCI) (Baker et al., 2010), and that PA may enhance semantic memory brain activation, particularly in cognitively intact older adults at genetic risk for Alzheimer's disease (AD) (Smith et al, in press). It is not currently known, however, if PA affects semantic memory activation in MCI patients. The objective of this study was to examine the effects of PA on brain activation during semantic memory processing in MCI patients (ages 65-85).

Participants and Methods: A cross-sectional design was used with two groups (n = 7 each): (1) Low PA; and (2) High PA. PA level was based on self-reported frequency and intensity. MCI diagnosis was confirmed using the Petersen criteria. The two groups were equivalent on sex, age, education, family history of AD, APOE status, cognitive status, and depression. Brain activation was measured using event-related functional magnetic resonance imaging (fMRI) while participants performed a famous name discrimination task (accuracy > 85%).

Results: Brain activation related to semantic memory processing occurred in 8 functional regions of interest. High PA MCI patients showed significantly greater semantic memory activation (famous > unfamiliar) in the right angular gyrus compared to the Low PA group ($p < .00625$).

Conclusions: These findings suggest that PA, as a lifestyle behavior, may increase memory-related brain activation in MCI patients. Longitudinal studies are required to determine whether increased semantic memory processing in physically active MCI patients is protective against further cognitive decline.
Correspondence: *J Carson Smith, Ph.D., University of Wisconsin-Milwaukee, PO Box 413, Milwaukee, WI 53201. E-mail: jcarson@uwm.edu*

J. CENTI, C. GIBBONS, A. CRONIN-GOLOMB & R. FREEMAN. Reversible Cognitive Impairment in Autonomic Autoimmune Ganlionopathy.

Objective: Objective: To address patients' subjective observation of cognitive impairment with symptomatic worsening, we determined the relationship of orthostatic hypotension and antibody titers to cognition in patients with AAG

Participants and Methods: Methods: Three antibody positive AAG patients, with severe orthostatic hypotension, had repeated neuropsychological testing in the seated and standing positions pre- and post-plasma exchange over several months (alternate forms used for sequential visits). Tests of attention, short-term memory, working memory and verbal fluency were repeated while continuous blood pressure was recorded at each visit. Plasma and CSF NAChR antibody titers were measured.

Results: Results: Before plasma exchange blood pressure fell by >40 mmHg while standing in all subjects ($p<0.01$ standing vs. seated); there was no orthostatic hypotension after plasma exchange. Pre-plasma exchange cognitive function was below estimated pre-morbid levels and all tests of cognition worsened with standing ($P<0.05$, all tests) in association with orthostatic hypotension. Post-pheresis, with an accompanying drop in antibody titers, there was an improvement across all testing domains in both positions (all $P<0.05$ vs. pre-pheresis seated) and no drop in blood pressure. Antibody titers decreased significantly post-pheresis (5.68 vs. 0.43 nmol/L, $P<0.01$). No antibodies were detected in spinal fluid.

Conclusions: Discussion: This study shows that there is a reversible decline in cognitive function in association with orthostatic hypotension in patients with AAG. In addition, antibody titer, independent of blood pressure and position, has a highly significant effect on cognition that is rapidly reversible with plasma exchange. The mechanism underlying the relationship between cognition and elevated antibody titers independent of blood pressure effects is unknown. Local vascular and/or neuronal effects may be responsible.
Correspondence: *Justin Centi, Psychology, Boston University, 511 E 8th Street #1, Boston, MA 02127. E-mail: jcenti@bu.edu*

J. CHIN, K. OH, S. SEO, H. SHIN, J. LEE, S. KIM & D.L. NA. Different Patterns of Cortical Thinning According to Subtypes of Subjective Memory Impairment.

Objective: Subjective memory impairment (SMI) is defined as memory complaints despite no objective memory deficits in neuropsychological tests. The aims of this study were to examine whether there were subgroups among SMI subjects and to compare cortical thickness of these subgroups with that of normal healthy subjects without any memory complaints.

Participants and Methods: A total of 252 subjects with SMI and 196 healthy controls with no memory complaints were recruited from a health promotion center. These subjects did not have previous history of dementia or cognitive impairment and performed normally on the Mini Mental State Exam (MMSE). They underwent the Geriatric Depression Scale (GDS), and Multifactorial Memory Questionnaire which consisted of 3 subscales: memory-contentment, memory-ability and memory-strategy. Clusters of SMI were identified according to the memory-ability, memory-strategy and GDS. The cortical thickness was measured across the entire brain with magnetic resonance imaging.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Cluster analysis in SMI group revealed 3 subgroups: Cluster 1 contained subjects with mild memory complaints and less use of memory strategies than HC. Cluster 2 contained subjects with mild memory complaints and more use of memory strategies. Cluster 3 contained subjects with severe memory complaints, more use of memory strategies and higher level of depression. Compared to HC, Cluster 1 group did not show any brain regions with cortical thinning. Cluster 2 group showed cortical thinning in the frontal area. Cluster 3 group revealed cortical thinning in the frontal and temporal areas.
Conclusions: Our results suggested that SMI subjects could be divided into three subgroups. Cortical thickness analyses showed that among the three subgroups we defined, the cluster 3 group (severe memory complaints, more use of strategies and depressive mood) might be at a greater risk for developing progressive cognitive decline associated with cortical degeneration.
Correspondence: *Juhee Chin, M.A., Neurology, Samsung Medical Center, #50, ILwon-Dong, Kangnam-Ku, Seoul 135-710, Republic of Korea. E-mail: juheechin@hotmail.com*

J.N. COPELAND, H.R. GRIFFITH, R.C. MARTIN, V.C. WADLEY & D.C. MARSON. A Survey of Neuropsychology-Related Professionals' Interpretation of Clock Drawing Errors.
Objective: Clock drawing is a quick and easily administered measure for detecting dementia. This study examined neuropsychology-related professionals' interpretation of the meaning of clock drawing errors.
Participants and Methods: Seven neuropsychology-related professionals (6 neuropsychologists and 1 behavioral neurologist) anonymously completed a survey rating 30 clock drawing error items (from 0 = Not at all to 10 = Extremely) as to the extent they represented conceptual, executive, and motor difficulties.
Results: Overall, the 30 errors were rated on average as most representative of executive (5.38±1.53) difficulties, followed by conceptual (4.48±2.26), then motor (3.09± 2.19). The "missing/extra number(s)" item (8.14±.69) and the "more/less than two hands" item (7.43±1.90) had the two highest average executive ratings; "the figure does not resemble a clock" item (8.86±.90) and the "non-clock hand and/or face was drawn" item (8.57± 1.81) were the two errors with the highest average conceptual ratings. For the motor ratings, the "lines and/or hands are imprecise" item (8.71±.95) and the "numbers are difficult to read" item (8.00±.82) had the two highest average ratings. However, ratings were quite variable between professionals for many of the error items, and several items were not characteristic of just one type of rating. When errors were weighted for ratings in both dementia and control populations, correlations with neuropsychological measures did not display the expected patterns.
Conclusions: The results suggest that professionals may interpret the underlying deficits of clock drawing errors in different ways and may be inaccurate in their conceptualization of errors. Thus, errors should be interpreted with caution, particularly when making a differential diagnosis in dementia.
Correspondence: *Jacquelynn N. Copeland, M.A,, Psychology, University of Alabama at Birmingham, 1530 3rd Avenue South, CH 415, Birmingham, AL 35294. E-mail: jcopeland@uab.edu*

H. CUNNINGHAM, N.C. CORONADO, J. WARD, S. MITCHELL, D. LIBON, S. COSENTINO, D. PENNEY, D. BOWERS, M. OKUN & C. PRICE. Clock Drawing: A Comparison Between Controls, Parkinson's Disease, and PD with Mild Cognitive Impairment.
Objective: On the Clock Drawing Test (CDT) dementia patients with subcortical disease often produce executive errors and fail to improve from the command to copy test conditions (Libon et al., 1997). The CDT was administered to Parkinson disease (PD) patients with normal cognition except slowness (PD-intact). We investigated the hypothesis that all PD groups will produce greater dysexecutive errors relative to controls. PD-MCI participants with a dysexecutive profile (PD-MCIex), in contrast to an amnestic profile (PD-MCIa), will demonstrate a similar subcortical clock drawing pattern with no improvement from command to copy and slower response latency.
Participants and Methods: Fifty elderly controls, 53 PD intact, 7 PD-MCIa, and 8 PD-MCIex participants were administered the CDT (Cosentino et al., 2002). Composite scores based on neuropsychological test performance was used to classify PD-MCI subtypes (>1.5 s.d. from standard norms). Rater reliability for CDT was high (ICC>.90-.99).
Results: PD groups were similar in age/ education (age=65.88±8.08; education=15.07±2.91), but not disease severity (PD-MCIex>PD, p=.01). PD-MCIsubtypes > PD-non-dem, and controls for total clock errors (F= 5.88, p=.001) and total planning errors (p<.01). PD-MCIex patients produced more time representation errors (p< .001). PD and PD-MCIa showed improvement from command to copy (p<.05). Time to completion for all PD groups was slower compared to controls (all p<.001). PD groups, except PD-MCIex, produced faster clock copies relative to command (p's<.02).
Conclusions: The PD-MCIex distinctly failed to improve in error and time from command to copy. Findings support the value of command and copy conditions for understanding PD with potentially co-morbid prodromal dementia forms.
Supported by: K23NS60660 (CP) and K23NS60660-2S1 (summer supplement)
Correspondence: *Nicole C. Coronado, University of Florida, 1210 SW 11th Ave APT C301, Gainesville, FL 32601. E-mail: nicole591989@ufl.edu*

H. CUNNINGHAM, N.C. CORONADO, J. WARD, S. MITCHELL, D. LIBON, S. COSENTINO, D. PENNEY & C. PRICE. Parkinson's Disease Mild Cognitive Impairment Subtypes and Clock Drawing: Comparisons to Dementia.
Objective: Similar to patients with subcortical dementia (Libon et al., 1996), research shows that non-demented PD patients with executive impairment (PD-MCIex) fail to improve from command to copy clock conditions relative to amnesic PD (PD-MCIa) and PD-intact. PD-MCI also produce executive based clock errors. We investigated the hypothesis that PD-MCIex patients will perform similarly to PD-Demented (PDD) patients on command to copy, while PD-MCIa patients will perform similarly to Alzheimer's disease (AD) patients. PD patients regardless of subtype will produce more executive type errors than AD.
Participants and Methods: A group of 62 AD, 19 PDD, 7 PD-MCIa, and 8 PD-MCIex completed a clock drawing test (Cosentino et al., 2002) and a neuropsychological protocol. Composite scores based on neuropsychological test performance classified PD-MCI subtypes (>1.5 s.d. from standard norms). Rater reliability for clock drawing was high (ICC> .90- .99). Data were statistically normalized.
Results: PD-MCI subtypes, AD and PDD groups were similar in education (years= 12.65±3.10) but PD-MCI subtypes were younger and had higher MMSE scores than AD and PDD (both p<.05). Groups had similar total clock errors (F=2.378, p=.075), yet PD-MCI groups produced more mental planning errors than the AD (p<.05; PDD<AD, p=.08). PDD produced more time representation errors than other groups (all p<.01) . Only PD-MCIa and AD patients improved from command to copy (all p<.05).
Conclusions: PD-MCIa show a similar clock pattern to AD, while PD-MCIex performed similarly to PDD. These findings suggest that clock drawing command vs. copy and error analysis may assist with identifying prodromal dementia forms in PD.
Supported by: K23NS60660 (CP) and K23NS60660-2S1 (summer supplement)
Correspondence: *Nicole C. Coronado, University of Florida, 1210 SW 11th Ave APT C301, Gainesville, FL 32601. E-mail: nicole591989@ufl.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

D. DAWSON, K. CHURCHILL, C. FISCHER, D.T. STUSS, G. WINOCUR, J. JEMCY & T. SCHWEIZER. Mild Cognitive Impairment & Self-Identified Problems in Everyday Life.

Objective: By definition, mild cognitive impairment (MCI) involves cognitive changes not severe enough to interfere with daily life. However, some reports suggest that people with MCI do have everyday life problems. The objective of this study was to further investigate this discrepancy.

Participants and Methods: 16 people diagnosed with MCI, age ed 68 (±7.6) with MMSE of 28 (±1.8) were recruited from the Memory Disorders Clinic, St. Michael's hospital, Toronto. Difficulties in daily life were measured the Canadian Occupational Performance Measure (COPM) and the Lawton Instrumental Activities of Daily Living scale (IADL). The COPM allows identification of individualized problems in self-care, work (paid, unpaid), and leisure activities. Likert-type scales of 1 (low) to 10 are used for rating the importance of the problem activities in daily life and performance ability. The IADL scale, included to allow comparison with other studies, is brief (8 items) and high scores can be achieved with relatively low levels of performance.

Results: Fifty problems in everyday life were identified using the COPM. Thirty-six related to memory difficulties (e.g., forgetting appointments), 14 were broader (e.g., social isolation, multi-tasking). The mean importance rating was 8.0 (±2.0) and the mean performance rating was 4.6 (±2.2). In contrast, the mean score on the Lawton-Brody was 7.0 (±1.8) / 8 (high).

Conclusions: This study provides further evidence that people with MCI have significant problems in everyday life that may not be elicited on brief IADL questionnaires. Clinicians and researchers should include measures of complex activities of daily living in their assessments of people with MCI.

Correspondence: *Deirdre Dawson, PhD, KLARU, Baycrest, 3560 Bathurst St., Toronto, ON M6A 2E1, Canada. E-mail: ddawson@klarubaycrest.on.ca*

N.K. LUC, L. DELANO-WOOD, D. NATION, K.J. BANGEN, E. LANNI, A.J. JAK, Y. CABRERA, D.P. SALMON & M.W. BONDI. The Association Between Stroke Risk Factors and White Matter Lesion Burden in Mild Cognitive Impairment (MCI).

Objective: There have been recent suggestions that vascular risk may precipitate cognitive decline in the context of mild cognitive impairment (MCI). Given that little is known about how increased stroke risk may modify this vulnerable, at-risk population, we sought to examine the relationship between important vascular risk factors and white matter lesion (WML) burden in MCI.

Participants and Methods: Forty nondemented participants were divided into two demographically-comparable groups on the basis of diagnosis (MCI: n=18; Normal Control [NC]: n=22). Fluid-attenuated inversion recovery (FLAIR) images were evaluated for deep white matter lesion (DWML) and periventricular WML (PVL) volumes. The Framingham Stroke Risk Profile was used as an index of overall stroke risk.

Results: Collapsed across group, correlational analyses showed that elevated stroke risk significantly related to increased WML (p=.017). This association was driven by DWML (p=.006) but not PVL (p>.05). Independent samples t-tests revealed that the MCI group demonstrated significantly higher stroke risk (p=.002) and DWML (p=.03) when compared to NCs participants. Analysis of individual stroke risk factors showed that the MCI group demonstrated significantly higher rates of diabetes and evidence of cardiovascular disease.

Conclusions: Findings bolster recent suggestions that WML—particularly DWML—is related to elevated stroke risk in nondemented older adults, and they further showed that MCI participants demonstrated increased DWML load and vascular burden (i.e., diabetes and evidence of cardiovascular disease). Taken together, these findings suggest that elevated stroke risk and macrostructural white matter alterations may contribute to the clinical picture of MCI, and these factors may underlie pathologic processes specific to incipient dementia.

Correspondence: *Lisa Delano-Wood, Ph.D., Psychiatry, University of California, San Diego, 3350 La Jolla Village Dr, Bldg 13 —151B, San Diego, CA 92161. E-mail: ldelano@ucsd.edu*

Y. CABRERA, L. DELANO-WOOD, J. DHANANI, D. NATION, J. EPPIG, D.J. LIBON, A.J. JAK, D.C. DELIS & M.W. BONDI. Stroke Risk and Qualitative Neuropsychological Performance: Differentiating Subtypes of Mild Cognitive Impairment.

Objective: Studies have suggested that MCI, in general, is a heterogeneous clinical entity and that MCI subtypes may be elucidated and characterized qualitatively by factors such as vascular burden as well as profile differences in neuropsychological performance. Thus, in our sample of clinically-diagnosed MCI subtypes, we investigated whether there were group differences by stroke risk as well as qualitative differences in cognitive performance (error analysis).

Participants and Methods: Fifty-seven nondemented participants were divided into demographically-comparable groups based on cognitive status (Amnestic MCI [A-MCI]: n=37; Nonamnestic MCI [NA-MCI]: n=20). Stroke risk was derived from the Hachinski Ischemia Scale (HIS) and performance on specific cognitive tasks (Digit Span and Verbal Fluency [FAS and Animals]) was examined qualitatively.

Results: The NA-MCI subgroup demonstrated significantly higher HIS scores (t =-3.06, p =.003) than the A-MCI subgroup. There were no quantitative differences by MCI subgroup, however, the NA-MCI subgroup produced significantly more Intrusion and Between-Trial Capture errors (p-values <.025) while the A-MCI subgroup committed significantly more Perseverative and Out-of-Set Errors (p-values < .03).

Conclusions: Findings showed that the NA-MCI subgroup demonstrated significantly higher levels of stroke risk when compared to the A-MCI subgroup. Additionally, consistent with what is often observed in a frontal-subcortical profile of dementia, the NA-MCI subgroup produced more errors reflective of executive dysfunction while the A-MCI subgroup produced a qualitative profile consistent with a degenerative dementia such as Alzheimer's disease.

Correspondence: *Lisa Delano-Wood, Ph.D., Psychiatry, University of California, San Diego, 3350 La Jolla Village Dr, Bldg 13 —151B, San Diego, CA 92161. E-mail: ldelano@ucsd.edu*

E.C. EDMONDS, E.L. GLISKY & S.Z. RAPCSAK. Pathological False Recognition in FTD/ALS: Evidence for a General Impairment of Frontal Executive Memory Functions.

Objective: Previous reports have documented pathologically elevated false alarm rates in patients with focal frontal lobe lesions, potentially related to increased reliance on preserved general memory for the studied category combined with defective recollection of the individual items presented. This study examined the issue of material- and domain-specificity of false recognition in a patient with FTD/ALS who had executive dysfunction and frontal lobe atrophy on voxel-based morphometry.

Participants and Methods: A 46-year-old man who was diagnosed with FTD/ALS 2 years prior to testing completed a comprehensive battery of yes/no recognition memory tests using verbal and non-verbal stimuli across a variety of categories (words, non-words, faces, cars, houses, etc.). He also completed recognition memory tests involving lures that were consistent or inconsistent with the studied category.

Results: Elevated false alarm rates were observed on both verbal and non-verbal memory tests. However, the patient made few to no false alarms on tests involving categories that were highly familiar (common household objects) or with which he had specific pre-morbid expertise (cars). False recognition responses only occurred to category-consistent foils.

Conclusions: False recognition was observed whenever the patient was unable to encode/retrieve detailed memory representations for individual study items. In the absence of item-specific recollection, recognition responses were based on preserved category-level memory representations that could not be used to discriminate between targets and novel, category-consistent foils. False recognition reflects the breakdown of domain-general frontal executive memory functions critical for determining whether the amount and quality of the information retrieved is sufficient to support a positive recognition decision.

Correspondence: *Emily C. Edmonds, M.A., Psychology, University of Arizona, 1503 E. University Blvd., PO Box 210068, Tucson, AZ 85721. E-mail: emilycedmonds@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

J. EPPIG, D. WAMBACH, C. NIEVES, C. PRICE, M. LAMAR, L. DELANO-WOOD, T. GIOVANNETTI, B. BETTCHER, D. PENNEY, R. SWENSON, M. BONDI, C. LIPPA, J. KITAIN & D. LIBON. Mechanisms Underlying Dysexecutive Impairment in Mild Cognitive Impairment and Dementia – Evidence for Derailed Temporal Gradients.

Objective: Our previous studies classified MCI patients as presenting with amnesic (aMCI), dysexecutive (dMCI), or mixed (mxMCI) cognitive profiles. The current research tested the hypothesis that derailed temporal gradients/ differential impairment as a function of time necessary to complete the task underlies dysexecutive impairment in MCI and dementia.

Participants and Methods: Normal controls (NC), aMCI, mxMCI, dMCI and dementia patients with mild executive dysfunction/ mild MRI leukoaraiosis (mLA), or marked executive dysfunction/ moderate to severe LA (m/sLA) were tested. The Wechsler Memory Scale-Mental Control (Boston Revision) and letter fluency tests were administered. Mental Control performance was assessed as a function of three test epochs, i.e., initial, middle, latter. Fluency performance was assessed as a function of four 15 second test epochs.

Results: On Mental Control, NC/ aMCIs did not differ; generally scored higher than other groups, particularly on the third test epoch ($p < .001$); and showed no decline across the three test epochs. MxMCI and mLA groups exhibited some decline in performance over time ($p < .043$ & $p < .001$). The dMCI and m/sLA groups demonstrated the steepest decline in performance over time ($p < .001$ & $p < .001$). For letter fluency slope, m/sLA patients produced the steepest decline compared to all other groups ($p < .001$). Letter fluency slope was steeper for dMCI and mxMCI compared to NC ($p < .020$ & $p < .014$).

Conclusions: These data suggest that a similar cognitive construct, i.e., impaired temporal gradient (Fuster, 1997) underlies dysexecutive impairment in dMCI and dementia characterized by m/sLA.

Correspondence: *Joel Eppig, B.A. in psychology; Neurology, Drexel University College of Medicine, 2404 Aspen Street, Philadelphia, PA 19130. E-mail: joel.eppig@temple.edu*

M.A. FAUST, J.M. BRUCE & H. WESTERVELT. Olfactory Function in Patients with Possible and Probable Dementia with Lewy Bodies (DLB): Comparison to Alzheimer's Disease and Relationship to DLB Symptomatology.

Objective: Impaired olfactory functioning is associated with both dementia with Lewy Bodies (DLB) and Alzheimer's disease (AD). In contrast, olfactory functioning in patients with possible DLB has not been studied. In the present study, we compared odor identification performance in patients with probable AD, possible DLB, and probable DLB. In addition, the relationship between olfaction and DLB symptom expression was explored.

Participants and Methods: 107 adults with dementia (62 with probable AD, 23 with possible DLB, and 22 with probable DLB) were given the Brief Smell Identification Test (BSIT). In addition, clinical features of DLB were recorded (e.g., hallucinations, fluctuations, parkinsonism).

Results: Patients with probable DLB demonstrated worse olfaction than patients with AD ($p<.001$) and possible DLB ($p<.05$); in contrast, no significant difference was observed between the AD group and the possible DLB group (mean BSIT percent correct: probable DLB=30.74[12.69]; possible DLB=45.70[20.81]; AD=55.56[21.64]). Across the DLB groups, patients who reported cognitive fluctuations ($n = 21$) performed worse on the BSIT than patients who did not ($n = 24$)($t[43]=2.33$, $p<.05$). In the probable DLB group, patients without parkinsonism performed worse than those with parkinsonism ($t[20]=3.05$, $p<.01$). No relationship was found between BSIT performance and hallucinations.

Conclusions: Patients with probable DLB are more likely to have impaired olfaction than patients with possible DLB and AD. BSIT performance, however, was not significantly different between the possible DLB and AD groups, as the possible DLB group may reflect an etiologically heterogeneous group.

Correspondence: *Melanie Faust, Neuropsychology Program, Rhode Island Hospital, 593 Eddy Street, POB 430, Providence, RI 02908. E-mail: mfaust@lifespan.org*

M.K. FOSTER, P.K. SHEAR, R. KRIKORIAN, E. LONG & S. BONNER. Perception Of Emotion In Older Adults With Mild Cognitive Impairment.

Objective: Emotional processing deficits are documented in patients with Alzheimer's disease but have been less studied in mild cognitive impairment (MCI). We compared individuals with MCI to healthy participants (HP) on measures of executive functioning/working memory (EFWM), emotional processing, and social functioning. We hypothesized that those with MCI would be deficient on emotional processing tasks; that EFWM performance would relate to affective processing and social functioning; and that affective processing would predict social functioning.

Participants and Methods: N= 13 older individuals with MCI and n =15 HP completed social functioning and EFWM tests and computerized tasks (PennCNP) requiring emotion recognition, discrimination, and ratings of intensity in facial expressions.

Results: The MCI group performed more slowly and less accurately than HP in emotional processing. The HP were more socially active and reported less mental or physical interference with social activity than those with MCI. Across both groups, better EFWM was related to better emotion discrimination and more social activity. Within the MCI group, greater interference with social functioning was related to slower emotion recognition at a trend level. In the HP, longer emotional recognition was related to better quality of life.

Conclusions: Those with MCI were less active socially and reported greater interference with social activity than HP, consistent with their poorer EFWM. Their slower emotion recognition was also related to perceived social interference. These findings highlight the implications of EFWM and emotional processing deficits in this population for decrements in social functioning, increased loneliness and decreased quality of life.

Correspondence: *Mary K. Foster, Ph.D., Psychiatry & Psychology, Cleveland Clinic Foundation, P57, 9500 Euclid Ave, Cleveland, OH 44195. E-mail: mary.foster@gmail.com*

M.J. GILBERT, K. HESS, V. RAO, A. MORRISON, M. NORTON, K. WELSH-BOHMER, J. BREITNER, C. LYKETSOS & J. TSCHANZ. Does History of Head Injury Predict Cognitive Decline or Survival in Alzheimer's Disease? The Cache County Dementia Progression Study.

Objective: History of head injury (HI) is associated with an increased risk of AD and, in animal studies, increased amyloid deposition. However, the effects of antecedent HI on decline after dementia onset have not been examined. We studied whether HI affects the rate of cognitive and functional decline and survival duration in AD.

Participants and Methods: 337 individuals with incident AD (66% female) were examined at intervals between 0.5-2 years, for a maximum of 11.18 years (mdn=1.54). Mean (sd) age of dementia onset and duration at diagnosis were 84.3 (6.4) and 1.7 (1.3) years. Cognition was assessed with the CERAD test battery, and functional ability was assessed using the Clinical Dementia Rating Scale sum of boxes. Lifetime history of TBI was ascertained before dementia onset and updated at each visit by a caregiver using categories of: No HI, HI without loss of consciousness (LOC), and HI with LOC. Linear mixed models were fitted for each outcome. Covariates tested in all models included APOE genotype and demographic factors.

Results: 31% of participants had a history of HI, 18% with LOC. Those with fewer years of education and HI scored better on verbal learning at onset ($p=0.04$). History of HI did not affect rate of functional decline or duration of survival.

Conclusions: Antecedent HI has marginal effects, if any, on cognition in AD. The results are counter-intuitive and may reflect differences in severity of HI. They may also be artifactual owing to the number of analyses.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Mac J. Gilbert, B.A. B.S., Psychology, Utah State University, 325 West 1100 North, Logan, UT 84341. E-mail: mac.gilbert@aggiemail.usu.edu*

T. GIOVANNETTI, P. BRITNELL, L. BRENNAN, A. SIDEROWF, M. GROSSMAN, D. LIBON, J. EPPIG, C. SEIDEL & B. BETTCHER. Differential Effects of Goal Cues for Improving Everyday Functioning in Alzheimer's Disease Versus Parkinson's Disease Dementia.

Objective: Behavioral interventions are generally effective for improving everyday functioning in dementia, but whether interventions are differentially effective across dementia subgroups remains unknown. We evaluated a cuing intervention across participants with Parkinson's disease dementia (PDD), Parkinson's disease-no dementia (PD), and Alzheimer's disease (AD).

Participants and Methods: Participants with PDD (n = 20), PD (n = 20), or AD (n = 20) performed 3 everyday tasks; the number and type of errors were recorded. A cue restating the task goals designed to remind participants of the task objectives (Goal Cue) was presented at the completion of each task. Corrective behaviors and additional errors were coded following the Goal Cue.

Results: PDD and AD groups did not differ on dementia severity nor demographic variables. Prior to Goal Cues, the PDD and AD groups did not differ in total errors; both dementia groups made significantly more errors than the PD group. AD and PDD/PD groups demonstrated differential error patterns, with a higher proportion of commission errors and lower proportion of omission errors in the PDD/PD groups. PD participants performed near ceiling; therefore, post-cue performance was not analyzed. Following Goal Cues, the AD group accurately accomplished significantly more new steps and corrected more errors than the PDD group (M steps accomplished = 1.30 vs. .60, $z = 2.08$, $p < .05$, $d = 1.11$; M corrected errors = 2.25 vs. .70, $p < .01$, $d = 1.57$). The groups did not differ on the number of additional errors committed after Goal Cues (M = 1.14 vs. 1.11).

Conclusions: While comparable in dementia severity and overall functional impairment, PDD and AD participants showed different error patterns and differentially responded to cues. Goal Cues demonstrate potential for improving functioning and safety for people with AD, whose action errors may be more strongly related to memory failures. People with PDD may not benefit from these cues because of limitations in planning/organization.

Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

F. ROUZARD, G.A. SEIDEL, P. BRITNELL, A. SIDEROWF, M. GROSSMAN, D.J. LIBON & T. GIOVANNETTI. Detailed Error Analysis of the DAFS: Different Everyday Action Errors Observed Across Dementia Subtypes.

Objective: To conduct an analysis of errors on the Direct Assessment of Functional Status (DAFS) across participants with Parkinson's disease (PD), PD dementia (PDD), and Alzheimer's disease (AD) in order to evaluate a model of functional impairment that posits omissions (failure to perform step) and commissions (inaccurate execution of step) reflect distinct deficits.

Participants and Methods: PD (n = 20), PDD (n = 20), and AD (n = 20) participants performed select DAFS tasks (Telephone, Letter, etc.) and were scored according to DAFS procedures and a novel method that classified errors as omission, commission or addition (off task). A brief neuropsychological protocol also was administered.

Results: Interrater reliability for the novel DAFS coding was high (90% agreement; Cohen's kappa = .78). There was a significant effect of group on DAFS score [$F(2, 57) = 15.96$, $p < .01$] and total errors [$F(2, 57) = 16.58$, $p < .01$], with post hoc tests showing the PD group outperformed the AD and PDD groups ($p < .01$). There was a significant effect of group on the proportion of omissions [$F(2, 57) = 4.67$, $p = .02$] and commissions [$F(2, 57) = 3.26$, $p = .05$] but not additions. Omissions and commissions were comparable between the PD and PDD groups ($p > .35$); the AD group exhibited a significantly higher proportion of omissions ($p = .01$) and lower proportion of commissions ($p = .04$) relative to the PD group. Omissions were significantly correlated with measures of episodic memory ($r = -.38$, $p = .05$) and task knowledge ($r = -.41$ $p = .05$), whereas commissions were related with measures of executive control ($r = .44$, $p = .01$).

Conclusions: DAFS error coding was reliable and differed across dementia subtypes. Group differences and differential correlations between errors and neuropsychological variables support a model on which omissions and commissions are associated with deficits in declarative memory versus executive control. This suggests that functional interventions should be tailored to dementia subtype/ error profile.

Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

C. SETER, J. EPPIG, D.J. LIBON & T. GIOVANNETTI. Everyday Action in Frontotemporal Dementia: A Performance-based Analysis.

Objective: Everyday functioning in Frontal Temporal Dementia (FTD) was characterized relative to Alzheimer's dementia (AD). Functional performance also was contrasted among FTD subtypes [dysexecutive (DYS), progressive nonfluent aphasia (PNFA), semantic dementia (SEM)].

Participants and Methods: FTD (n = 10; 4 DYS, 4 PNFA, 2 SEM) and AD (n = 20) participants were administered the Naturalistic Action Test (NAT), a performance-based measure that involves 3 tasks that differ in the number of subgoals, presence of distractors, etc. Videotaped performances were coded for Accomplishment- percent of completed steps; Total Errors; and Completion Time. Error distributions were analyzed through calculation of the proportion of errors that were commissions (inaccurate sequence or object selection) versus omissions (failure to execute step).

Results: The groups differed in age (MFTD= 72.10; MAD= 76.35; $t(28) = 2.05$, $p = .05$) but not education nor MMSE. FTD participants made significantly more errors on the NAT task that included distractor objects in the workspace ($t(28) = 3.30$, $p < .01$), and this effect was not influenced by age. FTD participants had lower but non-significant average performance on most NAT variables; FTD showed faster Completion Times. FTD and AD participants did not show different error distributions, but FTD subtypes did differ. PNFA and SEM made more sequence errors compared to DYS ($\alpha 2(1) = 7.38$, $p < .01$, $V = .26$; $\alpha 2$ $(1) = 4.17$, $p < .05$, $V = .31$). DYS participants made more omissions than PNFA ($\alpha 2$ $(1) = 8.11$, $p < .01$, $V = .27$). There were no significant differences between PNFA and SEM.

Conclusions: FTD participants showed greater functional deficits in the face of distracting objects. Different error distributions were observed among FTD subtypes but not between AD and the FTD group as a whole. The results underscore the importance of distinguishing FTD subtypes in research of functional abilities and suggest that FTD subtypes may benefit from differential treatment strategies for daily activities.

Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

F.C. GOLDSTEIN, M. CORKRUM, L. ZANDERS, A.V. ASHLEY, J.J. LAH & A.I. LEVEY. Blood Pressure Control and the Rate of Cognitive Decline in Patients with Mild Cognitive Impairment.

Objective: Hypertension is a risk factor for mild cognitive impairment. However, the relationship between blood pressure control and progression of cognitive symptoms in MCI patients is unclear. We hypothesized that patients with good blood pressure control would exhibit less impaired cognitive functioning and a slower rate of decline than hypertensive patients, especially in domains involving memory and executive functioning.

Participants and Methods: A chart review was conducted of 60 patients with single or multidomain MCI. Patients did not have histories

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

of stroke and other neurologic or psychiatric conditions. Patients received tests of cognitive status (MMSE), attention (Trails A), episodic memory (Logical Memory), semantic fluency (Animals) and executive functioning (Trails B) at three annual evaluations. Blood pressure readings were available at each occasion. Twenty nine patients were classified as having good control (systolic blood pressure less than 140 mm Hg, diastolic blood pressure less than 90 mm Hg) on every occasion, whereas 31 patients were classified as having poor control if their blood pressure readings were clinically elevated on one or more occasions.
Results: There were no significant differences between the groups in demographics, length of time between test occasions, other vascular comorbidities, depression scores, or use of cholinesterase inhibitors. No intervening strokes occurred between the test occasions. Repeated measures ANOVAs revealed that patients with good blood pressure control had significantly higher overall cognitive status on the MMSE, and better immediate and delayed story recall. Moreover, patients with good blood pressure control had a slower rate of decline in their MMSE scores, and they demonstrated less slowing over time in completing Trails B.
Conclusions: Good blood pressure control is associated with better cognitive performance and slower progression in MCI patients, highlighting the importance of monitoring and treatment efforts.
Correspondence: *Felicia C. Goldstein, Ph.D., Neurology, Emory University School of Medicine, 1841 Clifton Rd., N.E., Atlanta, GA 30329. E-mail: fgoldst@emory.edu*

M.C. GREENAWAY & N.L. DUNCAN. Burden, Mood, and Quality of Life in Care Partners of Individuals with Mild Cognitive Impairment.
Objective: Individuals with Mild Cognitive Impairment (MCI) are required to have relatively intact instrumental activities of daily living (IADLs). As such, while family and friends often aid individuals with MCI in some high level tasks, they are not recognized as "caregivers." We utilize the term "care partners" in MCI. Little is known about how this role affects care partners. This study sought to explore burden, mood, and quality of life (QOL) variables in care partners of individuals with MCI.
Participants and Methods: Forty care partners of individuals with single domain amnestic MCI completed questionnaires about their burden (Zarit Caregiver Burden), mood (Center for Epidemiological Studies-Depression Scale and abbreviated State-Trait Anxiety Interview), and QOL (modified QOL AD). The individual with MCI's IADLs (Everyday Cognition) were also assessed. Providers were spouses (67.5%), adult children (20%), and siblings/friends (12.5%). Care partners were more often female (67.5%).
Results: Significant caregiver burden was reported by 47.5% and depression by 10% of the sample. Anxiety (M = 18.3, SD = 6.9) approached that reported among AD caregivers. Spouses were more likely to report poorer QOL (M = 40.4 SD = 6.0) compared to other care partners (M = 44.5 SD = 5.7), $p < .05$, and more depressed mood (M = 10.9 SD = 7.0 and M = 5.8 SD = 6.7, respectively), $p < .05$. Mood, burden, and QOL were significantly correlated with each other, $p < .05$. Caregiver burden and depression were significantly related to memory IADLs in the individual with MCI, $p < .01$, and a trend was seen between IADLS and anxiety and QOL.
Conclusions: Caring issues in MCI have been largely unexplored. However, some care partners, particularly spouses, do report significant levels of burden, depression, and anxiety that impact their QOL and appear to worsen as more aid is needed by the individual with MCI. Understanding these variables in care partners of MCI could lead to interventions to improve their lives, as has been done for caregivers in dementia.
Correspondence: *Melanie C. Greenaway, PhD, Emory University, Wesley Woods Health Center, 1841 Clifton Rd NE, Atlanta, GA 30329. E-mail: mcgree3@emory.edu*

S.W. HILL & J. MORRONE-STRUPINSKY. One-year Follow-up Examination in Probable Posterior Cortical Atrophy: A Case Report.
Objective: This case study discusses the serial evaluation and functional impairments of a patient with likely posterior cortical atrophy (PCA). Posterior cortical atrophy is a relatively rare condition thought to be a variant of Alzheimer's disease. The predominant early neurocognitive features of this condition include visual agnosia and visuospatial impairment with relative sparing of other neurocognitive functions. Progression of the illness may result in Balint's syndrome, Gerstmann's syndrome, and neurocognitive decline in other domains.
Participants and Methods: A 63-year-old right handed female with a 2-3 year progressive decline in vision and neurocognitive functioning underwent 2 neuropsychological evaluations. In addition, she underwent MRI of the brain, neurological examination, and a neuro-ophthalmological evaluation.
Results: Evaluation results were consistent with PCA and progressive functional decline. Results showed visual agnosia, simultagnosia, topographic disorientation, profound visuospatial impairment, right homonymous hemianopia, and bilateral temporo-occipital atrophy. Disturbance of verbal, memory, and executive functions were noted but to a lesser extent. Neurocognitive and functional decline were noted across time.
Conclusions: This case illustrates the importance of considering the possibility of atypical presentations of Alzheimer's disease. These patients experience unique impairments and subsequent functional decline that is distinct from Alzheimer's disease, particularly during the early stage of the disease process.
Correspondence: *Stacy W. Hill, Ph.D., Clinical Neuropsychology, Barrow Neurological Institute, 222 W. Thomas Rd., Suite 315, Phoenix, AZ 85013. E-mail: hillstw@hotmail.com*

V.L. HOBSON, D.J. HEYANKA, J.G. SCOTT & R.L. ADAMS. An Examination of the Relationship Between Measures of Functional Impairment and the RBANS in a Mild Cognitively Impaired and Alzheimer's Sample.
Objective: Little is known about the relationship of neuropsychological testing and functional impairment in Mild Cognitive Impairment (MCI). The current project sought to determine the relationship between the Repeatable Battery for Assessment of Neuropsychological Status (RBANS) Indices and functional impairment using two different measures of functional impairment in an MCI and AD sample.
Participants and Methods: Data were available on 193 patients (124 with AD, 69 with MCI) for archival analyses of the University of Oklahoma Health Sciences Center clinical database. Subjects were given the RBANS, Problems in Everyday Living (PEDL), and a general functional assessment questionnaire. Correlations were conducted to examine the relationship between the RBANS Indices and the total scores of measurements of functional impairment.
Results: RBANS indices were found to be correlated with total scores of the functional assessment questionnaire and PEDL within the AD and MCI groups. In the AD sample, the PEDL was associated with all indices except Delayed Memory while the general functional assessment questionnaire was associated with RBANS Attention, Language, and Visuoconstruction. In the MCI sample, the PEDL was associated with RBANS Language and the functional assessment was associated with Attention and Visuoconstruction. Additionally, regression analyses found RBANS indices to be significant predictors of functional abilities within the groups.
Conclusions: The relationship between the RBANS and functional impairment measures in AD and MCI patients remains variable. Interestingly, the memory indices of the RBANS were not associated with the functional assessment measures, while the Attention Index was consistently associated with functional impairment. Findings point to the utility of the use of the RBANS with functional assessment measures in an effort to understand the progression of functional impairment in both AD and MCI patients.
Correspondence: *Valerie L. Hobson, M.A., Psychiatry and Behavioral Sciences, University of Oklahoma Health Sciences Center, 910 Stanton L. Young Blvd., Oklahoma City, OK 73104. E-mail: valerie.hobson@ttu.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

R.Y. IP. Neuropsychological and Psychiatric Characteristics of Huntington's Disease.

Objective: Clinical features of Huntington's disease consist of a triad of symptoms that include cognitive, neuropsychiatric and motor disturbances. Cognitive and psychiatric symptoms have been suggested to precede motor signs due to early striatal neural loss. Utilizing standardized clinical measures to capture cognitive impairments and psychiatric symptoms experienced by patients with Huntington's disease is essential.

Participants and Methods: The current pilot study examined five patients with Huntington's disease on a neuropsychiatric unit at a mental health centre. The patients were administered standardized clinical measures which included the Montreal Cognitive Assessment and screening neuropsychological tests (Verbal Fluency, Symbol Digit Modalities, Stroop Color Word) of the Unified Huntington's Disease Rating Scale. Caregivers were administered the Neuropsychiatric Inventory. Socio-demographic variables were examined in relation to the patients' cognitive and psychiatric status. Associations of the Neuropsychiatric Inventory with severity of cognitive impairments as measured by the Montreal Cognitive Assessment and screening neuropsychological tests were investigated.

Results: Findings indicate that cognitive impairments and psychiatric disturbances are prevalent amongst patients with Huntington's disease. The heterogeneity in cognitive and psychiatric symptoms suggests that standarized neuropsychological and psychiatric measures are crucial in capturing the psychopathology experienced by these patients.

Conclusions: Standardized use of clinical measures at the outreach, inpatient, and follow-up phases to identify cognitive and psychiatric disturbances and provide continuum of care for patients with Huntington's disease are important. These measures are useful in assessing treatment efficacy and tracking disease progress. The range of psychiatric symptoms and cognitive impairments in Huntington's disease calls for individualized care plan tailored to the needs of these patients.

Correspondence: *Rosa Y. Ip, PhD, C.Psych, Ontario Shores Centre for Mental Health Sciences, 700 Gordon Street, Whitby, ON L1N 5S9, Canada. E-mail: ipr@ontarioshores.ca*

E. OLESON, K. GIFFORD, A. GENTILE, N. CANTWELL & A.L. JEFFERSON. Clinician Versus Informant Based Assessment of Instrumental Activities of Daily Living in Mild Cognitive Impairment Subtypes.

Objective: There has been an increasing amount of research examining mild cognitive impairment (MCI) subtypes and impairment in instrumental activities of daily living (IADL). Most studies have used either informant or participant ratings, with limited information on the utility of clinician ratings. We sought to compare clinician- versus informant-based IADL measurements between amnestic and non-amnestic MCI subtypes.

Participants and Methods: 270 participants with MCI (193 amnestic subtype, 77 non-amnestic subtype) from the Boston University Alzheimer's Disease Center were included (73±9 years; 39% female). Global cognition was assessed using the Mini-Mental State Exam (MMSE). IADLs were measured through the informant-based Lawton & Brody IADL subscale and the clinician-rated Functional Assessment Questionnaire (FAQ).

Results: ANOVAs indicated no between-group differences for the amnestic and non-amnestic MCI subtypes for global cognition, as assessed by the MMSE (p=0.29), or functional difficulties, as assessed by the Lawton & Brody IADL subscale (p=0.92) or the FAQ (p=0.76).

Conclusions: Our results suggest that individuals with amnestic versus non-amnestic MCI are comparable in global cognitive status and functional difficulties, regardless of whether IADLs are assessed via informant or clinician ratings. These findings are congruent with current literature examining different assessment tools to detect differences in functional status among MCI subtypes.

Correspondence: *Angela L. Jefferson, PhD, Boston University School of Medicine, 72 East Concord Street, B-7800, Boston, MA 02118. E-mail: angelaj@bu.edu*

Y. KANG, M. SONG, J. PARK, K. YU & B. LEE. An Exploration of Subgroups in Vascular Cognitive Impairment No Dementia (VCIND).

Objective: Like mild cognitive impairment (Petersen & Negash, 2008), vascular cognitive impairment no dementia (VCIND) also showed the heterogeneity in the patterns of cognition. This study was conducted to explore the subgroups of VCIND.

Participants and Methods: The 60-minute Korean-Vascular Cognitive Impairment Harmonization Standards-Neuropsychology Protocol (K-VCIHS-NP; Kang et al., 2009) was administered to the stroke patients at 3 months after stroke onset. The VCIND was diagnosed with impairment (< 7 percentile) in one or more cognitive domains and without significant decline in functional activities of daily living. One hundred and seventeen out of 249 patients (47%) were ultimately diagnosed with VCIND.

Results: Cluster analysis revealed three distinct subgroups of VCIND that were characterized by predominant deficits in frontal lobe function and memory respectively: VCIND with multiple impaired cognitive domains (m-VCIND, n=36), amnestic VCIND with mild frontal dysfunction (a-VCIND, n=44), and VCIND with mild frontal dysfunction (f-VCIND, n=37). Discriminant analysis showed that "Trail Making Test" and "Digit Symbol Coding" were the most reliable tests for distinguishing the m-VCIND from the other two groups, while "Seoul Verbal Learning Test" was the most reliable test for distinguishing the a-VCIND from the f-VCIND.

Conclusions: These results support the existence of distinct subgroups in VCIND. The clinical, neuroradiological, and sociodemographic features of each subgroup were also discussed.

Correspondence: *Yeonwook Kang, Ph.D., Psychology, Hallym University, #1 Okchondong, Chuncheon 200-702, Republic of Korea. E-mail: ykang@hallym.ac.kr*

D.J. LIBON, D.L. PENNEY, C.C. PRICE, M. LAMAR, R. SWENSON, K.D. GARRETT, J. EPPIG, C. NIEVES, D.M. WAMBACH, J. KITAIN, M.W. HOPKINS, C. LIPPA & R. DAVIS. Digital Clock Drawing Test (dCDT) – V: Using total drawing time and latencies to assess decision making and capacity to shift mental set in patients with Alzheimer's disease and subcortical vascular dementia.

Objective: The current research tested the hypothesis that latencies and time to completion or total drawing time in clock drawing to command/ copy will be longer in vascular dementia (VaD) with subcortical white matter disease vs. Alzheimer's disease (AD).

Participants and Methods: VaD=33, AD=29; groups were equated for age, education and MMSE. Digital Clock Drawing Test (dCDT) parameters included total drawing time (TDT) for the entire clock, hour hand (HH), minute hand (MH), all digits; and latency prior to placing the first clock hand (PFH-L), latency prior to the next stroke after the clock face is drawn (PCF-L), and time lag before the center dot was drawn (CD).

Results: Command between-group comparisons found that the VaD have longer TDT for the entire clock (VaD - 71.63+44.77; AD - 49.06+24.84; p< .018); HH (VaD - 3.59+2.54; AD - 2.23+1.35, p< .015); and longer PCF-L (VaD - 3.10+2.55, 1.91+1.23; p< .025), and PFH-L latencies (VaD - 6.69+6.52; AD - 3.99+3.39, p< .053). Copy between-group comparisons also found VaD longer TDT for the entire clock (VaD - 48.69+22.33; AD - 38.78+11.87, p< .037); HH (VaD - 2.86+1.79, AD - 2.04+0.95, p< .032); and longer latencies for PFH-L (VaD - 4.16+4.70, AD - 2.15+1.80, p< .032), drawing all digits (VaD – 10.86+4.70; AD - 8.61+3.50, p< .040), and CD (VaD - 3.98+4.26; AD - 1.25+1.08; p< .017).

Conclusions: Greater TDT for the entire clock in command/ copy test conditions and longer stroke times suggests a general bradyphrenia in VaD. More interestingly, longer VaD latencies during transitions from one clock component to another suggest decision making impairment related to the capacity to switch mental sets.

Correspondence: *David J. Libon, Ph.D., Dept of Neurology, Drexel University, 245 North Broad St., Philadelphia, PA 19102. E-mail: libondj@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A.E. MIKOS, M.S. OKUN, K. FOOTE, L. ZAHODNE, L. KIRSCH-DARROW & D. BOWERS. Do Clustering and Switching Add to our Understanding of Deep Brain Stimulation-Related Verbal Fluency Declines in Parkinson's Disease?

Objective: Verbal fluency declines have commonly been reported following deep brain stimulation (DBS) for Parkinson's disease (PD). We examined whether this decline was associated with differential breakdown in processes involved in guiding fluency output, specifically clustering and switching. Each is thought to engage different neurocognitive networks (i.e., temporal; frontal). Based on neural circuitry involved, we hypothesized reduced switching but not clustering following DBS. We further examined whether clustering/switching were differentially influenced by surgery or stimulation.

Participants and Methods: Troyer's (1997, 2000) method was used to quantify clustering and switching components. For the surgical comparison, 31 DBS patients performed verbal fluency tasks before and after unilateral surgery, while 21 PD controls were tested at an equivalent interval. For the stimulation comparison, 44 DBS patients were tested after surgery while ON and OFF stimulation. 10 PD controls were tested at equivalent time points. To test the assumption that clustering and switching are related to separate neurocognitive factors, we conducted a confirmatory factor analysis on neuropsychological data from 103 nonsurgical PD patients.

Results: PD patients had lower switching and total verbal fluency scores after surgery compared to before surgery, but equivalent scores in the stimulation comparison. According to the factor analysis, clustering/switching did not map well to their hypothesized neuropsychological factors.

Conclusions: The mechanism of DBS-related verbal fluency decline appears to be related to reduced switching and to surgical rather than stimulation effects. However, our findings call into question the assumption that clustering and switching represent distinct temporal/semantic and frontal/executive factors in Parkinson's disease.

Correspondence: *Ania E. Mikos, PhD, Psychiatry and Human Behavior, Brown University, 130 Pitman St, Apt 3, Providence, RI 02906. E-mail: mikos.ania@gmail.com*

A.E. MIKOS, G. TREMONT, T. PLOURD, H. WESTERVELT & B.R. OTT. Do Patients with Mild Cognitive Impairment Demonstrate Reduced Semantic Integrity on Animal Fluency?

Objective: Deficits in semantic relative to letter fluency observed in Alzheimer's disease (AD) are thought to reflect semantic network degradation. In amnestic mild cognitive impairment (aMCI), a transitional state between normal aging and AD, findings regarding integrity of the semantic store have been mixed. We examined semantic integrity by measuring shared features among successively generated exemplars in the animal fluency task at the level of superordinate features (general, nonspecific: e.g., big/small, foreign/local) and subordinate features (specific: e.g., zoological designation, habitat).

Participants and Methods: Neuropsychological data for 84 individuals with aMCI, 49 older cognitively normal controls, and 61 patients diagnosed with possible/probable AD were drawn from clinical and research databases.

Results: Total animal fluency differed among the three groups (control > MCI > AD; mean scores 18.3, 13.4, and 8.9, respectively). The superordinate index did not differ among the groups while the subordinate association index did (control = MCI > AD). Across the entire sample, the subordinate association index was significantly correlated with word list learning ($r = 0.247$) and confrontation naming ($r = 0.207$), while the superordinate index was not related to memory ($r = 0.025$) or naming ($r = 0.052$).

Conclusions: AD patients demonstrated a reduction in association of subordinate features during animal fluency relative to MCI patient and controls. However, we did not find evidence that MCI patients display reduced semantic integrity relative to controls using these semantic association measures. These findings might reflect the heterogeneous nature of MCI or lack of sensitivity to the detection of network changes associated with very early degenerative disease.

M. NERY, D.M. BARBOSA, A. VASQUES & S.L. DA-SILVA. Memory Performance in The Rey Auditory Verbal Learning Test for Elderly People with Depression, Alzheimer's Disease and Vascular Dementia Subcortical.

Objective: To assess verbal memory performance in the Rey Auditory Verbal Learning Test (RAVLT) in elderly with depression, Alzheimer's disease and subcortical vascular dementia.

Participants and Methods: It is a descriptive study with 30 elderly over 65 years old, with education over four years, were divided into three groups with 10 subjects each. All the subjects were submitted to the RAVLT, the first group of elderly patients were diagnosed with depression (D), according to the criteria of CID-10 and the second and third groups of subjects were diagnosed with mild dementia, scoring 1 in Clinical Dementia Rating (CDR), respectively, 10 with Alzheimer's disease (AD), according to criteria of NINCDS / ADRDA, and 10 with subcortical vascular dementia (SVD), according to the NINDS-AIREN criteria.

Results: The three groups showed good performance in immediate memory. The learning curve was oscillating at 80% of the group SVD, 70% of the AD group and 40% of the group D. The recall after interference of 20 minutes was severely altered in the AD group (90%) and SVD group (60%), whereas only 20% of the D group showed a slight loss in this delayed recall. The recognition was the fase that most differed among the three groups. Groups D and SVD showed good performance in recognition, however, 90% of the group SVD confused the learning list with the list of interference, which did not happen with the group D. 100% of the AD group did not benefit from the recognition list.

Conclusions: The memory performance differed in the study sample according to the pathology presented, considering the aspect of the cortical and subcortical neuropsychological profile.

Correspondence: *Marina Nery, Master Student, UnB / CRER, Rua Comendador Negrão de Lima n 151 ap 1503 Brisas, Goiânia 74650030, Brazil. E-mail: marinanerym@gmail.com*

L.A. NGUYEN, P. TOOFANIAN, M. SOLLBERGER, A. ZHONG, P. POORZAND, S. GROSSMAN, T. SHANY-UR, B.L. MILLER, J.H. KRAMER & K.P. RANKIN. Neuroanatomy Underlying Social Norm Awareness in Neurodegenerative Disease.

Objective: A largely implicit set of learned rules guides everyday social behavior, helping us decide whether or not to cut in line or spit on the floor. Though theoretically, social norms comprise crystallized semantic knowledge, our previous research demonstrates that behaviorally disordered individuals like frontotemporal dementia (bvFTD) patients answer questions about these rules incorrectly, even though they do not have semantic loss. We investigated which anatomic structures would be correlated with social norm knowledge among neurodegenerative disease patients and controls.

Participants and Methods: The Social Norms Questionnaire (SNQ), consisting of 22 yes/no questions assessing knowledge of common social norms, was performed with 166 subjects (29 bvFTD, 11 semantic dementia, 13 progressive aphasia, 42 Alzheimer's disease, 14 corticobasal syndrome, 21 progressive supranuclear palsy, 11 amyotrophic lateral sclerosis, and 25 older normal controls), and structural MRI scans were obtained.

Results: We analyzed the relationship between brain volume and SNQ scores using voxel-based morphometry, including age, sex, and total intracranial volume as confounds. Poor SNQ scores were predicted by volume loss in bilateral inferior and dorsomedial frontal areas and right frontal insula ($p<0.05$ FWE). The left ventrolateral orbitofrontal cortex (VLOFC) remained the most powerful predictor after all corrections for coatrophy effects.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Damage to the VLOFC, a brain region involved in processing negative reinforcement, causes patients to be unable to decide whether behaviors are socially appropriate. These results suggest that knowing whether everyday social behaviors are acceptable may depend in part on brain regions responsible for imagining the negative, punishing consequences of breaking a social norm.
Correspondence: *Lauren A. Nguyen, BA, Neuorlogy, UCSF, 140 Dorado Terrace, San Francisco, CA 94112. E-mail: laanguyen@gmail.com*

T. O'BRIEN, V. WADLEY, H. GRIFFITH, D. CLARK, R. ANDEL & D. MARSON. The Useful Field Of View Test Predicts Speed Of Instrumental Activities Of Daily Living In A Clinical Sample Of Mild Cognitive Impairment Patients.

Objective: Modest deficits in Instrumental Activities of Daily Living (IADLs) have been observed in patients with Mild Cognitive Impairment (MCI). The presence of such deficits suggests increased risk for conversion to Alzheimer's disease. The computer-administered Useful Field of View (UFOV) assessment measures information processing speed for visual tasks involving simple attention, divided attention, and selective attention. Previous findings indicate poorer UFOV performance and slower IADL performance among individuals with MCI compared to controls, but effects of UFOV performance on IADLs has not been examined in patients with MCI.
Participants and Methods: Multiple regression modeling was utilized to investigate the speed of IADL completion, measured by the Timed Instrumental Activities of Daily Living (TIADL) assessment, in relation to UFOV performance, severity of memory deficits, and executive functioning. The TIADL measures time to complete a series of activities: finding entries in a phonebook, counting change, reading food labels, locating items on a shelf, and reading prescription labels. The sample included 70 individuals with consensus-diagnosed MCI (mean age=70.28±7.03, education=15.16±3.02 years).
Results: After variability due to age, education, gender, and visual acuity was accounted for, the total time to complete the TIADL assessment was associated with the divided attention (≥=0.392, t=3.030, p=0.004) and selective attention (≥=0.319, t=2.442, p=0.017) subtasks of the UFOV. When executive functions and severity of memory impairment were added to the model, the UFOV measures remained the strongest predictors of TIADL performance.
Conclusions: The influence of selective and divided attention should be considered when assessing functional abilities in patients with MCI.
Correspondence: *Timothy O'Brien, M.A., Medical/Clinical Psychology, University of Alabama, Birmingham, 1530 3rd Avenue South, CH 415, Birmingham, AL 35294-1170. E-mail: timobrien@uab.edu*

M.E. O'CONNELL, M. CROSSLEY, A. KIRK & D. MORGAN. RBANS Cortical-Subcortical Classification Algorithm in a Memory Clinic Dementia Sample.

Objective: To investigate the Repeatable Battery for Assessment of Neuropsychological Status (RBANS) classification algorithm for cortical versus subcortical profiles in a heterogeneous Memory Clinic dementia sample.
Participants and Methods: This study analyzed data from 89 patients who had complete RBANS data and were diagnosed with dementia after interdisciplinary assessment from neurology, neuropsychology, nursing, physical therapy, and medical examination of recent blood work and CT head scan. The mean age of this predominantly early-stage (i.e., M MMSE 23.25, SD = 3.55, range 13-30) sample of dementia patients (67% female) was 74.25 (SD = 9.20, range 44-89) with 10.65 average years of education (SD = 2.63, range 5-19). Dementia sub-type diagnoses were classified as primarily cortical (i.e., AD, FTD variants; n=60), primarily subcortical (i.e., vascular dementia, PDD, HD; n=8), or mixed/undifferentiated (e.g., DLBD, dementia due to multiple etiologies or due to general medical conditions; n=21).
Results: The RBANS classification algorithm was equally likely to classify the subcortical and mixed/undifferentiated diagnostic groups with a cortical or subcortical profile. For the cortical dementia group, the RBANS algorithm classified most (70%) with a cortical profile. For those patients with cortical dementias who were incorrectly classified as subcortical, they were no more likely than those correctly classified to have white matter changes seen on CT head scan and they had similar Hachinski Ischemia Scores and similar number of cardiovascular risk factors.
Conclusions: The RBANS classification algorithm correctly classifies most patients with predominantly cortical dementias, but its misclassification rates are high. The misclassifications of cortical dementias as subcortical are due to error rather than reflecting gross white matter changes or subtle cardiovascular involvement in those with predominantly cortical dementias.
Correspondence: *Megan E. O'Connell, PhD, Psychology, University of Saskatchewan, Arts Building Rm 154, 9 Campus Drive, USask, Saskatoon, SK S7N 5A5, Canada. E-mail: megan.oconnell@usask.ca*

J. FERRER & V.M. PATIÑO. A Partial Reversal Concreteness Effect in a Case with Semantic Dementia.

Objective: To test the hypothesis of a reversal concreteness effect in a case with Semantic Dementia (SD).
Participants and Methods: A SD patient (60 years old, >20 years of education) and a control group matched for age and education (n= 5) participated in the study. We used two experimental tasks including concrete and abstract stimuli: a) a sentence congruency verification task and b) a semantic decision task. Percent of correct responses was analyzed using a modified t test (Crawford & Garthwaite, 2002).
Results: The SD patient exhibited an inferior performance in concrete (54.25%) over abstract (64.58%) words in the sentence congruency verification task; the control group performed slightly better for concrete (95.41%) than abstract (91.66%) stimuli, being these latter differences non significant. Regarding the semantic decision task, the patient performed below the control group, with an advantage for concrete (37.50%) over abstract (12.5%) stimuli; controls had exactly the same accuracy level for both types of words (92.5%). All differences between patient and controls reached statistical significance.
Conclusions: These results do not support the reversal concreteness effect as a characteristic pattern of semantic memory impairment in SD, and suggest that the structure and cognitive load of the experimental tasks might play an important role over the observed pattern of responses.
Correspondence: *Victor M. Patiño, PhD, Psychology, Morelos State Autonomus University, Pico de Orizaba No. 1., Col. Los Volcanes, Cuernavaca 62350, Mexico. E-mail: vmpat@uaem.mx*

R. DAVIS, D.L. PENNEY, D. PITTMAN, D. LIBON, R. SWENSON & E. KAPLAN. The Digital Clock Drawing Test (dCDT) - I: Development of A New Computerized Quantitative System.

Objective: The Clock Drawing Test is subject to significant variation in variables measured and scoring systems. We hypothesize that well-designed computer software can semi-automate test interpretation, providing standardized, operationally defined scoring.
Participants and Methods: Patients use a digitizing pen (Anoto Inc) that works as an ordinary ballpoint while capturing pen position 80 times/second at ±.002". Our program analyzes that data, classifying each penstroke (e.g., as a clock face, digit, etc.). The program's color-coded display makes evident which classifications are correct; its drag-and-drop interface facilitates classification error correction.
Results: The program's initial classifications can be up to 84% accurate (e.g., on healthy controls), making test interpretation fast and easy. Because pen strokes are digitized, hundreds of measurements operationally defined in our software are carried out instantly, providing a highly detailed analysis with no additional effort by the clinician. The data is time-stamped, capturing representations of behavior and enabling the program to run a movie of the drawing, assisting in making sometimes-difficult clinical judgments (e.g., discriminating hour hands

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

and spokes). The spatial resolution of the pen enables enlarging the drawing by up to 100x, making apparent phenomena fractions of a millimeter in size, not visible on the paper. We hypothesize that some of these may be valuable early diagnostic markers. Data are easily exported for consultation, re-analysis, or inclusion in electronic medical records.
Conclusions: The dCDT semi-automates the capture of the drawing process, analysis, and reporting of results for the clock drawing test, providing the foundation for operationally defined test analysis.
Correspondence: *Dana L. Penney, PhD, Neurology, Lahey Clinic, 41 Mall Road, Burlington, MA 01805. E-mail: Dana.L.Penney@Lahey.org*

D.L. PENNEY, R. DAVIS, D. LIBON, M. LAMAR, C. PRICE, R. SWENSON, K. GARRETT, A. FREEDLAND, C. WENINGER, S. SCALA, T. GIOVANNETTI & E. KAPLAN. The Digital Clock Drawing Test (dCDT) - II: A new Computerized Quantitative System.
Objective: The Clock Drawing Test is a widely accepted, safe, and easy to administer neuropsychological test with high sensitivity and specificity useful for cognitive screening. However, significant variability exists in variables measured and scoring systems used. There is clear need for a standardized, operationally defined, automatic scoring system that can measure variables reliably and precisely. The new computerized scoring system (dCDT) will reliably score digitized clock drawings on both standard and novel measures even when employed by different users with varying combinations of computer hardware/ operating systems.
Participants and Methods: The dCDT scoring system analyzes clock drawings obtained with a digitizing ballpoint pen (Anoto), producing up to 1012 measurements for each drawing on variables including stroke number, drawing size, and inter-stroke latencies. It was used to analyze 5 clock drawing protocols (each with command and copy drawings), scored by 7 different clinicians, using 9 different computer hardware/ software configurations, at 6 geographically distinct sites. Test data was anonymized and uploaded to a central database.
Results: All computerized measurements were identical for all protocols, testing sites, operating systems, and users (i.e., 100% consistency on computerized measurements). Program output differed only on 7 user and site variables including clinician name and scoring time, which are intended to differ, for site and user identification purposes.
Conclusions: The dCDT is a reliable computerized system producing unprecedented objective, precise, reproducible quantitative measurements that can operationally define a wide collection of cognitive constructs. These data could be used for differential diagnosis and outcome treatment efficacy.
Correspondence: *Dana L. Penney, PhD, Neurology, Lahey Clinic, 41 Mall Road, Burlington, MA 01805. E-mail: Dana.L.Penney@Lahey.org*

D.L. PENNEY, D. LIBON, M. LAMAR, R. SWENSON, C. PRICE, C. WENINGER, A. FREEDLAND, K. GARRETT, S. SCALA & R. DAVIS. The Digital Clock Drawing Test (dCDT) - III: Clinician reliability for a new quantitative system.
Objective: The dCDT computerized scoring system measures quantitative and process variables of clock drawings captured by a digitizing ballpoint pen (Anoto). Although reliable and accurate (typically achieving 84% accuracy on routine protocols), the dCDT classification of pen strokes can err on some strokes due to unique drawing characteristics of clinical syndromes. We developed the dCDT Classification Assist Tool (CAT) to improve the stroke classification in digitized clock drawings.
Participants and Methods: CAT was developed to improve stroke classification in digitized clock drawings. It enables clinicians to reclassify pen strokes into operationally defined categories (e.g., hands, spokes). Six clinicians learned the CAT tool from the dCDT manual and tutorial, then classified 6 standardized training clock protocols and received classification feedback. After demonstrating proficiency, clinicians analyzed 5 dCDT test protocols (270 strokes) pre-selected to require a high level of clinical judgment. Computer and clinician-analyzed protocols were compared along four types of scoring classifications that were subsequently tallied: corrected (computer error reclassified correctly); uncorrected (computer error uncorrected); reclassification (computer correct reclassified to error); incorrect (computer error reclassified to error).
Results: On these challenging protocols dCDT correctly classified 48% of the strokes (128/ 270) when compared to expert clinician standard; 73 (57%) misclassifications were stroke types classifiable only by clinicians. Use of the CAT improved overall classification significantly (mean = 94.01%, SD= 3.86%). Rater accuracy was high (93% – 99% errors corrected).
Conclusions: The dCDT is a highly accurate scoring system when assisted by trained clinicians to classify strokes of computer pre-scored digitized drawings.
Correspondence: *Dana L. Penney, PhD, Neurology, Lahey Clinic, 41 Mall Road, Burlington, MA 01805. E-mail: Dana.L.Penney@Lahey.org*

D.L. PENNEY, D. LIBON, C. PRICE, M. LAMAR, R. SWENSON, K. GARRETT & R. DAVIS. Digital Clock Drawing Test (dCDT) – IV: Total clock drawing and inter-stroke latencies or information revealed between the lines.
Objective: Clock drawing test performance can differentiate Alzheimer's disease (AD) from other dementias. Past research suggests that in AD clock drawings improves from command to copy. Latency (seconds) prior to placing the first clock hand (PFH-L) and total clock drawn time (TCDT) will differentiate AD from amnesic Mild Cognitive Impairment (aMCI) and Healthy Controls (HC).
Participants and Methods: AD=18 aMCI=32, HC=27 were tested. On the MMSE all groups differed ($p < .001$). HCs were younger than other groups ($p < .001$). AD patients were marginally less educated than HCs ($p < .025$).
Results: Between-group command PFH-L was longer in AD (8.06+7.54) vs. HC (2.15+1.76, $p < .001$) and AD vs. aMCI (4.27+4.27, $p < .025$). Between-group copy PFH-Ls did not differ. PFH-L improvement from command to copy analyses found no difference for HC. PFH-L latencies shorten in both aMCI ($p < .001$) and AD ($p < .025$). Between-group command TCDT was longer for AD (62.29+37.35) vs. HC (33.94+15.65; $p < .001$) and aMCI (40.19+20.17, $p < .009$). Between-group copy TCDT was also longer for AD (40.59+22.27) vs. HC (28.99+10.93, $p < .023$ and between AD vs. aMCI (29.70+10.08, $p < .028$). TCDT Improvement from command to copy analyses continued to find shorter latencies only for aMCI ($p < .001$) and AD ($p < .008$) groups.
Conclusions: TCDT and PFH-L have previously been unobtainable. These diagnostic markers differentiate between-groups. Consistent with prior research, AD patients improve from command to copy. This finding is now extended to patients with aMCI. The cognitive correlates of clock drawing latencies will be the subject of further research.
Correspondence: *Dana L. Penney, PhD, Neurology, Lahey Clinic, 41 Mall Road, Burlington, MA 01805. E-mail: Dana.L.Penney@Lahey.org*

A.D. SCHMID, K. KELLEY LYONS & P. GORMAN. Utility of the Neuropsychological Assessment Battery in Patients with Normal Pressure Hydrocephalus.
Objective: The aim of the present study was to examine the utility of the screening module from the Neuropsychological Assessment Battery (NAB; Stern & White, 2003) to measure improvement in cognitive functioning in patients with Normal Pressure Hydrocephalus (NPH) treated by lumbar drain. Overall improvement of symptoms, such as urinary incontinence, gait instability, and cognitive functioning after lumbar drain informs determination of shunt placement.
Participants and Methods: 39 patients (59% female, mean age = 77.46(6.67)) were evaluated by a multi-disciplinary team in a hospital setting. The NAB was used to measure changes across several cognitive domains. Pre- and post-drain profiles were examined to place patients into three groups of probability for permanent shunt placement based on symptom improvement: "unlikely", "possible", and "probable" candidates. Paired t-test were used to compare pre- and post- domain scores.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: While unlikely candidates displayed decreased functioning across all domains and possible candidates evidenced no significant changes in functioning, significant improvements in functioning were found across all domains of the NAB with the exception of the Language domain within the probable group. Specifically, marginal improvements related to Attention functioning and significant improvements related to Memory and Spatial functioning existed.
Conclusions: The present findings underscore the usefulness of the NAB in measuring cognitive improvements in patients accurately diagnosed with NPH. Future directions of this project includes follow-up evaluations of patients with NPH after shunting at six month intervals.
Correspondence: *Amy D. Schmid, Ed.M., School Psychology, Columbia University, 6519 N. Campbell Ave., Chicago, IL 60645. E-mail: amyschmid@ymail.com*

C.A. SIDERS, F.W. MARTINEZ, P.T. NGUYEN, B. HO, G. CHENG, S. LALEZARI, M.J. WRIGHT, E. WOO & J.L. CUMMINGS. The Role of Encoding and Consolidation in Alzheimer's Disease and Amnestic Mild Cognitive Impairment.
Objective: Our goal was to determine the role of memory processes in the verbal memory impairments observed in amnestic mild cognitive impairment (aMCI) and Alzheimer's disease (AD) via the application of the Item Specific Deficit Approach (ISDA). The ISDA is a recently developed and validated method for parsing encoding, consolidation, retrieval deficits in list learning performances.
Participants and Methods: We administered the California Verbal Learning Test (CVLT) to 28 AD, 74 aMCI, and 31 neurologically intact control participants. We applied the ISDA to the CVLT to derive indices of encoding, consolidation, and retrieval deficits.
Results: The controls performed significantly better than the aMCI participants, who in turn performed better than the AD participants on learning and delayed recall trials. Regression analyses revealed that impaired delayed free recall in the AD group was primarily driven by encoding deficits (R2=.25). A second regression analysis showed that the aMCI group's delayed free recall was predicted by both encoding (R2= .55) and consolidation (R2=.14) deficits. Retrieval deficits did not account for a significant variance in either model.
Conclusions: The results suggest that encoding and consolidation play a role in aMCI related memory deficits. They also suggest that encoding deficits are prominent in AD and aMCI related memory impairments.
Correspondence: *Craig A. Siders, Ph.D., Psychiatry, Harbor-UCLA Medical Center, 1124 W. Carson St. B-4 South, Torrance, CA 90502. E-mail: csiders@labiomed.org*

M.B. SPITZNAGEL, L.A. MILLER, V. POTTER, E. GLICKMAN & J. GUNSTAD. Impact of a 6-Month Exercise Program on Global Cognition and Factors Associated with Weight Loss in Mild Cognitive Impairment (MCI).
Objective: Unintentional weight loss in Alzheimer's disease (AD) predicts morbidity and mortality. Effectiveness of dietary supplementation is reduced in those with low body mass index. Other interventions may be of benefit, particularly if started early. The current study is a 6-month exercise intervention in a Mild Cognitive Impairment (MCI) sample. We hypothesized that global cognition, body composition, and associated biomarkers would remain stable; improvements in fitness, appetite, and eating behavior were expected.
Participants and Methods: Thirty-one participants meeting criteria for MCI (CDR=0.5) completed a 6-month exercise intervention (twice weekly aerobic/resistance training). Baseline and post assessments included measures of global cognition (3MS), cardiovascular fitness, eating behavior, body composition, and circulating biomarkers associated with bioenergetic/cognitive implications (leptin, ghrelin, and brain-derived neurotrophic factor).
Results: Significant baseline relationships emerged among appetite and both cardiovascular fitness (r=0.40, p<.05) and 3MS (r=0.53, p<.01). Following exercise, improvements in fitness [F(1,26)=7.86, p<.01] and healthy eating habits occurred [F(1,28)=9.51, p< .01]. Body composition and biomarkers remained stable (p=ns). In contrast, 3MS declined [F(1,29)=4.61, p=.04].
Conclusions: Exercise may benefit persons with MCI by promoting healthier eating habits, and possibly helping stabilize body composition and biomarkers. Despite significant improvements in cardiovascular fitness, global cognition declined. Results suggest that even if an exercise intervention increasing fitness does not prevent cognitive decline in MCI, there may still be positive impact on eating behavior. Future research should investigate similar factors with a larger sample, inclusion of healthy control and later stage dementia comparison groups, and more frequent or intense exercise.
Correspondence: *Mary B. Spitznagel, PhD, Kent State University, 239 Kent Hall Addition, Kent, OH 44242. E-mail: mspitzna@kent.edu*

B.A. SPRINGATE & G. TREMONT. Relationship Between Awareness of Deficits and Cognitive and Functional Decline in Mild Cognitive Impairment and Dementia.
Objective: Anosognosia is common in dementia, and a growing body of literature suggests that unawareness of cognitive deficits may also be common in mild cognitive impairment (MCI). This longitudinal study examined whether awareness of cognitive deficits serves as a predictor of future cognitive and functional decline.
Participants and Methods: 45 patients with MCI (n=36) or mild dementia (n=9) underwent two neuropsychological evaluations an average of 1.91 years apart (SD=0.80; range=0.99-4.57). Participants were divided into groups based on clinician rating of awareness (aware = 25; unaware=20), which was determined following interviews with the patient and family. Depression and ADL ratings were also collected.
Results: No significant differences were found between awareness groups on demographic variables or MMSE score. At both time points, individuals rated as unaware performed significantly worse on a measure of phonemic fluency. No other cognitive scores or ADL ratings differed between groups. Aware individuals endorsed significantly more depression than unaware individuals at both time points (M BDI = 11.71 and 13.47 vs. 7.60 and 5.67). There was also a trend for a significant group x time interaction (p<0.10), with aware individuals developing greater depression over time while unaware individuals became less depressed over time.
Conclusions: Although surprising that both awareness groups remained cognitively and functionally equivalent over time, those who were aware of their cognitive deficits not only experienced a higher level of depression but became more depressed over time. Intact awareness of cognitive decline may be related to worsening depressive symptoms among cognitively impaired older adults.
Correspondence: *Beth A. Springate, MA, Psychology, University of Connecticut, 406 Babbidge Road, Unit 1020, Storrs, CT 06269. E-mail: beth.springate@uconn.edu*

G. TREMONT, G.D. PAPANDONATOS, B. HUMINSKI, J. GRACE, L. FRAKEY & B.R. OTT. Use of the Telephone-Administered Minnesota Cognitive Acuity Screen (MCAS) to Detect Mild Cognitive Impairment.
Objective: There are limited data on the effectiveness of telephone screening measures for Mild Cognitive Impairment (MCI). The Minnesota Cognitive Acuity Screen (MCAS) is a brief multi-domain, telephone-administered test. The study aim was to determine whether the MCAS is sensitive to MCI.
Participants and Methods: Participants were 100 individuals with MCI, 50 with mild possible/probable Alzheimer's disease (AD), and 50 healthy controls (HC). Individuals were screened to exclude medical conditions affecting cognition. Participants underwent neuropsychological, neurologic, and neurodiagnostic work-up. MCI was defined according to Petersen's criteria. Diagnoses were established by consensus conference. MCAS testing occurred an average of 18.91 days (SD = 15.20) after an office visit.
Results: MCAS total score significantly correlated with in-office MMSE (r = 0.73), DRS-II total (r = .81), and CDR sum of boxes (r = -.69).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

ROC analysis controlling for age and education revealed 94% sensitivity and 74% specificity for distinguishing both patient groups from HC (AUC = .94), 92% sensitivity and 74% specificity for discriminating MCI from HC (AUC = .91), and 88% sensitivity and 71% specificity for distinguishing MCI from AD (AUC = .86).
Conclusions: Results suggest that the MCAS successfully discriminates MCI from HC and AD. Although the test is less accurate in MCI-AD differential diagnosis, this distinction can be challenging even in the office. Overall, the MCAS has potential as an effective screening tool for memory disorders in clinical and research settings. Future research should replicate these findings in a new sample to provide the most accurate reflection of its diagnostic utility.
Correspondence: *Geoffrey Tremont, Ph.D., Psychiatry & Human Behavior, Brown Medical School, Rhode Island Hospital, 593 Eddy Street, Providence, RI 02903. E-mail: gtremont@lifespan.org*

E.R. TUMINELLO, S. HAN, A.J. JAK & M.W. BONDI. Mild Cognitive Impairment, Executive Functioning, and Anterior Cingulate Cortex Volumetry.
Objective: Mild cognitive impairment (MCI) is one of the most widely studied models of cognitive decline. Yet, the nature of MCI subtypes remains unclear, particularly for non-amnestic MCI. The anterior cingulate cortex (ACC) is well-known for its involvement in aspects of executive functioning (EF), motivation, and emotion regulation. We examined the relationships between diagnosis of MCI subtypes, EF, and ACC volumes.
Participants and Methods: Fifty-seven right-handed adults (21 cognitively normal controls, 20 amnestic MCI (5 with EF impairment), 16 non-amnestic MCI (8 with EF impairment)) were examined. Participants consented to neuropsychological testing and structural MRI. Rostral, dorsal, and whole ACC volumes were manually delineated.
Results: For analysis, patients were grouped by the presence of EF impairment. Controlling for verbal IQ and DRS score in ANOVAs, ACC volumes did not differ across diagnostic groups (cognitively normal, MCI without EF impairment, MCI with EF impairment). Scores from the D-KEFS Trail Making-Switching, Color-Word Inhibition-Switching, WCST, and Trails B were used to predict ACC volumes, controlling for verbal IQ. The model significantly predicted left and right rostral ACC volumes ($p<.05$). Regarding individual predictors, only WCST perseverative errors predicted right rostral ACC volume ($\geq$ -.37, $p=.01$).
Conclusions: Results suggest that ACC volume may not be impacted in MCI in general but may be altered in individuals with perseverative presentations. Consistent with the ACC's relevance for EF, more perseverative errors on the WCST predicted smaller right rostral ACC volumes. Future research should examine the ACC longitudinally as well as other EF-relevant structures in dysexecutive MCI.
Correspondence: *Elizabeth R. Tuminello, M.A., Loyola University Chicago, 10716 S. Laporte Ave., Oak Lawn, IL 60453. E-mail: etumine@luc.edu*

A. WELDON, K. RYAN, K. TALTON, C. PERSAD, N. BARBAS, J. HEIDEBRINK & B. GIORDANI. Neuropsychiatric Symptoms and Executive Functioning in Patients with Mild Cognitive Impairment (MCI): Relationship to Caregiver Burden.
Objective: Our previous studies have shown that caregivers of patients with MCI experience greater need for support services than those of healthy controls (HC), but similar levels as caregivers of patients with Alzheimer's disease (AD). However, it is unclear if MCI caregivers also experience increased caregiver burden. This study examines the level of burden among MCI caregivers as compared to HC and AD and whether specific patient or caregiver factors contribute to this perceived burden.
Participants and Methods: Participants were 134 Patient/Caregiver pairs (40 HC; 35 MCI; 59 AD) seen through the University of Michigan Alzheimer's Disease Research Center. Caregivers completed questionnaires about patients' neuropsychiatric symptoms, functional abilities, and their own caregiver burden, service needs, and well-being. Patients were administered a brief battery of neuropsychological tests including a depression inventory.
Results: MCI caregivers reported significantly more burden than HC, but less than AD. Time spent caring and development subscales (p's < .000) showed notable differences. Among MCI caregivers, patient's neuropsychiatric symptoms, performance on Trails B and functional status were related to greater burden. Increased burden was also associated with greater service need, less support, and dissatisfaction with life. No other measures of well-being were related to burden.
Conclusions: Caregivers for MCI patients experience increased levels of caregiver burden which is related to the patient's cognitive flexibility and neuropsychiatric symptoms. These results suggest MCI caregivers may be at increased risk for caregiver stress, including feelings of less support and satisfaction with life, and they appear to require additional assistance and/or education in caring for their loved one.
Correspondence: *Annie Weldon, B.S., Psychiatry- Neuropsychology, University of Michigan, 1021 Vaughn St., Apt. 7, Ann Arbor, MI 48104. E-mail: annewel@med.umich.edu*

S.A. WYLIE, E.A. CRAWFORD, W.P. VAN DEN WILDENBERG & C.A. MANNING. Expression and suppression of action impulses in Parkinson's disease: effect of speed pressure.
Objective: Pressing for performance speed increases one's susceptibility to acting on incorrect, stimulus-driven action impulses. This speed-accuracy tradeoff is especially apparent in response conflict tasks (e.g., Simon task), where features in a visual environment activate action impulses that either facilitate or conflict with goal-directed action selection. Parkinson's disease (PD) patients are less proficient at suppressing the interference produced by conflicting action impulses, so we investigated the hypothesis that pressing for performance speed would further exacerbate this deficit.
Participants and Methods: PD patients (n=15) and healthy controls (HC) (n=15) performed a Simon interference task either under speed or under accuracy performance instructions. Distributional analyses assessed susceptibility to impulsive action (fast errors) and proficiency of interference suppression (slope of reduction in Simon effect).
Results: Pressing for speed increased commission of impulsive errors for both groups similarly. PD patients were less proficient than HC at suppressing the interference produced by response impulses, but speed pressure did not exacerbate this difference. HC were more effective at suppressing interference when focusing on accuracy compared to speed, whereas PD patients showed poor suppression across both speed and accuracy conditions.
Conclusions: Action control is sensitive to adjustments in performance speed. Although pressing for performance speed did not exacerbate PD patients' enhanced susceptibility to the interfering effects of action impulses, PD patients were globally less proficient at suppressing interference. Shifting to a more deliberate performance strategy (i.e., focusing on accuracy) improved interference control to a greater extent in HC than in PD patients. These novel findings show that PD patients benefit less than HC when implementing cautious response strategies to prevent impulsive actions from interrupting goal-directed behavior.
Correspondence: *Scott A. Wylie, Ph.D., Neurology, University of Virginia, 500 Ray C. Hunt Drive, Charlottesville, VA 22908. E-mail: saw6n@virginia.edu*

Cross Cultural

N.E. COOK & A.M. BAKER. Structured Data Collection of Culturally Relevant Risk Factors in Refugees: A Case Example of Somali Bantus.
Objective: Cultural and linguistic characteristics are reflected in the samples used to develop, validate, and norm psychological tests. However, the fidelity and trustworthiness of many tests currently available are influenced or biased between cultures. This bias presents evaluators with practical and ethical issues that are particularly accentuated when the examinee in question is of refugee status. This poster aims to illustrate the practice of structured data collection within a particular ethnic and cultural minority group, Somali Bantu refugees.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: The Somali Bantu were selected because of their increasing resettlement to the United States and their particularly traumatic cultural experience. An exhaustive literature search resulted in just 4 peer-reviewed articles on Somali Bantu refugees. Given the limited number of published studies, the authors expanded the literature search to include Somali refugees in general to ensure a more adequate account of the Bantu's cultural experience.
Results: There were 26 risk factors identified and compiled to provide evaluators with a user-friendly list of variables that Bantu clients may experience.
Conclusions: By exhaustively searching the available scientific literature (which at times may need to be expanded to fields such as epidemiology, anthropology, linguistics, etc.) on the particular minority group in question, evaluators take steps to assure that they will account for any potential risk factors that may be part of the client's cultural experience. Identification of culturally relevant risk factors and their relationship with current neurocognitive and psychosocial functioning could enhance prognostic and diagnostic decisions and improve client care. Practical implications will be explored.
Correspondence: *Nathan E. Cook, M.A., Psychology, University of Rhode Island, 10 Chafee Road, Suite 8, Kingston, RI 02881. E-mail: nathan_cook@my.uri.edu*

C.M. FUNES, J. HERNANDEZ RODRIGUEZ & S.R. LOPEZ. Informing Clinicians: Considering the Standardization Samples of Spanish-language WAIS Batteries used with US Adults.
Objective: Reliable and valid neuropsychological assessment of Spanish-speakers in the US has posed a dilemma for clinicians for several decades. In recent years, Spanish-language versions of the WAIS have been developed abroad, and are commonly used in the US. A closer understanding of the different normative compositions among versions may allow clinicians to make more informed decisions on whether the norms are useful when assessing a client. This study aims to comprehensively compare the norms of the latest Spanish-language versions of the WAIS from Spain, Puerto Rico and Mexico with the US WAIS-III from which all were adapted.
Participants and Methods: The normative data of the WAIS-III and its three Spanish counterparts were utilized for analysis. All instruments were systematically examined for differences and similarities in administration, content, scoring and demographic characteristics in their samples. Identical subtests were identified for further examination.
Results: Three identical subtests were found across versions: Block Design, Digit Symbol-Coding, and Digit Span. Estimates of sample sizes and standard deviations were computed from the standard scores of each instrument. T-tests were conducted to compare the performance of the US- and the Spanish-language samples. Significant differences were found across several age groups on all 3 tests. Chi-squares also identified significant proportional differences in the level of education of these samples.
Conclusions: These findings suggest that there are significant normative differences between the US WAIS-III and its Spanish-language versions. Knowledge of these differences may serve clinicians when selecting measures for use with Spanish-speaking adults in the US.
Correspondence: *Cynthia M. Funes, M.A., Georgia State University, 140 Decatur St, Atlanta, GA 30303. E-mail: libelulavaga@gmail.com*

R. KAMAT, M. GHATE, T. GOLLAN, R. MEYER, F. VAIDA, R. HEATON, S. LENTENDRE, D. FRANKLIN, T. ALEXANDER, I. GRANT, S. MEHENDALE & T. MARCOTTE. Effects of Marathi-Hindi Bilingualism on Neuropsychological Performance.
Objective: In studies of disparate languages, bilingualism is associated with lower verbal fluency and enhanced executive functioning. We hypothesized that a bilingual advantage would be observed in the executive domain, but for verbal performance, the relationship would be affected by cognate frequency as well as phonological and orthographic similarity, and would be associated with enhanced fluency for nouns, while lexical and structural differences in verbs would impart a bilingual disadvantage.
Participants and Methods: Participants were 88 male and 86 female HIV seronegative, native Marathi speakers from Pune, India (mean age = 33.2 [SD=7.8]), mean education=9.2 [SD=4.1]). Participants completed tests of executive functioning (Color trails test (CTT), Stroop, Halstead Category test (HCT)) and verbal fluency (Letter, Animal, Action fluency) in Marathi. A bilingualism index score (BIS) was calculated as the ratio of self-reported proficiency in Hindi to that in Marathi (M=.63, SD=.28). BIS was entered into a model to predict NP performance, after adjusting for demographic variables.
Results: In the executive functioning domain, BIS significantly predicted better CTT ($p<.001$), with the effect on Stroop interference scores approaching significance ($p=.07$). BIS did not independently predict HCT performance ($p=.47$). On the three verbal fluency tests, BIS predicted better letter fluency ($p=.02$), approached significance for animal fluency ($p=.08$), but not action fluency ($p=.92$).
Conclusions: The effect of bilingualism, as measured by self-rated proficiency, is impacted by the languages under study. An advantage is observed for tasks involving inhibition and switching, but not abstraction. For verbal measures, a bilingual advantage is noted on tests that elicit nouns, but not verbs, perhaps due to greater dissimilarity between Marathi and Hindi verbs.
Correspondence: *Rujvi Kamat, BS, SDSU/UCSD Clinical Psychology JDP, 150 West Washington, 2nd Floor, San Diego, CA 92103. E-mail: rkamat@ucsd.edu*

J. KELDERMAN & S. TIBBETTS. Cultural Considerations in the Neuropyschological Evaluation of Children on Grand Cayman.
Objective: Grand Cayman is a small island in the Caribbean home to a variety of subcultures and expatriates. Little, if any, information is available regarding cultural issues as they pertain to the neuropsychological assessment of children on Grand Cayman. The authors have collaborated to provide neuropsychological services to families residing on the island. The goal of this discussion is to describe challenges they have encountered, and to present techniques and strategies developed in an attempt to address cultural issues impacting pediatric neuropsychological evaluations. A cohort of children referred for neuropsychological evaluations over the last year is also described.
Participants and Methods: 33 children between the ages of 4 and 13 with parents representing 9 different nationalities participated in neuropsychological evaluations over the past year.
Results: The most frequent diagnoses in this referred sample were ADHD/ADD, Autism, learning disabilities, and dyspraxia. Identified cultural variables warranting distinct consideration include dialect, accents, the strong reliance on in-home childcare by most families, views of neurodevelopmental disorders and mental health diagnoses, attitudes towards children, and discriminatory attitudes between subcultures on island. Strategies addressing these issues include close collaboration with clinicians native to Grand Cayman and the Caribbean, emphasis on validity statements and limitations of obtained scores, consultation with native speakers including testing of limits using a native speaker, and de-emphasizing diagnoses while emphasizing the child's strengths and weaknesses. Limited resources for intervention and treatment constitute a major concern for clinicans and families alike.
Conclusions: Intimate knowledge regarding cultural variables is an essential component in the neuropsychological evaluation of children on Grand Cayman. Future goals include the development of a study protocol examining characteristics of non-referred children.
Correspondence: *Jill Kelderman, Ph.D., The Center for Pediatric Neuropsychology, 5601 Corporate Way, Suite 115, West Palm Beach, FL 33407. E-mail: drk@neuropsych4kids.com*

M.H. KOSMIDIS, C.H. VLAHOU & G. KIOSSEOGLOU. Examining Memory Deficits in the Greek Population.
Objective: We developed a Greek list learning task based on the California Verbal Learning Test-II and explored its ability to differentiate patients from healthy individuals.
Participants and Methods: Our sample consisted of 313 healthy individuals and three patient groups to explore the test's ability to differentiate groups with known memory deficits: 56 patients with schizophrenia, 15 with multiple sclerosis (MS) and 26 with chronic obstructive

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

pulmonary disease (COPD). We conducted stepwise a linear regression analysis to explore the influence of demographic characteristics of the normative sample on performance and stepwise discriminant function analyses matching each of three patient groups with a subset of the control group based on age and education.
Results: We found that age, education and sex predicted performance on the task in accordance with previous literature on the English version of the test (with younger age, greater level of education and female gender being associated with better performance). We also found differential patterns of the test's discriminant ability among the three patient groups highlighting the point in the word list learning process, which can account for poor performance in each group. In schizophrenia this impairment permeates all steps in the process beginning with learning with repetition (total recall from five trials: Wilk's lamda=.591) and in both MS and COPD it is reflected in recognition (Wilk's lamda=.896 and .968, respectively).
Conclusions: The present word list learning test can be useful in assessing memory processing in Greek-speaking individuals, as well as in understanding the pattern of memory breakdown in psychiatric, neurological and other medical patients.
Correspondence: *Mary H. Kosmidis, Ph.D., School of Psychology, Aristotle University of Thessaloniki, University Campus, Thessaloniki 54124, Greece. E-mail: kosmidis@psy.auth.gr*

P.H. LEE. Collectivistic Coping Predicting Psychosocial Outcomes Among Asian Americans with Acquired Brain Injury.
Objective: Coping with acquired brain injury (ABI) in Asian Americans may be distinct from predominant individualistic coping theories that place primary emphasis on fulfilling individual needs. Asian Americans may prefer utilizing collectivistic coping, a style congruent with Asian cultures that values maintaining interrelatedness, group harmony, and upholding social expectations (Oyserman, Coon, & Kemmelmeier, 2002). The purpose of this study was to determine the interrelationships among coping style, Asian values, and psychosocial functioning in Asian Americans coping with ABI.
Participants and Methods: 48 community-dwelling Asian American adults with ABI were recruited for this study. Seven dimensions of collectivistic coping proposed by Yeh et al. (2006) were explored to determine associations with psychosocial functioning, problem-focused coping (Lazarus & Folkman,1984), and Asian values (Kim, Li, & Ng, 2005). Predictors of quality of life, anxiety, and depression were also determined.
Results: Results indicated that of the seven dimensions, family support significantly predicted increased quality of life ($p < .05$), and social activity significantly predicted decreased anxiety ($p < .01$) and depression ($p < .05$), after controlling for gender, injury-related factors, and problem-focused coping. Post-hoc analyses indicated that despite not being directly correlated with psychosocial outcomes, forbearance significantly predicted decreased quality of life ($p < .05$) and increased anxiety ($p < .05$) after controlling for gender and type of injury. Problem-focused coping was not significantly related to psychosocial outcomes but was positively associated with forbearance, and only forbearance and fatalism were significantly associated with Asian values.
Conclusions: These findings should be incorporated into rehabilitation programs that serve Asian Americans with ABI.
Correspondence: *Patricia H. Lee, University of Massachusetts Boston, 335 Pearl Street, Cambridge, MA 02139. E-mail: happyleep@yahoo.com*

A.E. PUENTE, M. HERNADEZ, R.V. LOPEZ & L. SAN MIGUEL. Are Different Spanish Versions of the WAIS "Equivalent?"
Objective: The WAIS has been the most often used test of intelligence in English and Spanish. There are three frequently used versions of the WAIS in Spanish: Mexican (Manual Moderno), Puerto Rican (Psychological Corporation/Pearson), and Spanish (TEA). No study has been reported that has assessed the psychometric and cognitive equivalence of these three tests.
Participants and Methods: We report a comparison of the three tests, specially the WAIS III since that is translated and published for use of respective countries, using the following several criteria to assess equivalence
Results: First, only the Puerto Rican version (EIWA) is readily available in the US as the other two can only be purchased from Mexico or Spain and questions remain as to potential violation of copyright for the use of those tests purchased in/from other countries. Second, the Mexican and Spanish versions have the same name (WAIS) with the Puerto Rican translating the title in Spanish. Third, all tests have similar number of subtests and all subtests are found in the same order. Fourth, though most subtests have similar number of items, not all do. Outside of Digits, approximately one third of the questions have different questions, often being radically different. Fifth, normative samples vary widely, in terms of total numbers, gender, age, and other variables such as selection and location of subjects. Finally, raw score to scale score and scale score transformation are not equivalent.
Conclusions: In summary, the three tests are equivalent in concept but not in reality.
Correspondence: *Antonio E. Puente, Ph.D., Psychology, UNCW, Department of Psychology, Wilmington, NC 28403. E-mail: puente@uncw.edu*

R.N. ROBBINS, J. JOSKA, T. LINDA & C. ROBERTSON. Assessing the feasibility and acceptability of neuropsychological testing for HIV-associated neurocognitive disorders among Xhosa-speaking South Africans.
Objective: South Africa (SA) has an estimated 5.5 million people living with HIV who are at high risk for developing HIV-associated neurocognitive disorders (HAND). Thus, there is a strong need to diagnose HAND. However, SA poses numerous challenges to do this. SA has 11 national languages, high rates of illiteracy and low education, and neuropsychological (NP) testing is not common. While there is a great need for NP testing to detect HAND, it is not clear how viable it is and to what extent South Africans unfamiliar with it will accept it. The purpose of this study was to assess the experience of Black, Xhosa-speaking South Africans taking a battery of NP tests.
Participants and Methods: Twenty in-depth interviews tapping were conducted among Black, Xhosa-speaking South Africans (10 HIV- and 10 HIV+) who had never taken NP tests before.
Results: Thematic and content analysis indicated that participants were: not familiar with NP or similar tests, had limited understanding of what the tests are used for, were educated in resource-poor school systems, and did not know about HAND and/or other neurocognitive disorders. Interviewees did report: comfort taking the tests, thinking the tests would yield important information, and few difficulties with the testing procedures and environment.
Conclusions: Conducting NP tests for the detection of HAND in South Africa is feasible and acceptable, though education about what NP tests and HAND are is needed. Furthermore, given the context of SA, normative data on a variety of NP tests is needed for the various language groups.
Correspondence: *Reuben N. Robbins, Ph.D., HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, 1051 Riverside Dr., Unit 15, New York, NY 10032. E-mail: rnr2110@columbia.edu*

R.N. ROBBINS, J. JOSKA, T. LINDA & C. ROBERTSON. Detecting HIV-Associated Neurocogntive Disorders in South Africa: The Need for Culturally Appropriate Tests and Norms.
Objective: With one of the highest rates of HIV infection in the world, South Africa's 5.5 million people living with HIV are at high risk for developing HIV-associated neurocognitive disorders (HAND). While there is an urgent need to detect HAND in South Africa (SA), numerous challenges exist to doing so. Few neuropsychological (NP) tests with appropriate norms exist for a population with 11 national languages, and high rates of illiteracy and low education. Furthermore, health care resources in SA are very limited and few trained personnel (e.g., neurologists and neuropsychologists) exist to conduct HAND testing and diagnosis. Thus, easy to administer screening tools to detect HAND are needed. The purpose of this study was to test whether three easy to administer neurocognitive screening tools could detect HAND.
Participants and Methods: Thirty demographically similar HIV- and HIV+ Black, Xhosa-speaking South Africans were administered the International HIV Dementia Scale (IHDS), the Montreal Cognitive Assessment (MoCA), and the Grooved Pegboard test (GP).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: HIV+ participants performed significantly worse on the IHDS ($p = .003$) and GP dominant hand ($p = .019$). Performance on the MoCA varied. Most interestingly, though, both groups performed equally poorly on the necker cube drawing, picture naming of a rhinoceros, and abstraction subtests of the MoCA.
Conclusions: While commonly-used NP tests may be able to detect HAND, NP tests used in SA may need to be carefully modified and field tested taking into account language, familiarity with NP tests, and ability to perform routine tasks, such as drawing.
Correspondence: *Reuben N. Robbins, Ph.D., HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, 1051 Riverside Dr., Unit 15, New York, NY 10032. E-mail: rnr2110@columbia.edu*

M. RODRIGUEZ-RIVERA, H.A. BENDER, L. WHITMAN, J. WEINFELD, B. VAZQUEZ & W.B. BARR. Premorbid Estimates of Neuropsychological Functioning in Hispanics.
Objective: Measures of premorbid intellectual ability are instrumental to the assessment of neurologically-compromised populations. Although the Word Accentuation Test (WAT), Test de Vocabulario en Imagenes - Peabody (TVIP), and Ravens Standard Progressive Matrices (RSPM) have each been identified yielding a robust estimate of prior intellectual functioning in Spanish speakers (e.g., EIWA, the Spanish-language version of the WAIS), their respective ability to predict global neuropsychological functioning is largely unknown. The present study examines the relationship between three measures of premorbid abilities appropriate for Spanish-speakers (WAT, TVIP, and RSPM) and the RBANS Total Score.
Participants and Methods: Fifty-six neurologically-healthy Spanish-speaking volunteers were administered the WAT, TVIP, RSPM, and RBANS; participants exhibiting evidence of psychiatric or intellectual impairment (as indicated by a Spanish-language mental status screening instrument) were excluded from the study. The mean age of the sample was 37.54 years (11.11 S.D.) and average years of education was 13.56 (3.13 S.D.).
Results: Multiple regression analyses were conducted to examine the predictive value of three Spanish-language measures of premorbid ability on RBANS Total Score. TVIP total raw score in conjunction with age and education were adequate predictors of RBANS Total Score ($F(2, 54) = 3.031$, $p < .05$). However, neither the WAT nor the RSPM were significant predictors.
Conclusions: Results suggest that receptive vocabulary is a better predictor of neuropsychological functioning than tests of accentuation or nonverbal analogic reasoning in Hispanics. Further research is needed to validate the TVIP's predictive value of global neuropsychological functioning and its clinical utility in varied clinical populations.
Correspondence: *Marivelisse Rodriguez-Rivera, PsyD, Ponce School of Medicine, PO Box 670, Cidra 00739, Puerto Rico. E-mail: marivelisse@gmail.com*

T.M. SCOTT, D.J. HARDY, M. COTTINGHAM, T.L. VICTOR, E. ROMERO, B. PARISH, C. FLORES, K. FLOTT, T. LO, M. TURNER, J. RIVERA & M.J. WRIGHT. ESL Status and SES in Neuropsychological Test Performance in Hispanic College Students.
Objective: Differences in neuropsychological test performance between ethnic groups have been widely documented. The present study evaluates the factors of language (English) proficiency and socioeconomic status (SES) in test performance differences between Hispanic and White participants. We predict that language proficiency and SES will largely account for group differences in test performance.
Participants and Methods: Participants were 38 neurologically healthy college undergraduates divided into three groups: White ($n = 10$, mean age = 20.5), Hispanic with English as a first language (EFL) ($n = 11$, mean age = 18.7), and Hispanic with English as a second language (ESL) ($n = 17$, mean age = 19.0). Analyzed were measures of verbal comprehension, verbal fluency, visual memory, verbal memory, processing speed, executive function, and motor speed. Group comparisons were statistically analyzed and childhood SES was controlled for.
Results: Comparison between the groups revealed that Hispanic ESL participants performed more poorly on tests of verbal comprehension, verbal fluency, visual memory, processing speed, and executive function ($p < .04$). However, when controlling for SES, only a difference in verbal comprehension and processing speed ($p < .04$) was found.
Conclusions: In general, these results support our hypothesis and highlight the importance of contextual factors when testing different ethnic groups. Indeed, although age and education levels were equivalent among participants, language proficiency and SES both had a significant association with test performance among Hispanics and at least partially account for poorer neuropsychological test performance.
Correspondence: *Travis M. Scott, BA, Loyola Marymount University, 1 LMU Drive, MSB:8299, Los Angeles, CA 90045. E-mail: tscott11@lion.lmu.edu*

A.M. STRUTT, B.M. SCOTT, S. SHRESTHA & M.K. YORK. A comparison of Rey-15 scoring systems and alternative indices of suspect effort with primarily Spanish speaking older adults.
Objective: The Rey 15-Item Memory Test (Rey-15) is among the most popular instruments employed by neuropsychologists to detect feigned memory deficits, and several different scoring systems have been proposed for this measure to augment its psychometric properties with various patient populations. However, few researchers have attempted to further validate these scoring systems or investigate the clinical utility of this measure with an ethnic-minority sample. This study examines the potential influence of socio-demographic characteristics on the Rey 15 and compares the specificity of various scoring systems proposed for this instrument with six additional malingering indices in an elderly sample of primarily Spanish speaking healthy controls (HCs).
Participants and Methods: Sixty-six HCs ages 50-69 stratified by education (6-12 and 13+) with no incentive to malinger, were administered the Rey-15 at the commencement of a comprehensive neuropsychological battery.
Results: Results failed to show a contingency of socio-demographic variables on Rey-15 performance. Basic mental status as measured by the MMSE was the only significant predictor of performance in participants with 6-12 years of education, but not for participants with ≥13 years of education. A total recall score of 6 yielded the greatest specificity (100%), while alternative scoring methods produced sensitivities comparable to those derived from the other neuropsychological tests examined (67.7%-95.5%).
Conclusions: Preliminary normative data on the Rey-15 for primarily Spanish speaking older adults, stratified by education is provided in conjunction with recommendations regarding the use of the recognition trial when interpreting results.
Correspondence: *Adriana M. Strutt, Ph.D., Neurology, Baylor College of Medicine, 6550 Fannin, Smith Tower 1801, Houston, TX 77030. E-mail: adrianam@bcm.edu*

Symposium 16: The Differential Contribution of White and Gray Matter to the Phenotypic Expression of Dementia.

Chair: David Libon

Discussant: Kenneth M. Heilman

10:45 a.m.–12:15 p.m.

D.J. LIBON & K.M. HEILMAN. The Differential Contribution of White and Gray Matter to the Phenotypic Expression of Dementia.
Symposium Description: Recent population and longitudinal aging studies suggest that many patients with dementia present with a variety of underlying neuropathology. Such findings pose new challenges for the clinical diagnosis of dementia syndromes such as Alzheimer's disease (AD) and vascular dementia (VaD). Indeed, the new diagnostic criteria for AD acknowledge vascular disease as an important factor to be

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

considered before an AD diagnosis can be made. The theme of this symposium revolves around how quantifying certain white/ gray matter MRI parameters independently contribute to the phenotypic expression of dementia. Price and colleagues re-examined the hypothesis that a threshold of white matter alterations needs to be present before dementia patients present with prominent executive deficits. Tanner and colleagues found that different regions of gray/ white matter alterations account for amnesic and dysexecutive impairment seen on verbal serial learning tests. Lamar and colleagues examined the relationship between white/ gray matter and depression and found symptoms of depression to be related to caudate as well as specific white matter alterations. Seidel and colleagues looked at whether white/ gray matter alterations contribute to functional disabilities and found differing patterns of errors as related to specific white/ gray matter alterations. These papers suggest that it may be possible to use a combination of neuropsychological and MRI biomarkers to assess the relative contribution of specific anatomic regions as related to dementia. Thus, the work presented in this symposium suggests a more sophisticated approach to the phenotypic operational definition of what has been traditionally viewed as Alzheimer's disease and vascular dementia.

Correspondence: *David J. Libon, Ph.D., Dept of Neurology, Drexel University, 245 North Broad St., Philadelphia, PA 19102. E-mail: libondj@gmail.com*

C.C. PRICE, S. TOWLER, M. SANDRA, T. JARAD, M. LAMAR, T. GIOVANNETTI, E. JOEL, K.M. HEILMAN, I. SCHALFUSS, P. ALFIO & D.J. LIBON. Re-Examination of the 25% Threshold for Symptomatic Leukoaraiosis.

Objective: Prior research using a visual rating scale measuring MRI leukoaraiosis (LA) suggests that when LA involves 25% of the white matter, prominent executive deficits are present in dementia. This study re-examined the so-called 25% rule by quantifying LA volume as a proportion of intact white matter (LA/ white matter) obtained from the MRI scans of dementia patients.

Participants and Methods: T1 and FLAIR MRIs of 82 individuals with dementia and variable levels of LA were quantified for LA volume (rater reliability > .99) and the total volume of cerebral white matter. After correcting for total intracranial volume, a variable representing the proportion of total LA over total white matter was calculated. Using hierarchical regression procedures controlling for age, education, and MMSE, LA% was iteratively regressed by percentage point onto a composite measure of executive function (letter fluency ['FAS'] and the WMS-Non-Automatized Mental Control Index).

Results: Within the entire sample LA ranged from 0 to 22%. LA explained a significant proportion of executive function when it involved 3% or more of the white matter (Beta= -.30, R2 = .36). Thresholds of 10-15% failed to add significantly to models. Curve estimations indicate that LA% and executive function relations are not linear in nature (R2= .01).

Conclusions: The 25% LA threshold rule for the occurrence of executive dysfunction is an overestimate when LA is volumetrically quantified over white matter. Threshold points and the non-linear nature of LA may indicate differences in underlying pathology in dementia.

NINDS K23NS060660 (CP), Alzheimer's Association IIRG0627542 (DL)

Correspondence: *Catherine C. Price, PO Box 100165, 101 S. Newell Drive, Gainesville, FL 32610. E-mail: cep23@PHHP.UFL.EDU*

J. TANNER, C.C. PRICE, S. TOWLER, S. MITCHELL, J. COLLAZO, S. MORAN, J. EPPIG, I. SCHALFUSS, K.M. HEILMAN, A. PENNISI & D.J. LIBON. Dissociating Gray and White Matter Contributions to Verbal List Learning and Memory.

Objective: White and gray matter might be related to different performance patterns on verbal list learning tests. Disrupted regional white matter (i.e., subsurface, deep, or periventricular – termed leukoaraiosis [LA]) or reduced gray matter (i.e., hippocampus, caudate) may differentially affect verbal list learning and memory performance.

Participants and Methods: 81 dementia patients (age=80.15[5.11]; education=12.03[2.72]; MMSE=22.34[3.06]) were administered the Philadelphia (repeatable) Verbal Learning Test (P[r]VLT) and received T1 MPRAGE and T2 FLAIR MRI scans. Ten indices of the P[r]VLT were used to create four factor-derived composite scores. MRI brain structure volumetrics were calculated. Total whole brain LA volume was also quantified. The four P[r]VLT composite scores, Delayed, Cued Recall, Intrusions, Immediate Free Recall, and Recognition Discriminability were used as dependent variables in hierarchical linear regression analyses with volume-corrected hippocampal, LA by region, lacunar infarct, and caudate volumes entered in separate blocks, respectively. Age, education, and MMSE score served as control variables for all analyses.

Results: For the delayed recall and intrusion factors, hippocampal volume was a significant predictor (B= 0.28; B= -0.27, respectively) but not regional LA. For the recognition discriminability, only deep LA volume (B= 0.23) predicted performance. No neuroanatomic structure predicted P[r]VLT immediate free recall.

Conclusions: In dementia patients, there appears to be dissociations between gray/ white matter contributions to verbal memory. Smaller hippocampi predict worse delayed recall and more intrusion errors, classic stigmata of an amnesic syndrome. However, larger deep LA volume is associated with better recognition scores, consistent with a dysexecutive profile.

NINDS K23NS060660 (CP), Alzheimer's Association IIRG0627542 (DL)

Correspondence: *Jarad Tanner, PO Box 100165, 101 S. Newell Drive, Gainesville, FL 32610. E-mail: jjtanner@phhp.ufl.edu*

M. LAMAR, C.C. PRICE, T. STEPHAN, S. MITCHELL, J. COLLAZO, J. TANNER, J. EPPIG, A. PENNISI & D.J. LIBON. The impact of white matter and subcortical structure alterations on mood in euthymic older adults with dementia.

Objective: Clinical depression in aging is associated with cerebral small vessel disease and alterations involving subcortical structures including the basal ganglia. The endorsement of depressive symptoms in the absence of clinical depression, common in euthymic older adults, is also associated with white matter (WM) damage. Less clear is the extent to which these associations remain in the presence of dementia. We investigated the relationship between WM damage, alterations in subcortical structures, and depressive symptomatology in dementia.

Participants and Methods: 118 individuals with dementia (age=79.5[5.1]; MMSE=22.3[3.0]) received T1-weighted MPRAGE and T2-weighted FLAIR imaging as part of their clinical evaluation. Depressive symptomatology [Geriatric Depression Scale (GDS) scores < 12] was investigated as it related to volumetric measurements of WM and subcortical structures thought to be involved with depression.

Results: GDS correlated with a visual rating scale of leukoaraiosis [r(105)= .22,p< .01]; however, assessments of deep and periventricular WM load corrected for total intracranial volume did not reveal significant associations. In contrast, as corrected caudate volumes declined, depressive symptomatology increased in our sample [r(83)= -.20, p< .04], driven by the association between the right caudate and GDS [r(83)= -.21,p< .02; left: r(83)= -.14,p< .10]. Results did not change after adjusting for age and overall cognitive status.

Conclusions: This study demonstrates an association between gross WM damage, caudate integrity, and the endorsement of depressive symptoms in euthymic older adults with dementia. While subtle distinctions in WM neuropathology may only occur with the overt manifestation of clinical depression in this population, depressive symptomatology appears to involve subcortical structures associated with mood regulation and emotional functioning.

NINDS K23NS060660 (CP), Alzheimer's Association IIRG0627542 (DL)

Correspondence: *Melissa Lamar, UIC - Department of Psychiatry, 1601 W Taylor Street, Chicago, IL 60612. E-mail: mlamar@psych.uic.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

G. SEIDEL, T. GIOVANNETTI, C.C. PRICE, S. TOWLER, J. TANNER, S. MITCHELL, J. EPPIG, A. PENNISI & D.J. LIBON. Neuroimaging Predictors of IADLs and Everyday Action Errors in Dementia.

Objective: To investigate relations between brain structure volumes, IADL ratings, and everyday action errors in dementia.

Participants and Methods: Dementia participants underwent volumetric T1-weighted MRI to determine 3D volumes of intact regional white matter, cortical gray matter, hippocampus, and caudate nucleus, adjusted for intracranial volume. Intact white matter was determined by subtracting leukoaraiosis (LA) from surface, deep, and periventricular regions. Relationships were calculated between MRI measures and informant Lawton & Brody (1969, n= 58) IADL behavior and a direct assessment of everyday action (Naturalistic Action Test, NAT; n= 28). Errors coded from the NAT included omissions (failure to complete a task step), commissions (inaccurate step execution), and additions (performance of off-task steps).

Results: Correlations identified significant relationships between IADL ratings and intact deep white matter (r= .30, p< .05). Correlations were also obtained between NAT addition errors and cortical gray matter (r= -.49, p< .01), hippocampus (r= - .39, p< .05), and intact deep white matter (r= -.33, p< .08). Commission errors were related to intact deep white matter, trending towards significance (r= -.36, p< .06). No relations between omission errors and brain structure volumes were identified.

Conclusions: Reduced volume of intact deep white matter was associated with greater deficit on a questionnaire-based measure of IADLs, with increases in specific errors (commission and addition) on a performance-based measure. Reduced volumes of cortical gray matter/ hippocampus were associated with increasing addition errors. Findings highlight an important role for deep white matter in functional deficits and suggest unique neuroanatomic substrates for different action error types in dementia.

NINDS K23NS060660 (CP), Alzheimer's Association IIRG0627542 (DL)

Correspondence: *Gregory Seidel, 475 Weiss Hall, 1701 N. 13th Street, Philadelphia, PA 19140. E-mail: tub64355@temple.edu*

Symposium 17: Cross-cultural neuropsychology: Translation, modification, and empirical testing of cognitive measures across diverse populations and settings.

Chair: Reuben N. Robbins

10:45 a.m.–12:15 p.m.

R.N. ROBBINS, M. SCHULER, K. THOMAS, A. STRUTT MACLAS & H. FERRETT. Cross-cultural neuropsychology: Translation, modification, and empirical testing of cognitive measures across diverse populations and settings.

Symposium Description: Cross-cultural neuropsychological (NP) assessment is challenged by many obstacles, yet there is an increasing need to modify, develop, and translate commonly-used NP measures for use in a variety of different cultures and languages. This need is driven by research studies in developing-world countries where the need to detect NP impairment is vital to understanding various disease processes (e.g., HIV), and by clinical demand within immigrant populations in the United States. Our ability to use NP assessments to help make good legal, educational, and policy decisions in international and immigrant populations is hamstrung by the lack of appropriate normative data, translations, and test stimuli. Furthermore, current guidelines as to best practices for translating tests into local languages, or for selecting and developing culturally appropriate tests are not clear and consistent. This symposium is an attempt to develop such guidelines. Presenters, who work cross-culturally in clinical and research settings, will discuss processes they used to: 1) translate and norm a dementia battery for Hispanic immigrants; 2) assess the suitability of three commonly-used NP tests for use in South Africa; and 3) select and interpret NP tests for Hmong and Somali immigrants. Through discussing the challenges negotiated and methodologies employed to translate and develop culture-fair tests, the symposium will highlight available procedures and offer suggestions on how to best adapt NP tests for cross-cultural use.

Correspondence: *Reuben N. Robbins, Ph.D., HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, 1051 Riverside Dr., Unit 15, New York, NY 10032. E-mail: rnr2110@columbia.edu*

K. THOMAS, H. FERRETT, T. DOWLING, S. CONRADIE & P. CAREY. Cultural modification and testing of a Boston Naming Test short form in South Africa.

Objective: Neuropsychologists in many different countries use the Boston Naming Test (BNT) to assess visual confrontation naming ability. Performance on the test is heavily influenced by factors such as degree of literacy, educational attainment, and cultural familiarity of test items. Hence, clinicians and researchers working with populations different from the original standardization sample (Caucasians in the United States) must think carefully about whether and how to modify the test so that it is appropriate for use in their cultural and linguistic context.

Participants and Methods: Here, we describe procedures we undertook to modify a 15-item version of the BNT for use with English-, Afrikaans, and Xhosa-speaking individuals in the Western Cape province of South Africa. We then present performance data (including test-retest reliability) for children, adolescents, young adults, and older adults from those three language groups on our modified BNT short form.

Results: Those data show that English-speaking individuals perform at a level almost equivalent to that of the original standardization sample, but that Afrikaans- and Xhosa-speakers perform significantly more poorly, even when the test is administered in their home language.

Conclusions: We use these findings to argue for the use of demographically-corrected normative data in our South African population, at least as a first step toward addressing between-group discrepancies in performance. Finally, we show that our modified version of the test is better than a US-standard 15-item BNT at distinguishing elderly demented patients from cognitively intact older adults in a South African memory clinic setting.

Correspondence: *Kevin Thomas, University of Cape Town, Dpeartment of Psychology, Rondebosch 7701, South Africa. E-mail: Kevin.Thomas@uct.ac.za*

H. FERRETT & K. THOMAS. Neuropsychological assessment in South Africa: Empirical evaluation of the suitability of three WHO-endorsed tests.

Objective: The World Health Organization recognizes the need for neuropsychological tests capable of fair assessment cross-culturally. Hence, they commissioned the development of new culture-fair instruments (e.g., the Children's Color Trails Test and a version of the Auditory Verbal Learning Test that uses universally familiar stimulus items), and they compiled a list of existing instruments (e.g., the Grooved Pegboard Test) that are presumed to be universally appropriate. This study responds to the WHO's request for empirical verification that tests such as those listed above are indeed culturally fair.

Participants and Methods: We administered those three tests to 195 typically developing adolescents (12-15 years) resident in the greater Cape Town urban metropole in South Africa. Apart from two word substitutions in an AVLT list (necessary due to linguistic ambiguity), test instructions and stimulus items were translated and independently back-translated without requiring adaptation. The tests were well understood and well tolerated by participants, and proved time-efficient, cost-effective, and easy to administer and score.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: A series of one-sample t-tests demonstrated equivalent performance between the standardization samples and South African adolescents with an advantaged quality of education on some, but not all, of the tests. South African adolescents with disadvantaged quality of educational displayed pervasively poorer performance across all three tests ($p < .001$), however.
Conclusions: These findings suggest that, although the instruments seem, on face value, appropriate for use in the defined culturo-demographic context, the use of local normative datasets (particularly ones stratified by appropriate demographic variables) is necessary to mitigate against the possibility of inaccurate diagnostic inferences.
Correspondence: *Helen Ferrett, Stellenbosch University, Department of Psychiatry, Tygerberg 7505, South Africa. E-mail: hferrett@sun.ac.za*

M. SCHULER. Cross cultural neuropsychological evaluation in newly arrived populations with limited education in practice settings.
Objective: Cross-Cultural neuropsychological evaluation presents numerous challenges, requiring gathering qualitative and quantitative information within an interpretive framework of neurological, cultural, social, and community data pools. This presentation will focus on the application of current knowledge and practice in evaluating newly arrived individuals from cultures that are very different from the dominant culture in the United Sates who have limited education and assessment experience when referral questions pertain to neurocognitve functioning. Not only are there rarely any normed objective assessment procedures, but cultural disparity issues and a limited level of education are additional variables which complicate interpretation.
Participants and Methods: This discussion will highlight some of the challenges faced by this clinician when evaluating people from Southeast Asia (Hmong, Laotian, Karen) and east Africa (Somali, Ethiopian). The process of constructing a battery that can be flexibly modified when new procedures and data are available will be described.
Results: An interpretive strategy using new data collected from the presenter's practice and current published norms and while recognizing the unique contribution of each culture to performance will be used to articulate as one more stepping stone to strengthen the validity and utility of the test results. Current assessment literature related to limited education and cultural disparity will be discussed.
Conclusions: While translating, modifying, and norming neuropsychological tests is faced with many challenges, using a well-informed approach (both culturally and psychometrically) may yield valid and reliable tests with important clinical utility.
Correspondence: *Mark Schuler, 3812 Thomas Ave S., Minneapolis, MN 55410. E-mail: MarkSchuler@comcast.net*

A.M. STRUTT. The clinical utility of a translated dementia battery for primarily Spanish speaking older adults.
Objective: Research has consistently documented the significant influence of age, education, language, and acculturation on neuropsychological (NP) test performance. This is of considerable relevance given that the Hispanic and Spanish-speaking population, which constitutes the largest U.S. ethnic minority, varies considerably in these characteristics from the English-speaking culture on which the majority of NP normative data is derived. Currently, the preponderance of NP measures utilized with primarily Spanish-speaking older adults in the US are literal translations or modifications, which do not account for the influence of language and culture and for which normative data is nonexistent. In addition, significant discrepancies regarding the administration, scoring and norming of neurocognitive measures utilized with this population are common in both clinical and research settings. Consequently, a true understanding of the assessed individual's cognitive strengths and weaknesses may not be obtained.
Participants and Methods: As a result of these considerations, data for a Spanish dementia battery administered to primarily Spanish-speaking older adults residing in the US will be presented.
Results: Similarities and differences in performance across NP measures for suspect effort, auditory attention, verbal and visual memory, and executive functioning between this age and education stratified sample and the standard English norms, which are commonly used, will be presented.
Conclusions: Developing appropriate norms are essential for the demographically diverse populations in the US. Without appropriate norms, Spanish-speaking older adults' NP test performance may be misclassified, which may in turn affect their treatment, health service options, and housing and care decisions.
Correspondence: *Adriana M. Strutt, Baylor College of Medicine, One Baylor Plaza, Houston, TX 77030. E-mail: adriana,@bcm.edu*

Poster Symposium: The Emerging Applied Neuropsychology in Venezuela.

10:45 a.m.–12:15 p.m.

Cognitive Neuroscience

C.R. JAYARO, M. MORENO DE IBARRA, C. JAYARO BRICEÑO, A. PIÑA & R. RAMIREZ. The Emerging Applied Neuropsychology in Venezuela.
Symposium Description: Neuropsychology in Venezuela, has had a slow developement at the last century. Few activities were done by public universities and some Neuropsychological units in different hospitals, but It had a short impact.
What it is presented at this simposia is a summary of what different groups are doing in this field with the creation of a graduated program in Neuropsychology open to Psychologists, physicians and educators. The discution of topics which are considered important, and in the other hand two outcomes from this work: Cases Studies done in Venezuela, which promises a long professional work of those groups.
Correspondence: *César R. Jayaro, Doctor, Behavioral Sciences, Neuroscience, UCAB, UNIMET, Av Teheran, UCAB., Caracas 1040, Venezuela. E-mail: crjayaro@yahoo.com*

C. JAYARO & M. MORENO DE IBARRA. Neuropsychological consideration in evaluating Hispanic Patient: A theorical and practical case study César jayaro, PhD.
Objective: When we talk about Hispanic Patient, we have to take many considerations about which patient we are reporting and assessing about. We could understand Hispanic patient as a person who has Spanish origin, which in nature is true. But Hispanic patient have to be considered as a person with Spanish roots, but in a different way they have important differences with this culture. Latin-Americans, which is the most common patients in Neuropsychological Assessment, are a mixture of different backgrounds; not only Spanish but Aborigine or Afro-American, are the common culture characteristic they have as a result of European colonization and subsequent immigration from Europe, Africa and Asia. However, to do that more complicated, all the countries are not the same, and they have a mayor or a minor proportion of one or another culture.
Participants and Methods: Theorical conference
Conclusions: The proposal of this conference is to discuss the term "Hispanic" which have important consequences at the time of Assess this population, in terms of norms and conclusion implied on this. Also to propose a set of variables we considerer important in neuropsychological evaluation in Venezuela which can be useful for other contexts.
A case study is presented, where comparation with different "Hispanic" norms make differences in the measure obtained.
Correspondence: *Cesar Jayaro, UNIMET, Caracas 1040, Venezuela. E-mail: crjayaro@yahoo.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

M. MORENO & C. JAYARO BRICEÑO. A Transdiciplinary Approach to Applied Neuropsychology Marianela Moreno de Ibarra, Msc (UNIMET – UCAB).

Objective: Applied Neuropsychology encompasses research, teaching and applying principles, methods and procedures to understand, assess, diagnose, and intervene the cognitive processes, conduct and its alterations related to brain structures from a comprehensive perspective that consideres the bio-psycho-social reality on a variety of individuals and populations. No discipline itself can explain complex relations of human behaviour, higher functions and their disturbances. Applied Neuropsychology seeks to provide greater knowledge and skills in the exercise of the Neuropsychology and related disciplines in Neurosciences and the Education fields trying to enable professionals from various disciplines with a more comprehensive boarding of cognitive functions and its disorders, considering their interaction with the nervous system and the socio-cultural and etnogeographic context in which people are immersed.

A transdisciplinary professional perspective implies that, with the new knowledge generated from direct interaction in the process of diagnosis and assessment of other disciplines, the professional transcends its own discipline (Martínez 2010), achieving a more profound and comprehensive approach of cognitive and emotional processes of persons under their clinical and educational responsibility and adapt its own discipline intervention strategies to the new approach taken.

Participants and Methods: Diplomate Students studying Neuropsychology.

This is a Theorical Conference

Conclusions: The teams conformed by 35 professionals (14 psychologists, 12 doctors and 09 educators) of the advanced diploma in Applied Neuropsychology of Universidad Metropolitana (UNIMET) in Caracas (Venezuela) with the new approach of the cognitive processes and its disorders, can conclude that the transdisciplinarity in Applied Neuropsychology field is not a myth but a promising reality.

Correspondence: *Marianela Moreno, UCAB, Caracas 1040, Venezuela. E-mail: mmoreno_223@hotmail.com*

A. PIÑA, C. EDUARDO, A. LEON, A. RIVAS, M. MORENO & C. JAYARO. A Case Report from the Applied Neuropsychology Approach: Is It possible the transdisciplinarity? Carballo, E., León, A., Piña, A. and Rivas, A. Diplomado de Neuropsicología Aplicada (UNIMET).

Objective: The perspective generated from the Applied Neuropsychology allow design a methodology to assess a subject in a transdisciplinary manner. This involves breaking paradigms established in each particular discipline. The transdisciplinary team consisted of a psychiatrist, psychologist and two educators. The subject was a 17 years-old female adolescent with a children history of frequent school failures and difficulties with the leading figures of authority in her environment. The assessment included the psychiatric assessment, Evaluacion Neuropsicologica Infantil (ENI), Wechsler Infant Intelligence Scale (WISC III), Bender Visual-Motor Test, the Test of Murray of Thematic Apperception and the Wartegg Test (8 fields) and the educational assessment specially designed according to the academic grade and observed difficulties. Several interviews with the subject and with her main figure of relationship were done.

All the professionals observed and participated in the whole assessment process and implementation of the selected test. Once culminated this process they began a wide discussion of results from each of the disciplines, whose focal point was generated from the neuropsychological perspective which allowed the transdisciplinary team a single perspective about subject and her problems, including the capitalization of her strengths to design an specific intervention plan, so objectively specifies weighing advances and therapeutic setbacks to a more adaptive integration in her main environment relationship.

Participants and Methods: This is a theorical and case presentation conference

Conclusions: The aforementiones assessment process allowed exceed the subjects partial vision from each particular discipline, a greater understanding of the cognitive and emotional processes, as well as that strategies of assessment and analysis of each discipline. Those promoted a better communication between each professionals and a more comprehensive cognitive intervention program.

Correspondence: *Ariadna Piña, UNIMET, Caracas 1040, Venezuela. E-mail: ariadnabpl@yahoo.com*

R. RAMIREZ, S. PACCIONE, V. ALVIAREZ, I. MONTES DE OCA, A. RETALI, H. GRIFFITH, A. ZAPATA, C. JAYARO & M. MORENO. Cerebellar Cognitive Affective Syndrome After Cerebellar Stroke: A Case Study.

Objective: Patients with cerebellar stroke may present deficits in neuropsychological domains of functioning: attention, memory, executive functions, verbal fluency, abstract reasoning, visuo-spatial functions, verbal learning and emotional modulation. This clinical entity has been investigated in recent decades and it is named "Cerebellar Cognitive Affective Syndrome (CCAS)".

Participants and Methods: We report a 59-year-old female patient, seamstress, 5 years of education, with medical history of hypertension, diabetes type 2 and controlled hypothyroidism, who suffered an ischemic infarct on the right cerebellar hemisphere.

The neurocognitive assessment performed by the interdisciplinary health team included: COGNISTAT, Luria-Christensen Neuropsychological Battery, WAIS-III, STROOP, Rey Audio Verbal Learning Test (RAVLT), Aphasia Test (Borregón and González), Bender-Gestalt Test, Hamilton Depression Rating Scale and Hamilton Anxiety Rating Scale; Neuroimaging: TAC and RMNc.

Results: Patient evidences borderline intellectual functioning and impairments in domains: selective and maintained attention; immediate, short-term and work memory; visuospatial functions; motor skills: motor programming, integrative oral praxis, regulation of oral motor acts; and executive functions: set-shifting, abstract reasoning, planning, anticipation, sequencing, social judgment, behavioral inhibition. Also symptoms of anxiety and depression were found.

Conclusions: The results of this interdisciplinary study are comparable with previous research, demonstrating the existence of Post-Infarct Cerebellar Cognitive Affective Syndrome. Evidence suggests a modulatory role of the cerebellum in the organization of higher order functions.

Correspondence: *Rossana Ramirez, UNIMET, Caracas 1040, Venezuela. E-mail: rossanaramirez@hotmail.com*

Poster Session 11: Adult and Child Assessment Methods, Multiple Sclerosis and Related Disorders

10:45 a.m.–12:15 p.m.

Assessment/Psychometrics/Methods (Adult)

L.J. ALTMANN & J.P. WILSON. Does the N-Back Task Measure Working Memory or Executive Function?

Objective: N-back tasks incorporating long rehearsal periods were designed to measure working memory during neuroimaging. Currently, self-paced n-back tasks are appearing in the literature as working memory tasks; however, there have been few attempts to verify that the n-back really taps memory processes. Further, different studies variously report response times (RTs) or accuracy as outcomes, so it is unclear what the appropriate dependent measure is for this task.

Participants and Methods: 31 college students completed visual-spatial n-back tasks (0-back, 1-back, 2-back), as well as tasks testing short term verbal and visual memory, working memory (operation span), and several versions of Stroop tasks.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Acuracy in 0-back was lower than in 1-back, and 2-back accuracy was lower than both. Accuracy across n-back levels did not correlate with verbal or visual short-term memory accuracy or working memory, but did correlate with accuracy on various versions of online Stroop tasks.

N-back RTs did not vary between 0- and 1-back, both of which were significantly faster than 2-back RTs. 1-back RTs correlated with RTs on two visual identification tasks (visual memory and oral digit symbol). Correlations with offline tasks were minimal. RTs in all n-back levels correlated with Stroop times.
Conclusions: In this study, n-back performance was highly related to Stroop performance in accuracy and RTs, and only marginally related to memory performance. This suggests that n-back tasks primarily tap aspects of executive function, particularly updating and cognitive control, rather than memory ability. This finding has important implications for research using n-back tasks as cognitive measures.
Correspondence: *Lori J. Altmann, PhD, Speech, Language & Hearing Sciences, University of Florida, 336 Dauer Hall, Box 117420, Gainesville, FL 32611-7420. E-mail: laltmann@ufl.edu*

S. KEY-DELYRIA, L. ALTMANN & B. BREZICKI. Not Just Working Memory: Complex Sentence Comprehension during Rapid Serial Visual Presentation Relates to Executive Functions.
Objective: We examined ambiguous and unambiguous sentence comprehension during whole sentence presentation (WSP) and rapid serial visual presentation (RSVP). RSVP, with sentences presented word-by-word, is commonly used in sentence processing research to study the P600. RSVP is often assumed to tax working memory (WM); however, no studies to our knowledge have directly compared WSP and RSVP or their relationship to WM. This is problematic because:
1. RSVP is rarely used in conjunction with WM tasks.
2. RSVP is used to study sentence processing in people with cognitive impairments.
3. The P600 has been linked with the P300, related to cognition.
We asked:
1. Will sentence comprehension for WSP and RSVP differ?
Hypothesis: Yes, RSVP will be less accurate and slower.
2. Is comprehension for WSP and RSVP related to cognition?
Hypothesis: Yes, RSVP will correlate most strongly with WM measures.
Participants and Methods: 23 undergraduates answered comprehension questions about ambiguous and unambiguous sentences during separate RSVP and WSP tasks. They also completed 7 cognitive tasks: Shipley Vocabulary, North American Adult Reading Test, Digit Span Forward & Backward, Operation Span, Trails Test and Stroop.
Results: We conducted 2x2 repeated measures ANOVAs (ambiguity x presentation) for accuracy and RT. We found for accuracy: main effects of ambiguity and presentation; marginal interaction. For RT: main effect of ambiguity; significant interaction.
Cognitive and sentence tasks were compared using Pearson's correlations. The main finding was that RT sentence measures correlated with Trails B and Stroop but not with WM (digit spans, OSpan). There were very few correlations between accuracy and cognitive tasks.
Conclusions: Sentence comprehension using RSVP, especially with ambiguity, may differ from WSP in terms of interpretation and cognitive demands. Rather than taxing WM, RSVP may tax sequence maintenance, inhibition and processing speed. These differences would likely be exacerbated in people with cognitive impairments.
Correspondence: *Sarah Key-DeLyria, University of Florida, 3061 SE 28th Ave, Gainesville, FL 32641. E-mail: sarahekd@ufl.edu*

A.M. BAKER & N.E. COOK. Impact of non-diagnostic information in assessment: Identification and corrective procedures.
Objective: The aim of this pilot study was to investigate the impact of common, although non-diagnostic, alterations in the graphical display of test data. The accuracy of psychological and neuropsychological evaluation may be degraded when non-diagnostic information (information of no true value) impacts interpretation, which may lead to underutilization of diagnostic (truly useful) information. It was hypothesized that increasing visual scatter, while holding mathematical properties of test data constant, would result in unequal judgments. More specifically, increased visual scatter of inter-index discrepancy would be associated with decreased perceived frequency and increased perceived aberrance.
Participants and Methods: Participants were graduate students in either clinical or school psychology (N=11) completing a course in cognitive assessment. Participants were randomly assigned a prototypically normal profile from the Wechsler Adult Intelligence Scale – IV plotted in either standard scores or percentiles with equal-unit intervals. Therefore, graphical display of percentiles had exaggerated visual scatter. Participants were then asked to make a determination of frequency and aberrance using a Likert-scale ranging from one to seven.
Results: Increased visual scatter was judged as less frequent (M=4, SD=1.79) and more aberrant (M=4.7, SD=1.21) compared to the protocol plotted in standard scores (frequency M=5.8, SD=0.84; aberrance M=2.6, SD=1.82). Nonparametric analyses (Wilcoxon-Mann-Whitney Test) revealed that even with the small sample size, non-diagnostic information influenced decision-making in frequency (z=1.79, p=.04) and aberrance (z=-1.67, p=.05).
Conclusions: The pilot study supports future research aimed to identify the magnitude and offer corrective procedures for the potential problem of non-diagnostic information impacting accuracy in assessment. Further evidence is warranted to make broad conclusions.
Correspondence: *Aaron M. Baker, Psychology, University of Rhode Island, 445 Boston Neck Rd., North Kingstown, RI 02852. E-mail: aaron.m.baker@gmail.com*

A. BENITEZ, M.D. HORNER & D. BACHMAN. Utility of the RBANS Cortical-Subcortical Index in MCI and Alzheimer's Disease.
Objective: Identifying whether a profile is "cortical" or "subcortical" is a shorthand approach to differentially diagnosing cognitive dysfunction. This study examines whether the Cortical-Subcortical Index (CSI), a deviation score using indices from the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph et al., 1998), is useful in distinguishing a cognitively intact sample from patients with more "cortical" dysfunction as in Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD). CSI scores ≥1 indicate a cortical profile, while scores <0 indicate a sub-cortical profile.
Participants and Methods: Elderly, male veterans at a Southeastern VAMC completed a neuropsychological and neurological evaluation at a multidisciplinary Memory Disorders Clinic, and patients diagnosed as cognitively intact (n=56), with MCI (n=45), or with AD (=42) were included in this study. Each patient completed the RBANS, among other measures. Only patients who provided adequate effort on testing and who completed the full evaluation were included in this study.
Results: The CSI scores of AD (M=8.42, SD=14.99) patients were significantly more "cortical" than that of the cognitively intact group (M=-2.00, SD=11.24; $F(1, 94)=7.44$, $p<.01$), but neither group was significantly different from MCI patients (M=3.49, SD=12.67). However, with a cut-off of CSI≥1, the CSI demonstrated poor classification accuracy is distinguishing intact cognition from AD (AUC=0.73, Sensitivity=0.29, Specificity=0.39, PPP=0.26, NPP=0.43, Hit Rate=0.35). Changing cut-off scores did not result in improved classification accuracy.
Conclusions: While the CSI is significantly more "cortical" in MCI and AD patients, the findings suggest that its clinical utility is limited and it thus must be used with caution.
Correspondence: *Andreana Benitez, Kent State University, 11969 Kiowa Ave., Apt 16, Los Angeles, CA 90049. E-mail: anyabenitez@gmail.com*

D.A. DENNEY, K. NOLL & L.H. LACRITZ. Dyadic Short Forms of the Wechsler Adult Intelligence Scale-IV for Estimating FSIQ and GAI.
Objective: Derive estimated Wechsler Adult Intelligence Scale-IV (WAIS-IV) Full Scale Intelligence Quotient (FSIQ) and General Ability Index (GAI) scores for use when lengthier assessments are not possible.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: A mixed diagnostic sample of 85 individuals were administered the WAIS-IV as part of a larger neuropsychological evaluation for clinical purposes [M age=60.14(13.24); M Edu=14.29(2.98)]. FSIQ and GAI estimates from four dyadic short forms were obtained by entering sums of selected subtest scaled scores from the Vocabulary (V), Block Design (BD), Information (I) and Matrix Reasoning (MR) subtests (V/BD, V/MR, I/BD, I/MR) into individual regression equations.
Results: Standard multiple regressions revealed the variance in actual FSIQ accounted for by each of the dyadic short forms was as follows: (a) V/BD=80%, (b) V/MR=76%, (c) I/BD=78%, and (d) I/MR=76%, (all p<.001). The variance in actual GAI accounted for by each of the dyadic short forms was slightly higher: (a) V/BD=87%, (b) V/MR=84%, (c) I/BD=86%, and (d) I/MR=84%, (all p<.001). Predicted FSIQs were strongly correlated with actual FSIQ (rs = .87 to .89), as were predicted and actual GAIs (rs = .91 to .94).
Conclusions: Each of the four dyadic short forms of the WAIS-IV was a good predictor of FSIQ and GAI in a mixed diagnostic sample, with V/BD yielding the best estimates and accounting for the greatest amount of variance. As might be expected, estimates correlated better with GAI than FSIQ. These data support the validity of WAIS-IV short forms when time is limited or lengthier batteries cannot be tolerated.
Correspondence: *David A. Denney, M.S., Psychiatry, UT Southwestern Medical Center at Dallas, 5323 Harry Hines Blvd, Dallas, TX 75390-8846. E-mail: david.denney@utsouthwestern.edu*

A.L. FERNÁNDEZ, M. MORONI, J. CARRANZA, N. FABBRO & B.K. LEBOWITZ. Reliability Of The Five-Point Test.
Objective: The purpose of this study was to assess the internal consistency and stability of the Five- Point Test (FPT),developed by Regard, Strauss, and Knapp (1982). A test of non-verbal fluency, the FPT is an executive measure that may be particularly useful in the evaluation of individuals with presumed frontal lobe damage.
Participants and Methods: In the internal consistency study, 209 healthy participants were administered the FPT. A split-half analysis revealed a correlation of .80 for unique designs, and .48 for perseverative errors. In the stability study, 142 healthy participants were administered the FPT on two occasions with a mean interval of 37.8 days.
Results: Across the two administration periods, a test–retest correlation of .78 for unique designs and .51 for perseverative errors was found. When the mean performances were compared across administration periods, significant differences were found for unique designs, but not for percentage of perseverative errors.
Conclusions: Taken together, the results of the two studies suggest that the internal consistency and stability coefficients of the FPT are acceptable for unique designs but low for the percentage of perseverative errors.
Correspondence: *Alberto L. Fernández, PhD, Neuropsychology, Catholic University of Córdoba/Cortex Neuroterapias, Chile 279, PB, Córdoba 5000, Argentina. E-mail: neurorehab@onenet.com.ar*

A.L. FERNÁNDEZ, G. GODOY GARCETE & P. ELLIOT. Symbol Digit Modalities Test Alternate Forms.
Objective: The Symbol Digit Modalities Test (SDMT) is mainly considered a test of attention. In order to allow for repeated testing two alternate forms were designed for the SDMT.
Participants and Methods: The two alternate forms were created using the same symbols of the original form but changing the order in the key code. The arrangement of the stimuli that the testee has to complete was maintained in its original placement.
One-hundred and eighty three individuals participated of this study. Sixty five subjects took the original (A) form. Fifty nine subjects were administered alternate form B, and another fifty nine were administered alternate form C.
Results: Mean scores on forms B and C were lower than the mean of form A. Pairwise T-tests analysis showed that these differences were statistically significant. Forms B and C did not show significant differences between each other. Levene's F test showed no significant differences between the variances of the three forms in any case.
Conclusions: According to the APA standards (1999) forms B and C should be considered equivalent rather than parallel forms of the original one.
Correspondence: *Alberto L. Fernández, PhD, Neuropsychology, Catholic University of Córdoba/Cortex Neuroterapias, Chile 279, PB, Córdoba 5000, Argentina. E-mail: neurorehab@onenet.com.ar*

A.C. LYON, T. FLOYD, S. HEVERLY-FITT, E. STAMBROOK, S. RATCLIFFE, O. SELNES, C.C. PRICE & T. GIOVANNETTI. Factor Structure of a Neuropsychological Protocol for Older Adults with Vascular Disease.
Objective: Several studies have used factor analysis to help characterize cognitive impairment in vascular dementia, but few have explored the factor structure of a neuropsychological protocol in non-demented older adults with vascular disease.
Participants and Methods: Ninety-seven non-demented older adults (age > 65) with a diagnosis of aortic stenosis and/or coronary artery disease were administered a comprehensive neuropsychological protocol. Participants with a history of recent stroke or TIA were not included. 12 raw test scores were analyzed using principal component factor analysis with varimax rotation. We predicted that the scores would fall into 5 domains: executive control, motor processing, visuospatial abilities, episodic memory, and language.
Results: Using conventional criteria (e.g., eigenvalue > 1, etc.), 4 factors emerged: visuospatial/motor functions [Grooved Pegboard (.71), JOLO (.78), Rey Copy (.52)]; working memory [Digit Symbol (.54), Mental Control (.59), Digits Backward (.74), FAS (.73)]; declarative memory [Rey Long Delay (.70), HVLT Recognition (.74), BNT (.56)]; higher order executive control [Trails B (.52), Clock Drawing Errors (.81)]. A few tests loaded on more than one factor, with overlap occurring between 1) working memory and executive control and 2) visuospatial motor functions and declarative memory (due to visual memory tests - Rey Copy, Rey Long Delay).
Conclusions: Contrary to prediction, the neuropsychological functioning of older adults with vascular risk factors may be best characterized by more than one construct related to executive functioning, with working memory and higher order executive control reflecting distinct yet overlapping processes. Episodic and semantic/language performance may be strongly associated in this population, suggesting the unitary construct of declarative memory may be useful in characterizing this population. The findings underscore the importance of establishing construct validity of neuropsychological tests with specific target populations.
Correspondence: *Tania Giovannetti, PhD, Psychology, Temple University, Weiss Hall, PSYCHOLOGY, 1701 N 13th St., Philadelphia, PA 19122. E-mail: tgio@temple.edu*

M.C. GROSCH, L.S. HYNAN, L. GRAHAM, M. PARIKH, M.F. WEINER & C.M. CULLUM. Brief Telecognitive Assessment vs. Face to Face Evaluation in Urban Caucasians and Rural American Indians.
Objective: As the availability and use of telemedicine grows, more information is needed regarding reliability of neuropsychological testing using this modality. As one of the goals of telemedicine is to provide access to healthcare services that would not otherwise be available, data are needed to show that outcomes are similar in different populations. Our objective was to compare cognitive screening performance via telecognitive assessment with traditional face-to-face testing in urban and rural groups.
Participants and Methods: Urban Caucasians (n=80) and rural American Indians (n=61) with Alzheimer's Disease or Mild Cognitive Impairment (n=46) and healthy controls (n=96) were included. Performance between telecognitive and face-to-face testing conditions was compared on the MMSE, Digit Span Forward and Backward, Months Backward, Letter Fluency, and Category Fluency. Agreement (reliability) between groups was compared using Intra-class correlation coefficients (ICC) and paired t-tests.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Reliability analysis revealed similar Intra-class correlations across all measures in telecognitive vs. face-to-face test conditions, including MMSE (M=27.70 vs. 27.75,ICC=0.946,p<0.001), Digits Forward (M=6.00 vs. 6.15,ICC=0.713,p<0.001), Digits Backward (M=4.61 vs. 4.63, ICC=0.745,p<0.001), Months Backward (M=21.08 vs. 18.13 seconds, ICC=0.810,p<0.001), Letter Fluency (M=38.26 vs. 38.38, ICC=0.913,p<0.001), and Category Fluency (M=16.63 vs. 16.93, ICC=0.810,p<0.001). In addition, all paired t-tests were non-significant (minimum p>0.15) with the exception of Months Backward (p=0.032). Similar results were found for Caucasians and American Indians when analyzed separately.
Conclusions: Cognitive screening performance did not differ significantly across testing modalities, indicating that telemedicine-based assessment using the selected measures appears to yield similar findings to face-to-face testing in urban Caucasians and rural American Indians.
Correspondence: *Maria C. Grosch, B.S., University of Texas Southwestern Medical Center, 3230 Maple Ave, #126, Dallas, TX 75201. E-mail: maria.grosch@utsouthwestern.edu*

J.M. GULLETT, C.C. PRICE, P. NGUYEN, M. OKUN, R.M. BAUER & D. BOWERS. Reliability of a Benton JOLO Short Form in Parkinson's Disease.
Objective: Patients with Parkinson's disease (PD) often exhibit mental and physical slowing, increased fatigue, and a reduction in visuospatial abilities. The standard administration of the Benton JOLO test requires 60 responses and the length of the JOLO test may cause fatigue which in turn affects the entire subsequent evaluation. A previous study on healthy controls has shown that a reliable short form can be made of the full 30-item test (Winegraden, 1998). The present study aims to reduce the number of JOLO items that can be administered to PD patients, while retaining the reliability of the original full form.
Participants and Methods: Completed JOLO forms of 74 non-demented, idiopathic PD patients (60-86 years old), and 29 age and education matched healthy controls (60-79) were collected. Responses were analyzed using Microsoft Excel and SPSS 17.0 to determine full-test equivalent scores for three proposed short form versions of the test (even, odd, and the latter 20 items).
Results: Results showed that using the latter 20 items proved to be the most reliable short form in both PD and HC, with an Intraclass Correlation (ICC) of .97 (PD) and .94 (HC). Using the even-numbered items produced an ICC of .91 (PD) and .90 (HC), and odd-numbered items produced an ICC of .89 (PD) and .91 (HC). All correlations were significant to the p<.001 level.
Conclusions: Multiple short forms can be used reliably in patients with PD, potentially reducing the fatigue effects that the full 30 item test can have on a neuropsychological evaluation. NINDS K23NS060660(CP)
Correspondence: *Joseph M. Gullett, B.S., University of Florida, Health Science Center, PO Box 100165, Gainesville, FL 32610. E-mail: gullettj@phhp.ufl.edu*

J.P. HARP, L.J. JASINSKI, D.T. BERRY, A.L. SHANDERA-OCHSNER & L.H. MASON. Detection of Malingered ADHD Among College Students.
Objective: This study evaluated the utility of several measures of neurocognitive malingering for detecting malingered attention deficit/hyperactive disorder (ADHD) among college students.
Participants and Methods: College students with and without ADHD (n = 50 and n = 38, respectively) were assigned to perform honestly or to feign or exaggerate deficits related to ADHD on a battery of neuropsychological tests and neurocognitive feigning measures (WAIS-IV Digit Span, Coding, and Symbol Search, Computerized Test of Information Processing, Nonverbal-Medical Symptom Validity Test, Test of Memory Malingering (TOMM), Letter Memory Test (LMT), Digit Memory Test, The b Test, Woodcock-Johnson III Reading Fluency). Individuals with ADHD diagnosed using fewer than two methods of assessment were excluded from the study. Participants assigned to feign were offered $50 as an incentive to feign believably. Before receiving an instruction condition, participants completed screening measures to allow comparison of demographic and diagnostic variables across groups.
Results: Neurocognitive feigning measures were insensitive to the presence of ADHD under both honest and malingering conditions and were able to distinguish feigners and exaggerators from clinical controls at high levels of specificity and moderate sensitivity. Positive and negative predictive power values showed that test utility was similar at different base rates. Using neurocognitive feigning tests in combination resulted in better sensitivity and specificity than using individual tests. Binomial logistic regression demonstrated that the TOMM provided an increment in validity in combination with the LMT for predicting malingering.
Conclusions: This study replicated and extended past studies supporting the clinical utility of employing neurocognitive feigning measures in evaluations for adult ADHD.
Correspondence: *Jordan P. Harp, M.S., Physical Medicine & Rehabilitation, University of Kentucky, 2050 Versailles Rd, Lexington, KY 40504. E-mail: jordanharp@gmail.com*

Y. HASHIMOTO, K. SAWADA, R. MITSUTO, H. YOSHIDA & M. MARUISHI. Recognition of Six Basic Emotions from Facial Expression After Traumatic Brain Injury- Explore Study.
Objective: Previous study shows that the ability of recognition of emotion from facial expression is affected by not only personal characteristics but also age or brain injury. Radice-Neumann et al.(2007) suggested that impairment of facial recognition of emotion is a significant problem for the TBI population. In the present study, patient with TBI were tested the ability of recognition of emotion from facial expression by using semantic classification task that can measure the discrimination threshold of recognition.
Participants and Methods: Fifty-nine patients with TBI and 101 normal controls were participated in this study. The threshold tracking methods was used in the task. Participants were required to classify the facial expression stimulus using linguistics labels. Facial expression stimulus became mixed with normal face in stages.
Results: Patients with TBI fell into two types; DAI patients and others. DAI patients' threshold and the type of error response was compared with those of age-matched normal controls, and other patients were compared according to their lesion. The result showed that there was no difference in performance between DAI patients and normal controls. Furthermore, there was no difference according to their lesion.
Conclusions: Our task did not reveal any impairment of recognition of emotion from facial expression with TBI patients. Although these result may appear lower validity of the task, Yoshida et al. (in press) showed age-related impairment by using same task. We discuss the differences between the results of this study and previous studies based on the neuropsychological characteristics and the difference of tasks.
Correspondence: *Yukari Hashimoto, Fukuyama University, 1-Sanzo, Gakuenmachi, Fukuyama city 729-0292, Japan. E-mail: yukari@fuhc.fukuyama-u.ac.jp*

M. HENRY, P. NOLIN, A. STIPANICIC, C. JOYAL, A. DROUIN-GERMAIN & C. CLICHE. ClinicaVR Stroop: Stroop Version 2.0?
Objective: The Stroop is a widely used neuropsychological measure and it's known to be a robust task. On the other hand, Virtual Reality (VR) has been showing a spectacular growth in interest amongst researchers. The purpose of this paper was to compare the traditional Stroop with a Virtual Stroop, the ClinicaVR Stroop (Digital MediaWorks©).
Participants and Methods: The study group was composed of 7 men and 5 women between 20 and 51 years of age (Mean: 28.8 years, SD: 11.6). Each participant completed the traditional Stroop and the ClinicaVR Stroop. The ClinicaVR Stroop is a VR task presented on a TV screen in a virtual appartement. It is composed of two conditions: one where color blocks appear on the TV screen and the subject has to click

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

on the mouse if the colour said by the computer in the same as the color block shown (which could be compared to card 1 on the traditional Stroop); and the second one where the name of a color is written in a different ink color and the subject has to click on the mouse when the color said out loud by the computer matches the ink color of the word (card 3 of the traditional Stroop).
Results: Significant correlations were found between time to complete the task on card 1 and 2 of the traditional Stroop and the number of errors on Condition 1 in the ClinicaVR Stroop (respectively: $r(11)= -6.15$, $p < 0.05$; $r(11) = -6.12$, $p < 0.05$). A correlation was also found between number of errors on the traditional Stroop task card 3 and the number of correct responses on the ClinicaVR for condition 2 ($r(11)= -6.98$, $p < 0.05$).
Conclusions: Theses results indicate promising outcomes for the ClinicaVR. Indeed, more subjects are needed, but even with a very small group, results show that the ClinicaVR could be similar to the traditional Stroop. This poster will also compare results from the ClinicaVR to other traditional tasks administered in this experiment: CPT-II and Elevator task from the TEA.
Correspondence: *Mylene Henry, Psychology, University of Quebec in Trois-Rivieres, 1020 Avenue Cote, Champlain, QC G0X1C0, Canada. E-mail: mylene.henry@uqtr.ca*

A. SNYDER & M. HISCOCK. Why is Part B of the Trail Making Test More Difficult than Part A?
Objective: The Trail Making Test,a commonly used neuropsychological test, consists of two parts—A and B—that differ in cognitive demands. However, Fossum, Holmberg, and Reinvang (1992) have shown that Parts A and B also differ in the spatial arrangement of the path ("trail") that must be followed. Consequently, if Fossum et al. are correct, Part B would be more difficult than Part A even without the difference in task complexity. The present study was designed to replicate Fossum et al.'s findings and to develop a new set of paths, based on fractal geometry, that are of comparable difficulty.
Participants and Methods: After constructing 2 equivalent fractal-based paths, we created 4 experimental conditions: (1) standard TMT (Parts A and B); (2) standard TMT paths with reversed tasks, e.g., TMT-B task on TMT-A path; (3) fractal TMT (Parts A and B); and (4) fractal TMT with reversed tasks, e.g., TMT-B task on TMT-A path. Data were collected from 48 undergraduate students at a large public university. Each participant was administered all 4 conditions in a counterbalanced sequence.
Results: ANOVA showed strong effects for both task, $p < .0001$, and path, $p < .0001$, in the conventional TMT. However, substituting the fractal paths for the standard paths eliminated differences between the TMT-A and TMT-B paths, $F < 1$, while producing an even larger task effect (A versus B), $p < .0001$.
Conclusions: The results replicate the findings of Fossum et al. that the path for TMT-B is more difficult than the path for TMT-A. Moreover, our data indicate that comparably difficult paths for TMT-A and TMT-B, designed according to fractal principles, can remove the effects of spatial arrangement from the TMT while maintaining or even increasing sensitivity to differences between the TMT-A and TMT-B tasks. Thus, careful design of the "trails" can eliminate a confounding variable that may obfuscate the role of cognitive complexity in causing Part B to be more difficult than Part A.
Correspondence: *Merrill Hiscock, Ph.D., Psychology & Center for Neuro-Engineering and Cognitive Science, University of Houston, Heyne Bldg, Room 126, Houston, TX 77204-5022. E-mail: mhiscock@uh.edu*

G.L. IVERSON, J.A. HOLDNACK, B.L. BROOKS & R.T. LANGE. Evidence-Based Diagnosis of DSM-V Neurocognitive Disorders.
Objective: The purpose of this study is to strengthen the scientific underpinnings of clinical judgment relating to the proposed DSM-V criteria for neurocognitive disorders. Evidence-based criteria for identifying impairment in working memory, processing speed, and memory are provided.
Participants and Methods: Participants included 900 healthy adults (16-69 years) from the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV) and Wechsler Memory Scale-Fourth Edition (WMS-IV) standardization samples. The WAIS-IV contains three tests of auditory working memory (Arithmetic, Digit Span, and Letter Number Sequencing) and three tests of processing speed (Coding, Symbol Search, and Cancellation). The WMS-IV contains four tests of learning and memory (Logical Memory, Verbal Paired Associates, Designs, and Visual Reproduction) that provide four immediate and four delayed memory age-adjusted scaled scores. Comprehensive base-rate analyses involved each domain of subtest scores, stratified by TOPF-demographic predicted intelligence and years of education.
Results: Obtaining one or more low processing speed scores (<10th percentile; SSA6) occurred in 38.9%, 18.0%, and 8.9% of adults with predicted low average, average, and high average intelligence. The percentage obtaining one or more low working memory scores (<10th percentile), stratified by years of education, was as follows: 9-11=42.3%, 12=23.9%, 13-15=13.5%, and 16+=5.4%. Obtaining one or more low delayed memory scores (<10th percentile) occurred in 46.3%, 34.7%, and 17.2% of adults with predicted low average, average, and high average intelligence.
Conclusions: Low scores are common and their prevalence varies by level of education and intelligence. Having comprehensive, stratified, domain specific information will strengthen the psychometric underpinnings of clinical judgment.
Correspondence: *Grant L. Iverson, Ph.D., Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada. E-mail: giverson@interchange.ubc.ca*

G.L. IVERSON & B.L. BROOKS. Psychometric Criteria for Identifying Cognitive Impairment in Older Adults on CNS Vital Signs.
Objective: The purpose of this study was to develop evidence-based psychometric criteria for defining cognitive impairment on computerized cognitive testing with older adults.
Participants and Methods: Participants were 390 healthy older adults between the ages of 55 and 96 (M=68.9, SD=8.8) from the Central Nervous System Vital Signs (CNS VS) standardization sample. The sample was 52.9% male, 93.8% Caucasian, and their average education was 15.7 (SD=2.6; Range=9-20). CNS VS is comprised of seven tests that yield five primary domain scores (i.e., Memory, Psychomotor Speed, Reaction Time, Complex Attention, and Cognitive Flexibility). The base rates of low scores, when these five domain scores were examined simultaneously, were calculated for several cutoff scores.
Results: Having at least one (36.9%) or two (15.9%) domain scores <1SD from the mean is fairly common in healthy adults. In contrast, having two or more scores ≤5th percentile is uncommon, occurring in only 7.9%. This cutoff stratified by education revealed the following prevalence rates: 12 or fewer years=15%, 13-15 years=9.5%, and 16+ years=4%. A Boolean algorithm was applied to the normative sample (i.e., 4 scores <1SD, or 3 scores <10th percentile, or 2 scores ≤5th percentile) yielding a prevalence rate of 9.7%. This algorithm stratified by education revealed the following prevalence rates: ≤12 years=15%, 13-15 years=15.9%, and 16+ years=5.3%.
Conclusions: Having base rates of low domain scores in healthy older adults facilitates clinical interpretation of CNS VS. The two criteria for identifying cognitive impairment on this screening battery have relatively low false positive rates.
Correspondence: *Grant L. Iverson, Ph.D., Psychiatry, University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada. E-mail: giverson@interchange.ubc.ca*

G.L. IVERSON, H.A. JAMES, B.L. BROOKS & R.T. LANGE. Evidence-Based Psychometric Criteria for Memory Impairment.
Objective: The bell curve, as routinely applied in neuropsychological practice, can result in unnecessarily high rates of both false positive and false negative diagnostic errors. The purpose of this study is to examine the prevalence of low memory test scores in healthy adults, and provide base-rate tables that can facilitate evidence-based memory assessment.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Participants included 900 healthy adults (16-69 years of age) who were part of the Wechsler Memory Scale – Fourth Edition (WMS-IV; Wechsler, 2010) standardization sample. Additional cases (n=595) collected as part of the education and ethnicity oversample were included. Three WMS-IV tests of learning and memory (Logical Memory, Verbal Paired Associates, and Visual Reproduction) that provide seven age-adjusted scaled scores (6 core and 1 optional score) and four indexes were analyzed. Base-rate analyses stratified by TOPF-demographic predicted intelligence and years of education are presented.
Results: Considering the 5th percentile as a cutoff (SSA5), one or more low subtest scores occurs in 84.6% with unusually low, 41.8% with low average, 25.2% with average, 10.2% with high average, and 0% with superior/very superior predicted intelligence. When stratified by years of education, one or more scores <5th percentile occurs in 50.8% with A8, 52.0% with 9-11, 31.4% with 12, 23.3% with 13-15, and 11.4% with 16+ years.
Conclusions: Knowing the prevalence of low scores can help reduce false negative and false positive diagnostic rates. It is important for clinicians to know that some low scores are common on the WMS-IV, particularly in adults with lesser intelligence or education.
Correspondence: *Grant L. Iverson, Ph.D., Psychiatry; University of British Columbia, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada. E-mail: giverson@interchange.ubc.ca*

K. RYU, Y. LEE & Y. KANG. The Test-Retest Changes of the MMSE in Healthy and High-Risk Elderly.
Objective: Related to the rapid increase in the number of older people, screening for NMCI, VMCI, and dementia in its early stage is very important to individual, family, and community. In order to detect early cognitive changes more accurately, normative standards to determine a reliable and meaningful change are needed. The present study was conducted to investigate the normative rates of change in the MMSE that has been widely used as a screening tool.
Participants and Methods: The Korean-MMSE (K-MMSE) was given twice to 264 healthy elderly (mean age 66.61±8.31 years, mean education 6.17±4.79 years) and 112 high-risk elderly who had vascular risk factors (mean age 67.38±7.85, mean education 5.31±4.44) over a 2-year interval. There were no significant group differences in age, education, and the baseline scores of the K-MMSE.
Results: The Reliable Change Index with adjustment for practice (RCIp) was analyzed for the healthy group. The 90% confidence interval of the RCIp was (-3.67, 3.87) (the mean difference of test-retest scores: .10±2.29). Based on the 90% confidence interval of the RCIp, more decliners were found in high-risk group (10.7%) than in healthy group (7.2%). However, this difference was not statistically significant ($\alpha 2 = 1.43$, ns).
Conclusions: These results should be cross-validated by further studies using more than twice of the repetitive assessments.
Correspondence: *Yeonwook Kang, Ph.D., Psychology, Hallym University, #1 Okchondong, Chuncheon 200-702, Republic of Korea. E-mail: ykang@hallym.ac.kr*

D. MINER, K. PAPP, B. SPRINGATE, D. STEINMETZ & R.F. KAPLAN. A Comparison of Alzheimer's Disease, Huntington's Disease and Mild Cognitive Impairment using the RBANS.
Objective: An advantage of neuropsychological batteries, like the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), is that they allow for the direct comparison of scores between cognitive domains. Although the RBANS has been viewed as screening instrument, it has been shown to be sensitive to cognitive impairment in conditions such as Alzheimer's disease (AD), Huntington's disease (HD), traumatic brain injury and schizophrenia.
Participants and Methods: The current study examined utility of the RBANS Index scores in differentiating patterns of impairment in Mild Cognitive Impairment (MCI, n=62)), AD (n=41) and HD (n=55) when compared to the normal elderly (n=104).
Results: The elderly performed significantly better than the three patient groups on every index score. Although MCI patients performed significantly worse than the normal elderly on every index, their scores were within the average range based on published norms on all but Immediate Memory and Delayed Memory indices, and better than the AD and HD groups on the Visuospatial/construction, Language and Attention indices. AD patients performed worse than the other three groups on measures of Immediate Memory, Language and Delayed Memory, whereas HD Patients performed worse than other groups on the Attention index. AD and HD patients performed worse than the MCI and elderly groups on Visuospatial/Construction, but did not differ from one another.
Conclusions: These data suggest that while the RBANS may be considered a screening instrument it is sensitive to patterns of impairment that differentiate MCI, AD and HD and consistent with profiles from more extensive neuropsychological assessment.
Correspondence: *Richard F. Kaplan, PhD, Psychiatry, UConn Health Center, 263 Farmington Av, Farmington, CT 06030. E-mail: rkaplan@uchc.edu*

D.A. KAUFMAN, F.W. SABB, E. CONGDON, E.D. LONDON, T.D. CANNON, N.B. FREIMER & R.M. BILDER. Relationships Between Temperament and WAIS-IV Matrix Reasoning Performance.
Objective: Personality has been associated with certain psychometric measures of intelligence. As genetic studies of personality and cognition require increasing precision of phenotypic measurement, it is important to clarify the associations that exist between temperament and commonly used neurocognitive measures. The current study examines the relationships between temperament and performance on the WAIS-IV Matrix Reasoning (MR) subtest.
Participants and Methods: Three hundred and eighty-seven adult participants completed the Temperament and Character Inventory-Revised (TCI-R), along with the MR subtest from the WAIS-IV. Completion times for each item in the MR subtest were recorded, so that performance could be characterized by the total number of correct responses as well as mean item completion time. Multiple linear regression models were used to examine the relationships between TCI-R subscales and MR task performance.
Results: A regression model using subscales from four TCI-R scales as predictors of MR total score identified significant relationships between MR performance and several temperament subscales (NS3: Extravagance, HA3: Shyness, and RD4: Dependence). When examining MR completion time as the outcome variable, a different set of temperament subscales emerged as significant predictors (PS3: Ambitious, HA2: Fear of Uncertainty, and RD4: Dependence).
Conclusions: Several temperament factors were found to be associated with WAIS-IV MR task performance. With the exception of one TCI-R subscale (RD4: Dependence), different temperament factors were associated with MR total score and MR completion time. These results help to clarify associations between temperament and cognition, and may have implications for genomic and phenomic research in this area.
Correspondence: *David A. Kaufman, Ph.D., Semel Institute for Neuroscience and Human Behavior, UCLA, 760 Westwood Plaza, Los Angeles, CA 90095. E-mail: dskaufman@mednet.ucla.edu*

D. KAY, L.B. ZAHODNE, L. KIRSCH-DARROW, J. JONES, L. JORDON, M.S. OKUN & D. BOWERS. Apathy in Parkinson's Disease: Comparing FrsBe and Apathy Scale.
Objective: Apathy is a common and clinically significant problem among Parkinson's disease (PD) patients. Although several measures are used to assess apathy in PD, additional research establishing cross-measure concordance is needed, particularly on apathy measures embedded in multidimensional scales such as the Frontal Systems Behavior Scale (FrSBe). This study compared the apathy subscale from the FrSBe to the "gold-standard" instrument, the Apathy Scale (AS), recently recommended by a workgroup from the Movement Disorders Society.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: A convenience sample of 99 patients with idiopathic PD, from the UF Movement Disorders Center, completed the FrSBe and AS during a routine clinic visit. To compare these measures, 1) total scores were correlated, 2) ROC curve analysis was conducted, and 3) Hotelling's correlation was performed to determine if the FrSBe apathy subscale more strongly corresponded to one of three AS factors (behavioral, cognitive, emotional) derived from previous factor analytic studies. Across all analyses, only FrSBe ratings of "current" status were used.
Results: A large correlation was found between the total AS and the FrSBe apathy subscale (df=90,r=.766; p<.001). Area under the ROC curve (AUC) was significant (df=99,AUC=.865; p<.001). The best cut-off score on the FrSBe was 33, sensitivity=78% and specificity=81%. Correlations between the AS factors (behavioral, cognitive, emotion) and the FrSBe apathy subscale did not differ in magnitude.
Conclusions: Study results support convergent validity of the FrSBe apathy subscale, as compared to the AS, in this PD sample. A cut-off FrSBe apathy score of 33 demonstrated the best operating characteristics, relative to the AS. That the AS factors correlated indiscriminately to the FrSbe apathy subscale suggests this measure has high content validity with the AS. The FrSBe appears appropriate for assessing apathy in PD for both research and clinical purposes. Strengths and limitations will be discussed.
Correspondence: *Daniel Kay, University of Florida, 3927 NW 58th Ave, Gainesville, FL 32653. E-mail: decay@ufl.edu*

E.E. KRAUSKOPF, R. ALEXANDER, S.G. SORENSEN & R.O. HOPKINS. Feasibility of Brief Computerized Cognitive Battery to Assess Cognitive Function in Migraine Patients Pre and Post-Contrast Transcranial Doppler Testing.
Objective: Brain microembolization due to diagnostic contrast bubble echocardiography can cause neurological symptoms in migraine patients with severe right-to-left shunts (RLS) due to patent foramen ovale. Comprehensive neuropsychological testing is impractical in some medical populations due to length of test batteries. We assessed feasibility of a computerized test battery to assess cognitive function in migraine patients who undergo transcranial Doppler bubble testing (TCD). Migraine patients referred to Sorensen Cardiovascular Group for diagnostic TCD for diagnosis of RLS shunt were included in our study.
Participants and Methods: Exclusion criteria were age <18 years, prior cardiac surgery, prior cognitive impairment, or non-English speaking. Cognitive tests were administered pre- and post-TCD using the CogState test battery; included tests were Detection (psychomotor functioning), Identification (attention), and Two-Back (complex working memory). Twenty participants (15 females, 5 males) were enrolled in the study. The mean age was 38.5 +/-11.7 years and mean education level was 14.5 +/-2.6 years. The tests took 18 minutes to administer; 12 minute pre TCD (administered twice to obtain true baseline scores) and 6 minutes post TCD.
Results: Testing was able to be integrated with the patient's clinical care. Patients were able to learn to do the tasks. Detection (speed) pre TCD = 2.75 and post TCD = 2.54; Identification (speed) pre TCD = 2.58 and post TCD = 2.57; and Two-Back Memory pre TCD = 1.24 and post TCD = 1.31.
Conclusions: The brief CogState tests were feasible, and a quick and effective means to evaluate cognitive function in migraine patients' pre and post-contrast TCD testing.
Correspondence: *Erin E. Krauskopf, Clinical Neuropsychology PhD Candidate 2013, Clinical Psychology, Brigham Young University, 475 West 1350 South, Orem, UT 84058. E-mail: eekrauskopf@gmail.com*

S. LEININGER, M. BAUERLE, M. CHAMBERS & R.L. SKEEL. Cortisol and Self-Report Measures of Anxiety as Predictors of Neuropsychological Performance.
Objective: Although literature demonstrates increased anxiety and cortisol can disrupt neural activity, the impact on neuropsychological performance has been inconsistent. The current study investigated the relationship between salivary cortisol activity and self-report measures of anxiety on neuropsychological measures. It was hypothesized that elevated anxiety and cortisol levels would negatively affect memory and executive functioning performance.
Participants and Methods: Fifty-eight male participants were randomly assigned to either a control (no stress induction) or experimental (stress induction) condition, and completed a variety of neuropsychological measures. The experimental group was told their performance would be judged behind a one-way mirror. Self-report state anxiety measures and saliva samples were jointly collected on three occasions during testing.
Results: The experimental condition reported higher self-report anxiety after the stress induction procedure at time 2 compared to controls, with no differences at time 3. There were no interactions or main effects between conditions across cortisol samples. However, the experimental group generally performed more poorly than controls on the memory test (e.g., CVLT-II Trials 1-5: (1,56)=4.64, p<.05) and more cognitively demanding executive functioning tests (e.g., Letter-Number Sequencing: (1,56)=7.55, p<.05). Despite self-report anxiety relating to more impaired neuropsychological performance, initial elevations of cortisol at session arrival were associated with facilitative memory effects.
Conclusions: Cortisol and self-report anxiety appeared to independently influence cognition, as initial baseline cortisol elevations were generally associated with improved memory performance and higher magnitudes of self-report anxiety were associated with poorer executive functioning and reduced memory performance. It is possible that increased arousal and motivation could in part explain these unexpected effects.
Correspondence: *Shelley Leininger, M.A., University of Florida, 3700 Windmeadows Blvd. Apt. #72, Gainesville, FL 32608. E-mail: shelley.leininger@hotmail.com*

A.D. MATEREK, C.I. HIGGINSON, E.E. MACDOUGALL & M.W. KIRKHART. Does Verisimilitude Improve Veridicality: Using Executive Measures to Predict Money Management Skills in Older Adults.
Objective: One method to improve the degree to which neuropsychological measures predict everyday functioning (i.e., veridicality) is to design tests that closely resemble everyday tasks (i.e., verisimilitude).
Participants and Methods: The current study examined the relationship between selected executive measures and a performance based measure of financial skills in 39 older adult participants, as age related decline in executive function is thought to affect ability to perform activities necessary for successful independent living. Two more traditional measures of specific elements of executive function, Mazes and Categories from the NAB, were compared to two measures of the same elements of executive function that have better verisimilitude, Zoo Map Test (ZMT) and Rule Shift Card Test (RSCT) from the BADS. Z-tests and regression analyses were conducted to determine the statistical significance of the difference between correlations and the additional variance explained by specific measures.
Results: Results indicated that the more difficulty older adult participants had completing measures of planning and cognitive flexibility, the more difficulty they had, overall, with a financial management task (r's = .36 - .61). However, correlations between BADS subtests and the financial management task were not significantly higher than correlations between NAB subtests and the financial management task. In addition, BADS subtests did not predict a significant amount of variance in financial management beyond that accounted for by NAB subtests.
Conclusions: These results support the veridicality of both NAB and BADS subtests.
Correspondence: *April D. Materek, M.S., Clinical Psychology, Loyola University Maryland, 4501 N. Charles Street, Baltimore, MD 21210. E-mail: admaterek@loyola.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

S.M. MCCLINTOCK, M. CULLUM, M.M. HUSAIN, H. TERRACE, I. BERNSTEIN, C. RODEZ & S.H. LISANBY. Gender and Race Effects on the Columbia University Primate Cognitive Battery.

Objective: We previously reported that it was feasible to translate neurocognitive tests used in non-human primates to humans. Specifically, we found that performance on the Columbia University Primate Cognitive Battery (CUPCB), a touch-screen computerized test battery, was associated with age, education, and estimated intelligence. The purpose of this study was to examine whether gender or race influence performance on the CUPCB.

Participants and Methods: 40 healthy participants (age: M=38.7, SD=14.5; education: M=16.4, SD=2.1; estimated IQ: M=112.7, SD=6.0) completed the five CUPCB subtests (Target Identification, Target Tracking, Target Sequencing, Spatial Configuration, and Serial Target Recognition). 53% of participants identified themselves as Caucasian, 30% Asian, and 17% African American. Independent-samples t-tests were computed to evaluate whether performance on the CUPCB differed by gender or race.

Results: All groups showed high accuracy rates and efficient task completion times. Groups did not differ by age, education, or estimated intelligence. There were no statistically significant differences between male and female participants' performances on any of the CUPCB subtests (p values = .11 to .56, M=.48). Similarly, CUPCB subtest scores did not differ between racial groups (p = .07 to .99, M=.49).

Conclusions: Preliminary findings suggest that performance on the CUPCB may not be influenced by gender or race. As the sample sizes were small and could have limited power to detect significant differences, further research in larger cohorts is needed to confirm these findings. The CUPCB could be useful to advance the understanding of cognitive component processes of memory functions and impairment in humans.

Correspondence: *Shawn M. McClintock, Ph.D., Psychiatry, UT Southwestern Medical Center, 5323 Harry Hines Blvd., Dallas, TX 75390-8898. E-mail: shawn.mcclintock@utsouthwestern.edu*

R.J. MELROSE, T.L. VICTOR, M.L. ETTENHOFER, C.C. CARTER, J. GHIAM, S.A. CASTELLON & A. OKONEK. The Use of Cognitive Effort Instruments in OEF/OIF Veterans who Speak English as a Second Language.

Objective: There is little empirical data referencing psychometric characteristics of cognitive effort instruments in individuals who speak English as a second language (ESL). Failure to adjust for this demographic variable may lead to unacceptable rates of false positive error (Salazar et al., 2007).

Participants and Methods: Sixty-one OEF/OIF polytrauma veterans with history of TBI referred for neuropsychological evaluation. We examined mean performance and pass rates using standard cut-offs on the Test of Memory Malingering (TOMM), Rey-15 Item Test, Digit Span Age-Corrected Scaled Score (DSpACSS), Reliable Digit Span (RDS), and California Verbal Learning Test 2nd edition Forced Choice Test (CVLT-FC) in ESL and English speaking (ENG) groups.

Results: ESL (n=18) and ENG (n=42) did not differ in age or education. ESL had lower mean performance on DSpACSS ($t(56)=2.8$, $p<.01$) and RDS ($t(40)=2.1$, $p=.04$). Although not statistically different between groups, the ESL mean (M=14.88) on the CVLT-FC fell below the cut-off of <15. ESL and ENG did not differ with respect to the number failing each measure (p>.20). Because ESL did not impact nonverbal effort indicators, we repeated the analysis in those who passed the TOMM and Rey-15 to ensure credibility of the sample. ESL showed lower mean performance on the DSpACSS ($t(25)=2.4$, $p<.05$), and a trend on RDS ($t(24)=1.7$,. $p=.10$). There was a trend towards more failures on the CVLT-FC in ESL than ENG ($\alpha 2(1, n=22)=2.79$, $p=.10$) but no differences on DSpACSS or RDS (p>.5).

Conclusions: ESL participants produced lower mean scores on verbal effort measures, cautioning clinicians to consider this variable when interpreting effort tests.

Institutional Support from Greater Los Angeles Healthcare System, West Los Angeles VA & Uniformed Services University of the Health Sciences

Correspondence: *Rebecca J. Melrose, Ph.D., Geriatric Psychiatry- 116AE, VA Greater Los Angeles HealthcareSystem, 11301 Wilshire Blvd., Los Angeles, CA 90073. E-mail: rjmelrose@ucla.edu*

A.S. MIELE, J.H. GUNNER, J.K. LYNCH & R.J. MCCAFFREY. Base Rates of Clinically Impaired Scores on the Wisconsin Card Sorting Test in a Sample of Community Dwelling Neurologically Intact Older Adults.

Objective: The purpose of this study was to examine the base rates for impairment on the Wisconsin Card Sorting Test (WCST) in a group of older adults using three impairment criteria (1, 1.5, and 2 standard deviations below the mean).

Participants and Methods: Five commonly used scores (Total Errors, Perseverative Responses, Perseverative Errors, Nonperseverative errors, and Percent Conceptual Level Responses) were examined in a sample of 241 non-litigating, neurologically intact, community dwelling adults, all of whom passed symptom validity testing. Average age was 64.5 (SD = 8.7) years, average IQ was 102.7 (SD = 8.1), and the sample consisted of 128 males.

Results: Approximately half of the sample (44.1% - 64.8%) performed at least 1 standard deviation below the mean. On average, 25% of the sample scored 1.5 or more standard deviations below the mean (10.6% - 34.6%), and approximately 12% of the sample performed 2 or more standard deviations below the mean (4.7% - 19.5%).

Conclusions: These data demonstrate that a large proportion of adequate-effort, neurologically normal examinees obtained scores 2 standard deviations below the mean. The high base rate of outliers may indicate that the WCST has limited ability to discriminate adequate-effort from inadequate-effort examinees. In addition, these data indicate that it is not unusual for neurologically intact older adults to score 2 or more standard deviations below the mean. Therefore, impaired range scores on the WCST may be reflective of normal variability in higher level cognitive skills, and some degree of caution is warranted in attributing low scores to cognitive decline or impairment in older individuals.

Correspondence: *Andrea S. Miele, MA, Psychology, University at Albany, SUNY, 1400 Washington Ave, Social Sciences 399, Albany, NY 12203. E-mail: asmiele@gmail.com*

J.H. GUNNER, A.S. MIELE, J.K. LYNCH & R.J. MCCAFFREY. Base Rates for Impairment on the Stroop Color-Word Test in Community Dwelling Older Adults: A Cautionary Note.

Objective: Three commonly used criteria for determining clinical impairment on the Stroop Color-Word Test (scores of 1, 1.5, and 2 standard deviations below the mean) were utilized to examine base rates for impairment in a sample of 241 non-litigating, neurologically intact, community dwelling older adults, all of whom passed symptom validity testing.

Participants and Methods: Average age was 64.5 (SD = 8.7) years, average IQ was 102.7 (SD = 8.1), and the sample consisted of 128 males. The variables examined were Word score, Color score, Color/Word score, and Interference score.

Results: Approximately half of the sample (46.6%-69%) performed at least 1 standard deviation below the mean. On average, 15% of the sample scored 1.5 or more standard deviations below the mean (7.2%-23.6%). Lastly, approximately 5% of the sample performed 2 or more standard deviations below the mean (2.1%-7.4%).

Conclusions: In conclusion, these data show that at a cutoff of 1.5 standard deviations below the mean, a large proportion of neurologically normal, adequate-effort older adults obtained scores in the outlier range. Although unlikely, adequate-effort examinees may score 2 or more standard deviations below the mean. Neuropsychologists should therefore exercise caution when interpreting outlier scores on the Stroop test as the result of either poor effort or cognitive impairment.

Correspondence: *Andrea S. Miele, MA, Psychology, University at Albany, SUNY, 1400 Washington Ave, Social Sciences 399, Albany, NY 12203. E-mail: asmiele@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

D.A. PEREIRA, C. SATLER, L. MEDEIROS, R. PEDROSO & C. TOMAZ. Validation of Philadelphia Brief Assessment of Cognition (PBAC) in a Brazilian Population.

Objective: Philadelphia Brief Assessment of Cognition (PBAC) is a brief neuropsychological screening instrument that assesses five functioning domains: working memory/mental search, visuospatial/visuoconstructional operations, language skills, verbal/visual episodic memory, and personality behavior. This pilot research has been conducted to verify if PBAC can be properly used in a Brazilian population.

Participants and Methods: Two hundred health volunteers [100 young adults 21.6(2.5) and 100 old adults 70.1(7.3) > 12 years of formal school] and 31 Alzheimer's disease patients (AD) [73.7(5.7), 4 -11 years in formal school] participated in this study. Mini Mental State Examination (MMSE) scores were obtained for young 29.1(0.9), old adults 28.3(1.4) and AD 18.4(3.0) group and compared with PBAC scores: 95.8(2.6), 90.0(4.4) and 65.0(10.8) respectively.

Results: A one-way ANOVA showed a significant difference between groups ($p<0.001$). No differences were found for Language and Behavior domains. There was a positive significant correlation between MEEM and PBAC ($r=0.9$, $p<0.001$). Negative significant correlations ($p<0.01$) were observed between age and PBAC subtests [Memory (-0.63), Visuospatial Abilities (-0.44) and Executive (-0.3) tasks]. Language had the lowest correlation (-0.2). A better male performance in Visuospatial Abilities ($F=8.5$, $p=0.004$) was found with MANOVA due to female. PBAC cutoff scores for mild cognitive impairment were obtained (89 for 18-29), (78 for 60-74) and (76 for 75-89 years old).

Conclusions: The Brazilian version of the PBAC proved to be a promising cognitive instrument in research and clinical settings.

Correspondence: *Danilo A. Pereira, Neuropsychology, IBNeuro, SHCS CR 504 Bl C Entr 37 10 andar, pela W3 Sul, Brasília 70331535, Brazil. E-mail: danilo@ibneuro.com.br*

N. PHILLIPS, H. CHERTKOW, Z. NASREDDINE, V. WHITEHEAD, S. BISHUNDAYAL & C. MCHENRY. Validation of Alternate Forms for the Montreal Cognitive Assessment (MoCA), a Screening Test for Mild Cognitive Impairment.

Objective: The Montreal Cognitive Assessment (MoCA) is a popular cognitive screening test designed to detect mild cognitive impairment (MCI) in older adults (Nasreddine et al., 2005). Scored out of 30 points, it includes items tapping memory, visuospatial abilities, executive functions, working memory, language, and orientation. Our objective was to develop alternate forms to facilitate its use in repeated testing.

Participants and Methods: Two alternate forms were developed by replacing original items with new exemplars. The original and two new forms were administered one month apart in randomized order to 32 normal elderly controls (NEC; mean(SD): age = 70.2 (6.4); education=14.4 (3.3)), 30 patients with MCI (age=79.5 (6.1); education=13.7 (3.5)), and 21 patients with Alzheimer disease (AD; age=78.7 (4.6); education=13.1 (2.9)).

Results: Repeated measures ANOVA revealed the following:
total scores for the NECs on all three versions were within 0.8 points of each other:
MoCA1 (mean(SD)): 28.3 (1.8), MoCA2: 27.5 (3.4), MoCA3: 27.5 (1.7), with no significant differences between the versions.
Total scores for the MCIs were within 1.3 points of each other:
MoCA1: 23.0 (3.4), MoCA2: 22.1 (2.99), MoCA3: 21.7 (3.37), with a significant but small difference between MoCA 1 and MoCA3.
Total scores for the ADs were within 0.7 points of each other:
MoCA1: 18.5 (3.4), MoCA2: 18.1 (3.95), MoCA3: 18.8 (4.1), with no difference between the forms. Each version successfully discriminated the three groups (all F's>57.0, all p's<.001).

Conclusions: Overall, the three forms of the MoCA yield equivalent total scores and discriminate MCI patients from controls and AD patients. The three forms are suitable for situations requiring repeated cognitive testing, including patient reassessment, longitudinal studies, and clinical trials.

Correspondence: *Natalie Phillips, Ph.D., Psychology, Concordia University, 7141 Sherbrooke Street West, Montreal, NS H4B 1R6, Canada. E-mail: natalie.phillips@concordia.ca*

B. REED, W. YUND, A. CATE, R.F. HINK, A. TURKEN, T.J. HERRON & D.L. WOODS. Age Effects on Components of Visual Feature Conjunction Measured with the California Cognitive Assessment Battery.

Objective: Visual feature conjunction (VFC) is a complex cognitive-perceptual task that is sensitive to aging. Components of this task may be differentially affected by age. Here we examine the association between component VFC processes and age using data from the California Cognitive Assessment Battery (CCAB) obtained in a large community sample.

Participants and Methods: Participants were 1339 adults aged 18 to 65 in a study of chronic hydrogen sulfide exposure. The sample is representative of Rotorua, NZ, subject to stratification for H2S exposure. (Exposure data are not yet available.) The CCAB is a set of computerized tests that yield high precision reaction time (RT) measures. Three tests are analyzed: Finger tapping (TAP; rate of key pressing), simple reaction time (SRT; RT to a target presented at variable interstimulus intervals in each hemifield),3) VFT, (RT and detection accuracy to a color/shape target and non-targets sharing color, shape, or no features with the target). Thus, VFC requires each of the motor and cognitive tasks of TAP and SRT plus additional attentional, perceptual, and inhibitory processes.

Results: Mean age was 46.4 with 25% of the sample age 56 or older. A series of multiple regressions examined age effects. Age explained 7% of the variance in TAP in a model with education and sex as covariates. Age explained 2% of SRT variance in a model that controlled for education, gender, and tapping speed. RT for VFC targets and foils were analyzed separately. Age accounted for over 14% of the variance in RT for targets, controlling for education and sex. When tapping speed, and SRT were added to the model the independent contribution of age shrunk to 7%. Results were similar for RT for foils.

Conclusions: Age affects multiple component processes of VFC, including motor speed, simple response time, and visual feature integration. Results provide validity data for the CCAB as a test that differentiates these processes, thus allowing investigation of their distinct predictors.

Correspondence: *Bruce Reed, PhD, Neurology, University of California, Davis, UCD ADC (127a), 150 Muir Road, Martinez, CA 94553. E-mail: brreed@ucdavis.edu*

T. RIDDLE & J. SUHR. Utility of the Contingency Naming Test in an Adult Clinical Sample.

Objective: The Contingency Naming Test (CNT; Taylor et al, 1987) is a Stroop-like measure initially designed to assess aspects of executive function in children. Recent research has shown evidence of utility across multiple child and adolescent clinical samples; however, extension of the measure into adult populations has been more limited. The current study aims to investigate use of this measure in discriminating between adult clinical groups.

Participants and Methods: Adults presenting to a university psychology clinic for neuropsychological assessment were administered the CNT as an experimental measure within a diagnostic neuropsychological battery. Participants were classified into one of three groups (no diagnosis (N= 43), psychological diagnosis (N= 21), or ADHD/LD diagnosis(N=19)) based on their assessment. CNT performance was then compared across groups.

Results: While there were generally no differences between groups on the number of trials needed to learn the task or the number of self-corrections, significant differences were found in speed and number of errors. The ADHD/LD group was consistently slower and made more errors than the no diagnosis group, and also showed worse performance than the psychological diagnosis group on the most difficult inhibition and inhibition/switching portions of the CNT.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Results suggest that the CNT may be useful in identifying executive function performance differences between clinical groups, including adults with ADHD and psychological disorders. Although more research is needed, the CNT may present an additional option for assessing executive aspects of inhibition and switching.
Correspondence: *Tara Riddle, Psychology, Ohio University, 4540 Snelling Ave., Apt. #315, Minneapolis, MN 55406. E-mail: riddle.tara@gmail.com*

B.L. ROBERG, J. BRUCE, L. HANCOCK, B. FOX, L. BUSCHER, M. SOMOGIE & S. LYNCH. Patient Perceptions of Information Processing Speed Difficulties in Multiple Sclerosis.
Objective: Several studies suggest that slowed information processing speed is the primary cognitive deficit in MS, contributing to problems with attention, memory, and executive functioning. Despite this, no studies have examined how MS patients perceive processing speed difficulties. The present study employed the Processing Speed Difficulties Scale (PSDS) to examine perceived processing speed in MS.
Participants and Methods: MS patients were recruited through a specialty clinic and a local MS newsletter. Controls were recruited via posted flyers and a university list server. The PSDS was administered as part of a comprehensive neuropsychological battery.
Results: The PSDS demonstrated good internal reliability, Cronbach's ×=.96, and principal component analysis of the PSDS revealed one component that explained 72.10% of the scale variance. MS patients (N=113) reported significantly more processing speed difficulties than controls (N=43, t(105.40)=7.01, p<.001). Analysis of covariance revealed a significant effect of group (MS versus control) on processing speed even after controlling for the effects of self-reported memory deficits (F(1, 104)=9.80, p =.002, μ2 =.09). Slowed processing speed was significantly associated with self-reported memory deficits (r =.68, p<.001) and performance on the Symbol Digit Modalities Test (r =-.26, p<.001).
Conclusions: The PSDS demonstrated good psychometric properties and MS patients reported more processing speed difficulties than controls. Moreover, perceived processing speed difficulties were independent of perceived memory difficulties. Perceived cognitive slowing was associated with poorer performance on an objective measure of processing speed. The PSDS can help researchers and clinicians better understand the relationship between patient perceptions and objective measures of processing speed.
Correspondence: *Brandon L. Roberg, MS Psychology, Psychology, University of Missouri - Kansas City, 3938 Wyandotte Street # 2N, Kansas City, MO 64111. E-mail: blrp7c@mail.umkc.edu*

P. SUNDERARAMAN, H.M. BLUMEN, Z. APA & S. COSENTINO. How does task demand affect gender differences in verbal memory and organization? A comparative study of the California Verbal Learning Test (CVLT –II) and the Philadelphia (repeatable) Verbal Learning Tests (PrVLT).
Objective: Verbal memory is often assessed with word-list learning tests such as the 16-word California Verbal Learning Test (CVLT-II). The current study compared the performance of cognitively-healthy older adults on the CVLT-II and the Philadelphia (repeatable) Verbal Learning Test (PrVLT), a shorter 9-word list learning test. We were interested in understanding the extent to which previously reported gender effects on recall and organizational strategies (semantic versus serial) vary under different task demands.
Participants and Methods: 62 healthy elders (26 males and 36 females) completed the CVLT-II and 48 healthy elders (21 males and 27 females) completed the PrVLT.
Results: Findings indicate that, as expected, females recalled more words [F (1, 60) = 22.44, p < 0.001, hp2= .27], and used more semantic clustering on the CVLT-II [F (1, 60) = 8.19, p < .01, hp2 = .12], while males used more serial clustering by the last learning trial [F (4, 240) = 3.54, p < .05, hp2 = .06]. The novel finding was that the female advantage for recall [F (1, 46) = 5.22, p < .05], and semantic clustering [F (1, 46) = 7.52, p <.01, hp2 = .14], carried over even to the shorter list-learning test (i.e., the PrVLT), whereas serial clustering [p > .05] showed no gender differences.
Conclusions: These findings point to the complex, non-linear relationship shared between verbal memory, efficiency of organizational strategies, and task demand, and raise questions regarding the role of gender differences in this complex matrix. Such issues become especially relevant for interpreting performance on neuropsychological tests and for understanding verbal memory capabilities in cognitively-healthy older adults. Thus, our findings have implications for test developers, researchers and clinicians.
Correspondence: *Preeti Sunderaraman, First Year Graduate student in Neuropsychology., Columbia University Medical Center, 630 West 168th Street,, New York, NY 10032. E-mail: preetis.ps@gmail.com*

W.J. JOHNSON, J.K. KINKELA & A. URBAN. Incremental Validity of TOMM Versus Commonly Used Embedded Symptom Validity Measures in a MTBI Veteran Population.
Objective: Current literature and common practice indicate that neuropsychological evaluations include multiple measures of symptom validity, including both embedded and freestanding measures, to maximize the sensitivity and specificity in the detection of negative response bias. This study aimed to examine incremental validity for the use of the TOMM versus embedded CVLT-II forced choice and Reliable Digit Span (RDS), in accounting for neuropsychological test performance.
Participants and Methods: Participants were a convenient sample of 43 (4 female; Mean Age = 31.63 years, SD = 8.83) consecutively seen veterans referred due to possible Mild TBI and who met inclusionary criteria (English fluency, completed all three symptom validity measures (SVTs); no premorbid learning, developmental, or neurological deficits). Mean years education = 12.91 (SD = 1.46).
Results: Using T-tests, failure on either RDS or CVLT-II forced choice resulted in lowered performance on visual and verbal (word list) learning, visual and verbal delayed free recall, attention, processing speed, and category fluency. Failure on the TOMM also resulted in lowered scores in these domains, but explained additional variance only on visual learning (≥ = -.828; p = .002; Rsquare change = .155) as well as added incremental validity on a story learning task (≥ = 1.27; p < .000; Rsquare change = .363). Of this sample, 7% failed all three measures, 14% failed the CVLT-II Forced Choice and/or RDS, and 9% failed TOMM only.
Conclusions: Although the TOMM may not have demonstrated clinically significant incremental validity in explaining performance in cognitive domains, it did provide additional sensitivity.
Correspondence: *William T. J. Johnson, M.A., Alliant International University, 9183 Arvine Ct., Atascadero, CA 93422. E-mail: wjohnson@alliant.edu*

Assessment/Psychometrics/Methods (Child)

W.J. JOHNSON & P.C. LEBBY. Test-Retest Reliability of the Lebby-Asbell Neurocognitive Screening Examination for Adolescents (LANSE-A).
Objective: The Lebby-Asbell Neurocognitive Screening Examination for Adolescents (LANSE-A) was developed to as a means of rapidly assessing neuropsychological sequelae of TBI across cognitive domains. The aim of this study was to establish test-retest reliability with a control population of adolescents.
Participants and Methods: This study utilized a healthy control population of 24 (6 male; Mean age 17.33; SD = 0.637) adolescents, that were recruited from a Central California high school. These participants were administered the LANSE-A as part of a larger validation study and agreed to participate in a re-test study approximately two months after the initial evaluation.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: A repeated measures, paired samples t-test was conducted for each of the LANSE-A subtests. Significant differences were only found on the Verbal Auditory Memory (Mean Initial = 8.08; sd = 3.34; Mean retest = 11.29; sd = 1.08; p<0.001) and the Number Sequencing Backward (Mean Initial = 7.37; sd = 1.56; Mean Retest = 8.12; sd = 1.45; p=.021) subtests.
Conclusions: The Verbal Auditory Memory and Number Sequencing Backward subtests of the LANSE-A may be sensitive to re-test effects. Variance could be partially explained by improved testing environments during the retest portion, minimizing the effects of distraction. During the retest portion, participants may have also remembered that they would be queried about the words following a delay, thus optimizing attention during presentation. The LANSE-A authors also suggest substituting alternate words on the Verbal Auditory Memory test to help control for practice effects resulting from subjects remembering the words between evaluations.
Correspondence: *William T. J. Johnson, M.A., Alliant International University, 9183 Arvine Ct., Atascadero, CA 93422. E-mail: wjohnson@alliant.edu*

Assessment/Psychometrics/Methods (Adult)

G. WEISSBERGER & T.H. GOLLAN. An Assessment of Bilinguals' Ability to Self-Report Language Dominance.
Objective: A common practice in cognitive assessment of bilinguals is to test primarily in the self-reported dominant language. The current study investigated the relationship between self-reported versus objective measures of language dominance.
Participants and Methods: Fifty-two young (20.88; SD = 3.12) and 20 older (77.20; SD = 7.89) Spanish-English bilinguals provided self-ratings of language dominance, and were tested with an Oral Proficiency Interview (OPI), the Boston Naming Test (BNT), and a Multilingual Naming Test (MiNT) designed for Spanish-English bilinguals. Tests were administered in both languages in counterbalanced order. In addition to language-dominance, a degree of bilingualism index score was calculated for each measure (nondominant/dominant score).
Results: Young and older adults produced similar results. Self-rated proficiency and language-dominance were significantly correlated with objective measures (all ps < .05). However, on these same objective measures several bilinguals obtained higher scores (e.g., up to 25% higher with the BNT) in the language they reported is NOT their dominant language. Performance on the MiNT and BNT were highly correlated, however the BNT under-estimated the degree of bilingualism (i.e., the MiNT, OPI, and self-ratings classified bilinguals as 80-87% bilingual, compared to only 63% by the BNT).
Conclusions: These results simultaneously validate self-report measures and demonstrate their limitations. Measures validated for use with monolinguals will likely provide inaccurate measures of language dominance and degree of bilingualism. Multiple subjective and objective measures in both languages are needed to obtain accurate cognitive profiles of bilingual speakers.
Correspondence: *Gali Weissberger, Clinical Psychology, San Diego State University/University of California, San Diego Joint Doctoral Program, 811 West Nutmeg St. Apt 401, San Diego, CA 92103. E-mail: gweissbe@gmail.com*

K. WILD, S. MAXWELL, I. CAMPBELL, N. MATTEK & J. KAYE. Validation of Self-Reported Activity Data: Application of Day Reconstruction Methods to a Cohort of Monitored Elders.
Objective: Retrospective self-reports of daily events have been shown to be disconcertingly inaccurate in a variety of settings. An approach to increasing accuracy of reports is real-time in-home monitoring of activities and behaviors of interest captured by strategically placed home sensors. We were interested in determining the degree of fidelity of self-reports relative to sensor-detected activity. Accordingly, a modified Day Reconstruction Method (DRM) was used with an older adult population to identify those self-report events or activities that were most closely tied to time-stamped continuously collected in-home sensor data.
Participants and Methods: This project was carried out in two phases. First, a modified DRM approach was piloted with five participants from the OHSU Intelligent Systems for Assessment of Aging Changes Study (ISAAC), a longitudinal study using unobtrusive home monitoring to detect cognitive and functional decline in adults 80 years and older. Participants were trained in the DRM procedure, which entails recording the previous day's activities and events. In the second phase, another sample of five ISAAC participants engaged in an abbreviated telephone version of the DRM. Sensor data were obtained for each participant to compare with self-reports of activity.
Results: We found that completion of the initial daily activity logs varied widely among participants in terms of number, detail, and duration of events recorded. In the telephone format we found that older adults had difficulty accurately describing activities that occurred immediately prior to questioning, when compared with real-time sensing data.
Conclusions: Targeted reconstruction methods, while potentially effective in the validation of real-time activity data, pose unique problems for an older adult population.
Correspondence: *Katherine Wild, Ph.D., Neurology, Oregon Health & Science University, 3181 SW Sam Jackson Park Rd., CR-131, Portland, OR 97239. E-mail: wildk@ohsu.edu*

J. MIGNOGNA, N.M. WISDOM & R.L. COLLINS. Increased Variability in Wechsler Adult Intelligence Scale, Fourth Editon (WAIS-IV) Performance Across Adulthood.
Objective: Normal aging is associated with a steady decline in raw mean scores on WAIS-IV subtests, albeit the magnitude of raw score change is not equal among subtests. However, corresponding changes in variability (e.g., raw score SDs) are less readily discerned from the normative manual as all scaled scores are assumed to have a standard deviation of 3. The purpose of the present study is to characterize patterns of raw score change and associated variability on WAIS-IV subtests across age groupings.
Participants and Methods: Raw WAIS-IV subtest means and SDs for each age group were tabulated from the WAIS-IV normative manual. In addition to this data, the percentage of the mean (dividing the SD by the mean and multiplying by 100) was also derived for each subtest to further inform the magnitude of variability represented by each SD (Ardila, 2007).
Results: Raw mean scores predictably decreased across age groups. Increased variability was noted in Perceptual Reasoning and Processing Speed Index subtests, as Block Design, Matrix Reasoning, Picture Completion, Symbol Search, and Coding had percentage of the mean increases ranging from 56 - 100%. In contrast, Working Memory and Verbal Comprehension subtests were more homogeneous with Digit Span, Comprehension, Information, and Similarities percentage of the mean increases ranging from 28 - 39%. Little change in the percentage of the mean was noted on Cancellation, Arithmetic, Letter/Number Sequencing, Figure Weights, Visual Puzzles, and Vocabulary subtests (< 13%).
Conclusions: Normal WAIS-IV performance relative to average normative scores alone can be an oversimplification as this fails to recognize disparate subtest heterogeneity with increases in age. A thorough understanding of age related subtest variability will help to identify test limitations as well as furthering our understanding of cognitive domains which remain relatively steady versus those which steadily decline.
Correspondence: *Nick M. Wisdom, Ph.D., Michael E. DeBakey VA Medical Center, 2002 Holcombe Blvd., #2B-315, Houston, TX 77030. E-mail: nicholas.wisdom@va.gov*

A.L. WONG, B.P. COLEMAN, J. WELLMAN, M. WOOD, T. PARSONS, S.D. MARION & A. RIZZO. Comparison of Standardized and Virtual Environment Versions of the Paced Auditory Serial Addition Task.
Objective: In the past decade, researchers have established useful measures of cognitive functioning designed specifically for the virtual environment (VE) and have begun to conduct validity studies

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

of the same. Researchers have focused on attention for many reasons, not the least of which is an increasing need to parse elements of attention. In the current study, we compared a virtual environment version of the Paced Auditory Serial Addition Task (PASAT) with a well-validated, standardized paper-and-pencil PASAT used frequently to assess complex attention. We hypothesized that the virtual PASAT would correlate significantly but imperfectly with the standardized PASAT.

Participants and Methods: The sample consisted of 22 healthy adults aged 18 to 52 years. Participants completed the PASAT (Levin version) and a virtual task in which participants performed a PASAT-like task while "walking" through a virtual city. They also completed standardized attention tests.

Results: As predicted, performance on the virtual PASAT was significantly correlated with the traditional PASAT ($r = .77$, $p < .01$). In addition, the virtual PASAT was correlated with several other measures of attention (r's = .43 to .66, p's Λ .01 to .04).

Conclusions: The fact that traditional PASAT performance predicted virtual PASAT performance indicates strong, albeit early, convergent validity. The imperfect nature of this relationship, as well as the graded nature of correlations with more or less similar paper-and-pencil attention measures, indicate appropriate divergent validity. These early, pilot data indicate promise for virtual versions of the PASAT, although more research is needed to demonstrate its precise clinical and research utility.

Correspondence: *Andrew L. Wong, M.A., Clinical Psychology, Fuller Theological Seminary, 1501 S. Fifth Avenue, Arcadia, CA 91006. E-mail: alwongS3@gmail.com*

Assessment/Psychometrics/Methods (Child)

M. ANDERSON. Verbal Memory and Language Assessment.

Objective: To analyze the unique variance associated with language and verbal memory when assessing students with typical language (TL) and language impairment (LI) using integrated language assessment tasks.

Participants and Methods: 74 students (ages 6 to 19 years) in 2 groups comparable in age, sex, race/ethnicity, and SES, but differing in language ability (CELF-4 scores above or below 85).

The Test of Integrated Language and Literacy Skills (beta edition) was administered. Subtests met the Cronbach's alpha threshold of .80. Bivariate analyses and multiple regression models were used.

Results: For the TL group vocabulary had the strongest relationship with nonword spelling and listening comprehension ($r = .687$ and $.597$, $p < 0.01$). Memory correlated moderately with nonword spelling and following directions ($r = .564$ and $.524$, $p < 0.01$). Age was correlated significantly with nonword spelling ($r = .422$, $p < 0.01$). In regression modeling: vocabulary (but no longer memory) accounted for significant variance in listening comprehension. Memory (but no longer vocabulary) accounted for variance in following directions.

For the LI group, age correlated more strongly with language tasks than either memory or vocabulary. Vocabulary correlated significantly with nonword spelling ($r = .414$, $p < .05$); listening comprehension ($r = .369$, $p < .05$); and following directions ($r = .488$, $p < .001$). Memory was associated with nonword spelling only ($r = .570$, $p< 0.01$). In regression modeling, age was the only variable that correlated significantly with listening comprehension, but no longer, following directions. Age and memory contributed to the variance of nonword spelling.

Conclusions: Differences in processing patterns emerged depending on group inclusion and task. Interesting is the lack of predictive ability of verbal memory skills for direction following for the LI group, whereas it was the most predictive variable for the TL group.

Correspondence: *Michele Anderson, PhD, Western Michigan University, 1203 Sheridan Dr, Kalamazoo, MI 49001. E-mail: michele.a.anderson@wmich.edu*

R. BALDWIN & S. PROVENCAL. Prevalence of Co-occurring Disorders with Dyslexia in a Clinical Sample: Implications for Clinical Practice.

Objective: Dyslexia is a neurobiological disorder that involves impairment in reading that is discrepant from other cognitive abilities, level of motivation, and opportunity. With rates of dyslexia estimated between 2-10% of the general population, referrals to neuropsychological practices are common. Considering high demands on time and resources, as well as challenges of reimbursement for services, abbreviated and highly focused test batteries may be implemented. However, persons referred to community clinics for assessment are more likely to have more than one diagnosis. While there are several studies that have explored specific comorbidities, such as dyslexia and ADHD, few studies have more broadly surveyed co-occurring diagnoses with dyslexia that could help inform test battery design and clinical practice. Exploring patterns of co-occurrence also informs research in the identification of potential risk factors and etiology.

Participants and Methods: The current study explores rates of co-occurrence of psychological and cognitive disorders with dyslexia in a clinic referred sample. The sample consists of 998 children who received full neuropsychological evaluations at an outpatient neurodevelopmental center in a private hospital in Rhode Island.

Results: Of the 201 who received a diagnosis of dyslexia, 82% had at least one co-occurring condition. The most frequent co-occurring condition was ADHD (56%, inattentive type - 35%, combined type - 21%). Other high frequency co-occurring conditions included other learning disabilities (45%) and psychiatric disorders (16%).

Conclusions: Findings suggest that evaluation of dyslexia should include screening for attention, other associated learning disabilities, and psychological disorders for optimal case conceptualization and treatment planning.

Correspondence: *Rachel Baldwin, Psychology, University of Rhode Island, 35 Primrose Hill Road, Barrington, RI 02806. E-mail: RachelkBaldwin@yahoo.com*

A.C. BARBOSA, L. KATERINA & E.C. MACEDO. Evidence of Validity of a test of non-verbal intelligence for Brazilian Deaf Students.

Objective: The objective was to seek evidence of validity of the Test of Non-Verbal Intelligence (TONI-3) in deaf persons according to the instrument's validity criteria with respect to external variables: age, education, gender, type of deafness, use of hearing aid and communication mode.

Participants and Methods: Two hundred and five deaf subjects participated in the study, of whom 86 were girls/women and 119 boys/men. Ages ranged from 6 to 25 years old, with the average age being 14 years old (SD = 4.4). The participants were students in first through ninth grades from a regular state elementary/middle school in Sao Paulo, two municipal special-education schools in Sao Paulo, and a municipal special-education school in Recife. Participants with clear motor difficulties, with test-comprehension difficulties or with multiple deficiencies were excluded from the test, as were deaf students who did not use any type of communication.

Results: Results showed no significant differences between subjects according to gender, type of deafness, use of hearing aid and communication mode. There was an increase in test scores with increasing age and education, indicating evidence of developmental validity.

Conclusions: The purpose of this study was to look for evidence of validity of the TONI-3 for Brazilian deaf people; the findings reveal that the instrument may be useful in assessing these individuals. Nevertheless, it is still necessary to consider an increase in the sample studied in order to better observe the impact of education on the application of this test, taking into consideration Brazilian deaf students in high school and universities.

Correspondence: *Anna Carolina C. Barbosa, Master, Universidade Presbiteriana Mackenzie, Rua Maria Antonia, 77/207, Vila Buarque, São Paulo 01222-010, Brazil. E-mail: carol.cassiano@gmail.com*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A.C. BARBOSA, L. KATERINA & E.C. MACEDO. Analysis of Physiological Measures During the Reading Texts by Dyslexics and Good Readers.

Objective: To investigate the relationship between behavioral tasks and record physiological measures in a population composed of people diagnosed with dyslexia and without dyslexia.

Participants and Methods: Participated in the study 48 subjects equally divided into four groups, Group 1 (G1): 12 children diagnosed with dyslexia and Group 2 (G2): 12 children good readers and Group 3 (G3): 12 adults diagnosed with dyslexia, Group 4 (G4): 12 adult good readers.

For the reading test used a simple three-line text taken from a book teaching. The text was presented the equipment to record eye movements Tobii ® 1750. The text was read aloud and comprehension was assessed with three questions relating to content, made immediately after reading. The reading was recorded by the computer's audio system.

Results: For analysis of eye movements while reading the text we used the statistical program SPSS 15.0 ® for Windows ® (SPSS Inc.). Analysis of Variance (ANOVA) were conducted comparing: mean pupil diameter per line of text, the average number of fixations per line of text, the average number of fixations in the text, mean fixations per line of text and mean duration of fixations in the text. The level of significance was set at × = 5%.

There is a statistically significant difference when comparing the measured pupil of children with dyslexia in relation to children good readers and adults with and without dyslexia, dyslexic children have lower pupil dilation. However no significant differences were found when we compared the measurements of pupil with dyslexia and good readers.

Children with dyslexia have Mean Time Fixation superior when compared to children with good readers. There is no difference among adults. Moreover, dyslexic children have a higher number of fixations only when compared with adults without dyslexia.

Conclusions: The results for the mean time and number of fixings in agreement with results already described in literature. However the data of pupil dilation in children with dyslexia should be better investigated.

Correspondence: *Anna Carolina C. Barbosa, Master, Universidade Presbiteriana Mackenzie, Rua Maria Antonia, 77/207, Vila Buarque, São Paulo 01222-010, Brazil. E-mail: carol.cassiano@gmail.com*

C. PURCELL, J.E. CASEY & P. RICCIARDI. The Relationship Between the WISC-IV PRI and the Executive Functioning Scale of the BASC-2 in Children Referred for Psychoeducational Assessment.

Objective: To address the question of whether the Perceptual Reasoning Index (PRI) of the Wecshler Intelligence Scale for Children-Fourth Edition (WISC-IV) is a measure of fluid reasoning by correlating the PRI and the Executive Functioning Scale (EFS) of the Behavior Assesment System for Children-Second Edition (BASC-2) in a referred sample.

Participants and Methods: Participants comprised 152 children (109 boys, 43 girls) ranging in age from 6 to 16 years. They were drawn from an anonymous archival database of 931 children who were referred for psychoeducational assessment due to persistent academic concerns, behavioural concerns, or both. To be included, they had to have received the WISC-IV and BASC-2, be fluent in English, be without a significant sensory or motor deficit, and not be taking a powerful medications (e.g., Risperdal, Haldol, Ativan).

Results: Since this was a clinical sample, a check was performed using principal factor analysis to insure the factor structure was the same as that of the WISC-IV standardization sample, which was found to be the case. No significant correlations were found between the PRI and the EFS, suggesting little to no relationship. A significant correlation was found between the EFS and the Processing Speed Index (PSI).

Conclusions: This study did not provide support for the hypothesis that the PRI is primarily a measure of fluid reasoning. Studies that look at the relationship between the PRI and other higher-order cognitive tests, in the context of a comprehensive neuropsychological battery, would be a useful direction for future research.

Correspondence: *Joseph E. Casey, PhD, Psychology, University of Windsor, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada. E-mail: jecasey@uwindsor.ca*

C.R. HALE, J.E. CASEY & P. RICCIARDI. A Cluster Analytic Investigation of the WISC-IV Core and Supplemental Subtests in Children Referred for sychoeducational Assessment.

Objective: To identify, among a sample of children referred for psychoeducational assessment, reliable and valid subgroups based on patterns of performance using the WISC IV core subtests plus Picture Completion, Information, and Arithmetic.

Participants and Methods: 117 participants, ages 8 to 16, were selected from a population of children referred for assessment due to persistent academic difficulties. Participants' WISC-IV subtest scores were subjected to a two-stage (hierarchical and iterative partitioning) cluster analysis. The reliability of the final solution was assessed through multiple-method comparisons using kappa and one-way random effects intraclass correlations. The derived subgroups were compared, via MANOVA, on the basis of academic achievement patterns using WIAT-II Word Reading, Spelling, and Numerical Operations subtests.

Results: The three cluster solution was stable across hierarchical and K-means methods and replicated across various agglomerative clustering algorithms (Ward's, Complete Linkage, Average Linkage between Groups, and Average Linkage within Groups). The subgroups were labeled: Globally Low; Low VCI; and Low VCI and WMI. The groups did not differ significantly on WIAT-II subtests.

Conclusions: Reliable patterns of WISC-IV core subtest scores were identified in children with persistent academic difficulties. These clusters are similar to those found in previous taxonomic research. Unexpectedly, a low PRI group did not emerge, nor did clusters characterized by subtest variations reflecting Gv or Gf. Curiously, Picture Concepts was among the highest score in every cluster. Future research is needed to elucidate the cognitive processes tapped by the PRI subtests, and to explore the external validity of this typology using more extensive measures.

Correspondence: *Joseph E. Casey, Psychology, University of Windsor, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada. E-mail: jecasey@uwindsor.ca*

V.M. PETRAUSKAS, J.E. CASEY, C.R. HALE & E.M. PICARD. Exploratory factor analysis of the WISC-IV Perceptual Reasoning Index in a referred sample using a CHC framework.

Objective: The Cattell-Horn-Carroll (CHC) theory of cognitive abilities suggests that the Perceptual Reasoning Index (PRI) of the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) comprises subtests that measure two different constructs – fluid reasoning (Gf) and visual processing (Gv). The traditional interpretation of the PRI, however, requires that all subtests be added together to form the index score. This study aimed to determine whether the PRI is better represented by the two separate factors of fluid reasoning (Gf) and visual processing (Gv) with the addition of the Beery Visual Motor Integration (Beery VMI) task.

Participants and Methods: Participants comprised 296 children (211 boys, 85 girls) ranging in age from 6 to 16 years. They were drawn from an anonymous archival database of children referred for psychoeducational assessment due to persistent academic difficulties, behavioural concerns, or both. An exploratory factor analysis (EFA) was conducted using the core and supplemental PRI subtests of the WISC-IV, with the addition of the arithmetic subtest as suggested by CHC theory. The Beery VMI was also included in the analysis to further assist in the differentiation of potential Gf and Gv factors.

Results: Various indicators (e.g., Scree plot, eigenvalues greater than 1, parallel analysis) all support the presence of a single factor underlying the core and supplemental PRI subtests with the addition of Arithmetic and the Beery VMI. This factor accounted for 59.20% of total variance.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: This study did not provide support for the hypothesis that dividing the PRI into two factors would aid interpretation, as suggested by CHC theory.
Correspondence: *Joseph E. Casey, Psychology, University of Windsor, 401 Sunset Avenue, Windsor, ON N9B 3P4, Canada. E-mail: jecasey@uwindsor.ca*

L.A. ERDODI & R. LAJINESS-O'NEILL. Memory as a Predictor of Adaptive Functioning.
Objective: The purpose of the current study was to investigate the relationship between memory performance and functional outcome and examine the extent to which neurocognitive data are relevant to affective-social aspects of functioning.
Participants and Methods: Data from 268 children with ADHD (n = 83), ASD (n = 62), VCFS (n = 21) as well as LBW (n = 38) and neurotypicals (n = 64) were used in the study. Statistical analysis included between-group contrasts on all neuropsychological variables studied and a set of multiple regression equations using memory as predictor and functional outcomes (academic achievement and social skills) as criterion variables.
Results: When memory was used to predict academic achievement, it explained 37% of the variance in math, 22% in reading and 13% in spelling scores. The same models did not predict social skills as measured by the CBCL. When age, gender and FSIQ were added to memory scores, the adjusted R2 value doubled for achievement scores, with IQ clearly driving the effect. However, IQ was not a significant predictor of social skills. With that criterion, age became the only significant predictor, increasing previous adjusted R2 values to .39.
Conclusions: Results suggest that memory functioning is a relatively strong predictor of academic achievement (especially math). However, parent reports on children's social skills are unrelated to cognitive performance. Finally, there seems to be a developmental trend in the perception of manifest psychopathology: as children age, parents report an increasing level of functional impairment. The clinical implications of the findings to the assessment of neurodevelopmental disorders are discussed.
Correspondence: *Laszlo A. Erdodi, EMU, 174 King St, London, ON N6A1C6, Canada. E-mail: lerdodi@gmail.com*

T.W. ERTELT, T.V. PETROS & C. YEAGER. Neuropsychological, Academic Achievement, and Behavioral Differences Between the Child Behavior Checklist Pediatric Bipolar Disorder Profile, Attention-Deficit/Hyperactivity Disorder, and Emotionally Normal Controls.
Objective: The goal of the present study was to identify differences in neuropsychological functioning, as well academic achievement and emotional/behavior functioning, in children identified as having a bipolar disorder or attention-deficit/hyperactivity disorder (ADHD) and emotionally normal children. The present study hypothesized that children with bipolar disorders would experience impaired performance on executive functioning tasks compared to the other groups and have higher reports of problematic behaviors.
Participants and Methods: A profile on the Child Behavior Checklist (CBCL), called the CBCL Pediatric Bipolar Disorder (CBCL-PBD) profile, has been identified as an efficient proxy method of screening children for bipolar disorders, and strong diagnostic accuracy has been reported when using the CBCL-PBD profile. The present study examined children between six and twelve years old who were positive for the CBCL-PBD and positive for a diagnosis of ADHD (CBCL-PBD + ADHD group, n = 17), negative for the CBCL-PBD and positive for a diagnosis of ADHD (ADHD group, n = 44), and negative for both the CBCL-PBD and an ADHD diagnosis (control group, n = 10) on measures of problem solving, set shifting, sustained attention, alternating attention, verbal memory, visuospatial memory, academic achievement, and emotional/behavioral functioning.
Results: No significant differences were observed between groups on measures of neuropsychological functioning; however, notable differences in academic achievement and emotional/behavioral functioning were observed.
Conclusions: The lack of significant neuropsychological differences for the CBCL-PBD group suggests the profile may not identify full-threshold cases of bipolar disorders. The importance of considering neuropsychological functioning in diagnosis is addressed.
Correspondence: *Troy W. Ertelt, MA, Psychology, University of North Dakota, 725 Hamline Street, Grand Forks, ND 58203. E-mail: troy.ertelt@und.edu*

J.K. IRWIN, M. JOSCHKO, S.W. MACDONALD & K.A. KERNS. Confirmatory Factor Analysis of the Reynolds Intellectual Assessment Scales (RIAS) in Typically-Developing Canadian Children.
Objective: The Reynolds Intellectual Assessment Scales (RIAS) is an individually-administered intelligence test, developed based on the Cattell-Horn and Cattell-Horn-Carroll models of intelligence. It was designed to measure overall cognitive ability (g), verbal (crystallized) intelligence, nonverbal (fluid) intelligence, and memory. Examining the validity of the RIAS in independent samples is critical since the RIAS is being increasingly used to make important clinical and educational decisions. However, previous studies have produced conflicting results about the RIAS' factor structure, particularly the two-factor (verbal and nonverbal) model fit. Furthermore, to our knowledge, no studies have examined its factor structure in a Canadian sample of children.
Participants and Methods: Participants were 164 typically-developing Canadian children, aged 6-18 years (M = 10.6, SD = 3.55; 75 females). They were administered the four core subtests of the RIAS (Verbal Reasoning, Guess What, What's Missing, and Odd-Item-Out).
Results: Confirmatory factor analysis was used to compare the relative fit of one-factor (g) and two-factor (verbal and nonverbal) models. Conventional fit indices indicated that both models had excellent, equivalent fit to the data, though the two-factor model was more parsimonious. The models were not different from each other. The What's Missing subtest had low factor loadings on g and the nonverbal factor in the one- and two-factor models, respectively.
Conclusions: The interpretability of the index scores of the RIAS was supported by the equally good fit of the one- and two-factor models. However, the low factor loading of the WHM subtest in both models calls into question the validity of this subtest.
Correspondence: *Julie K. Irwin, Dept. of Psychology, University of Victoria, 204-1576 Midgard Ave., Victoria, BC V8P 2Y1, Canada. E-mail: jkirwin@uvic.ca*

G. KURIAKOSE & A. MARGOLIS. Differentiating Between Typically and Atypically Developing Child Populations: A Microanalysis of the Children's Clock Drawing Test.
Objective: The Clock Drawing Task (CDT) historically has been used as a neurological screener with geriatric populations because it assesses several categories of executive functioning such as planning, self-monitoring, and sequencing. Recent studies have shown that the Children's CDT (CCDT) is sensitive to various childhood disorders, such as ADHD, and executive dysfunction. In this study, the cognitive deficits of children with Attention Deficit/Hyperactivity Disorder (AD/HD), Reading Disorder (RD) and ADHD + RD were examined through a microanalysis of typically developing (TD) and atypically developing (ATD) children's performances on the CCDT. Two scales, conceptual knowledge, and spatial planning were examined. Consistent with the literature, we hypothesized that TD children would improve with age on both scales, that RD children would show deficits in conceptual knowledge, and that AD/HD children would show deficits in spatial planning.
Participants and Methods: This is a cross-sectional study that utilized archival data collected from classrooms in a parochial school and from neuropsychological evaluations conducted at a private clinic in New York City. Of the 160 total participants, 54% were female.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: One way between subjects ANOVAs, ANCOVAs, and MANCOVAs were used to explore the hypotheses set forth in this study. Results indicate that TD and ATD children's performance improved across most age groups on both scales (p's < .001). Both scales differed between TD and ATD groups (p's < .05). Analyses of differences between diagnostic groups showed significant differences on both conceptual knowledge and spatial planning, with RD children having deficits in conceptual knowledge (p < .05) and AD/HD children having deficits in spatial planning (p < .05).
Conclusions: The cognitive process approach to analyzing children's performance utilized in this study yields valuable information about the types of deficits that accompany different childhood disorders.
Correspondence: *Geena Kuriakose, Ph.D., Geena Kuriakose, Brooklyn Learning Center, 142 Joralemon Street, 3E, New York, NC 11201. E-mail: geena@brooklynlearningcenter.com*

C. MCGILL, E. GERST, P. ISQUITH & G. GIOIA. Evidence of Validity for a Monitoring Version of the Behavior Rating Inventory of Executive Function (BRIEF).
Objective: Factor analysis and correlations with other measures were used to examine evidence of validity for a shortened, modified version of the BRIEF designed to track changes in executive function.
Participants and Methods: 187 children (66% male) aged 11 to 18 years (M = 13.21(3.36)) with recent mTBI (median post-injury days = 14) and their parents completed retrospective baseline and post-injury forms of a modified BRIEF: Self-report form, 32 items composing Working Memory, Emotional Control, Task Completion, Planning/ Organization, Inhibit scales; Parent form, 31 items composing the same scales with Initiate substituted for Task Completion. Additional measures included Auditory Consonant Trigrams (ACT), WISC-IV Digit Span, WJ-3 Reading/Math Fluency subtests, and Post-Concussion Symptom Inventory (PCSI).
Results: Post-injury BRIEF subscales correlated significantly with PCSI totals (e.g., self-report Working Memory r = .759; p < .000, parent total score r = .655; p <.000). ACT correlated significantly with self-report metacognitive subscales (e.g., Working Memory r = -.432; p <. 000), Digit Span and self-report Working Memory subscale (r = -.192; p < .012), and WJ-3 Fluency subtests with self-report subscales (e.g., Reading and Working Memory r = -.286; p < .000). Item-level principal factor analyses of parent and self-report baseline and first post-injury visit ratings revealed a factor structure similar to the original scale/factor structure.
Conclusions: A monitoring form of the BRIEF exhibited promising evidence of validity via a consistent scale structure to the original measure and moderate to high correlations with other measures, suggesting the BRIEF may be useful in monitoring changes in executive dysfunction following mTBI.
Correspondence: *Catherine McGill, M.A., American School of Professional Psychology, 850 N. Randolph St, Apt 607, Arlington, VA 22203. E-mail: catherine.mcgill@hotmail.com*

Y. NAKAGAWA & T. KOYAMA. Grammatical development of written language in Japanese A comparison between children with normal hearing and those with a hearing loss.
Objective: The objective is to investigate school children's development of Japanese grammar comprehension in written language and to evaluate the grammatical abilities of children with a hearing loss.
Participants and Methods: The participants of this study were 175 native hearing children from elementary school aged six to twelve years and 125 children with a hearing loss. The participants were assessed using a Japanese written grammatical test (J.COSS: Japanese test for comprehension of syntax and semantics). The J.COSS is multiple-choice text consisting of 20 blocks of 4 items each. Each item has four choice pictures. The participants were required to select one picture that corresponds to a grammatical construction in written Japanese.
Results: Because the reproducibility of a scale analysis was within an acceptable range, the development of 20 grammatical items was determined by a step-by-step order, in accordance with the passing rate for children with normal hearing. A comparison between both types of participants revealed that most children with a hearing loss performed at a level similar to or below the elementary school first grade children with normal hearing. Moreover, they were not able to comprehend the reversible passive constructions and Japanese particles.
Conclusions: This study showed the development of written language grammar in Japanese and indicated the overall grammatical delay for children with a hearing loss. Specifically, they found it difficult to comprehend reversible passive constructions and Japanese particles. These delays may be influenced by not only the hearing impairment but also the grammatical construction in Japanese sign language.
Correspondence: *Yoshiko Nakagawa, PhD, Welfare and Psychology, Health Science University, 1-2-10-310, Suidou, Bunkyo-ku 1120005, Japan. E-mail: SNC59810@nifty.com*

A. PEDOTO. Breastfeeding: The Neuro-developmental Effects.
Objective: The associations between duration of breast feeding and cognitive and behavioral functions at preschool age needs to be explored more. The relationship between global mental ability and the specific outcome measures as it can be associated with maternal intelligence.
Participants and Methods: Twelve breastfeeding mothers were interviewed and observed as their children developed. Interviewer-administered questionnaires were completed by mothers every six months up to age 4 years of their child. A standardized version of the McCarthy Scales of Children's Abilities (MCSA) was used to evaluate the child's motor and cognitive capabilities. Multivariable regressions were used with MCSA's assessed outcomes adjusting for environmental variables and parental variables.
Results: Breastfeeding for more than 20 weeks was associated with an increase of 4.9 on executive function scores derived from the MCSA. The relative risks of poor social competence scores and attention-deficit hyperactivity symptom scores were 0.57 and 0.56, respectively for breastfeeding for more than 12 weeks. The measures of social competence and attention-deficit hyperactivity symptoms showed strong correlations with MCSA measures of cognitive function.
Conclusions: The study suggests there are effects of breastfeeding independent of any effects on global mental ability and maternal intelligence. Very interesting are the observed significant associations between duration of breastfeeding and cognitive functioning.
Correspondence: *Amy Pedoto, baylor university, 141 Stoneway Trail, Madison, AL 35758. E-mail: amy_myers@baylor.edu*

J. GARBARINO, G. MILLS & S. RASKIN. Psychometric Properties of the Memory for Intentions Screening Test for Youth (MISTY).
Objective: Prospective memory (PM), or remembering to do something in the future is important in the daily lives of children and adults alike. The Memory for Intentions Screening Test for Youth (MISTY), is based on the psychometrically valid MIST (Raskin, 2004). The study of PM in children is still emerging, with an increase in research in the past ten years and the need for valid clinical measures.
Participants and Methods: The MISTY is unlike previous tests in its use of two different time delays, both event-based and time-based tasks, and both action and verbal responses. The MISTY has been piloted on 113 children ages 5-14.
Results: All trials on the MISTY were significantly intercorrelated (p<.001) with all other trials. All trials also significantly correlated with the total score. Age was significantly correlated with MISTY total score (r=.719) performance but gender and ethnicity were not. There was strong interrater reliability (r=90). Importantly, the MISTY was able to show stronger differences in performance of younger children than older children depending on time delay and cue type. Younger children (ages 5-10) performed significantly better on shorter delays (two minutes) than longer delays (10 minutes) and event-based cues than time-based cues, while older children did not perform differently on shorter verses longer delays or event versus time cues.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Age group variation in significance on these comparisons suggests that consideration of time delay, cue type, and response type may explain some of the conflicting findings in the literature about age differences in PM ability among children.
Correspondence: *Sarah Raskin, Ph.D., Psychology, Trinity College, 300 Summit Street, Hartford, CT 06119. E-mail: sarah.raskin@trincoll.edu*

J.E. ROSENQVIST & M. KORKMAN. Recognition of Emotional Expressions in 3 to 6-Year-Old Finnish Children – Effects of Age, Other Neurocognitive Capacities, and Social Stimulation.
Objective: The present study was performed to explore the effects of moderators of performance on a new test of emotion recognition abilities in preschool-aged children.
Participants and Methods: 370 Finnish children aged 3 to 6 years were assessed with the NEPSY II. The new subtest Affect Recognition was used as an indicator of emotion recognition. Moderators were other neurocognitive capacities as evaluated through subtests from the NEPSY II, and the child's age, gender, parental education, siblings and day care.
Results: The children's score on Affect Recognition was significantly influenced by age and parental education but not by sex, but there was a significant interaction effect between sex and parental education. Regression analysis revealed that, after controlling for the influence of age, the score on the Affect Recognition subtest was positively related to the subtests Statue, Comprehension of Instructions, Design Copying, and Theory of Mind (Contextual Reasoning). A subgroup of children who had no siblings and had not attended day care (n = 19) performed equally well as children who had siblings and had attended day care (n = 38).
Conclusions: Age, performance on tests of inhibition, instruction comprehension, design copying, and nonverbal mentalizing, as well as higher parental education were significantly related to children's emotion recognition. An upbringing as an only child without attending a day care center or preschool did not seem to delay development of children's recognition of emotions. This study was the first to investigate the relationship between neurocognitive factors and social stimulation, and typically developing children's emotion recognition.
Correspondence: *Johanna E. Rosenqvist, Department of Psychology, University of Helsinki, Johanneksenrinne 1 B 22, Helsinki 00120, Finland. E-mail: johanna.rosenqvist@helsinki.fi*

J. WEINBERG & K. O'TOOLE. Using an Ecological Lens to Examine the Neurocognitive Outcomes of Congenital Heart Disease: A Case Study.
Objective: 1) To examine the neurocognitive profile of children with congenital heart disease (CHD). 2) To present an ecological framework to examine neuropsychological findings. 3) To apply this framework to the neuropsychological evaluation of a 5 year old child with CHD.
Participants and Methods: Family, school, and test data will be presented.
Results: 1) The participant showed similar neurocognitive strengths (i.e., language and emergent pre-academics) and weaknesses (i.e., fine motor and visual motor integration and attention regulation) of children with CHD. Given his history and pattern of performance, the diagnosis of Attention Deficit Disorder Combined Type was given. 2) An ecological lens provided a way to organize transactional variables from systems in the child's environment (i.e., chrono, micro, meso, exo, and macrosystems) and provided important information when conceptualizing this case and offering recommendations. For example, when conceptualizing this case, chronosystem (i.e., individual) level factors associated with the child's diagnosis of CHD such as undergoing 3 open heart surgeries, being immunocompromised, and experiencing neurodevelopmental sequelae were found to interact with microsystem (e.g., peers, family, and teachers) level factors. This interaction resulted in limited peer relationships, overprotective parenting, and poor behavior in school/home. The ecological framework also provided a useful structure when offering recommendations, e.g., due to the child's history of CHD, there were expected contraindications for using effective AD/HD medication. Thus, utilizing the ecological lens allowed for recommendations at various system levels (i.e., family, school, hospital, community).
Conclusions: Given the multiple systems in which a child is embedded, utilizing an ecological approach can be useful in neuropsychological assessment, during case conceptualization, and when making recommendations to support global neuropsychological change.
Correspondence: *Joanna Weinberg, M.A., Psychology, Georgia State University, POBox 5010, Atlanta, GA 30303. E-mail: weinjr0@gmail.com*

J.J. RYAN, A. KANE & L.G. UMFLEET. Stability of WISC-IV Process Scores.
Objective: The WISC-IV Technical Manual reports stability coefficients for five process scores over a retest interval of 32 days. Omitted from this data set were scores for Longest Digit Span Forward (LDSF) and Longest Digit Span Backward (LDSB). To supplement the Technical Manual, the present investigation reports stability data for seven process scores, and their associated discrepancy scores, with a new sample and a retest interval of 11 months.
Participants and Methods: Forty-three (25 girls, 18 boys) healthy students were administered on two occasions the 15 WISC-IV subtests and the seven process components of Block Design No Time Bonus (BDN), Digit Span Forward (DSF), Digit Span Backward (DSB), Cancellation Random (CANR), Cancellation Structured (CANS), LDSF, and LDSB. Mean ages at first and second testing were 7.77 years (SD = 1.91) and 8.74 years (SD = 1.93). Mean FSIQ at initial testing was 111.63 (SD = 10.71).
Results: Test-retest means, standard deviations, stability coefficients, t-tests, and effect sizes are presented in Table 1. Stability coefficients ranged from .75 on DSF to .32 on CANS. Only CANS showed a significant retest improvement. Similar information on the test-retest stability of process subtest discrepancy scores appears in Table 2. Stability coefficients ranged from .45 on DSF-DSB to .05 on CANS-CANR.
Conclusions: Process scores and their associated discrepancy values have poor stability over an 11 month interval. Caution must be exercised when interpreting these scores.
Correspondence: *Joseph J. Ryan, PhD, Psychology, University of Central Missouri, 1111 Lovinger, University of Central Missouri, Warrensburg, MO 64093. E-mail: ryan@ucmo.edu*

Multiple Sclerosis/ALS/Demyelinating Disorders

J.J. RYAN, S.T. GONTKOVSKY & H.A. TREE. WAIS-IV Performance in Multiple Sclerosis.
Objective: Cognitive impairment and processing speed deficits are prevalent among persons with multiple sclerosis (MS). No study has assessed the WAIS-IV performance of this patient group. Therefore, the present investigation reports WAIS-IV results in a sample of patients with MS.
Participants and Methods: Participants were 31 individuals (5 males, 26 females) with MS (29 relapsing-remitting, 1 secondary progressive, 1 undocumented course). Means for age and education were 40.65 years (SD = 10.10) and 14.35 years (SD = 2.21). Thirty were Caucasian; 1 was African American. From the WAIS-IV the following values were derived: VCI, PRI, WMI, PSI, FSIQ, General Ability Index (GAI), CPI (Cognitive Proficiency Index), FSIQ, 10 standard subtest scaled scores, and Block Design No Time (BDN) scaled score. Demographically based estimates of FSIQ were also derived.
Results: Means and SDs for all values appear in Table 1. PSI was the lowest of the standard indexes, but significantly so only compared to VCI ($p = .05$). GAI was significantly larger than FSIQ ($p = .004$) and CPI ($p = .03$). FSIQ and CPI did not differ from one another, nor did the Block Design and BDN scores differ. The mean FSIQ was significantly smaller than the mean demographically-based premorbid IQ estimate.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Patients with MS (predominantly-relapsing-remitting type) demonstrate a pattern of performance on the WAIS□IV that reflects mild processing speed deficits as well as intellectual deterioration.
Correspondence: *Joseph J. Ryan, PhD, Psychology, University of Central Missouri, 1111 Lovinger, University of Central Missouri, Warrensburg, MO 64093. E-mail: ryan@ucmo.edu*

A. ARENIVAS, L.L. HARDER, D. GRAVES & B.M. GREENBERG. Quality of Life, Fatigue, and Cognition in Pediatric Demyelinating Diseases.

Objective: Existing literature suggests pediatric demyelinating diseases are associated with difficulties in cognition and quality of life. The current study aimed to explore self and parent reports of quality of life and fatigue and their relationship with performance on neuropsychological testing in pediatric demyelinating diseases

Participants and Methods: Forty-six patients, aged 4 to 19 years, diagnosed with MS (N=16), TM (N=19), NMO (N=5), ADEM (N=3), or Other (N=3) participated in a brief neuropsychological screening battery within a multi-disciplinary clinic. Caregivers and patients completed the PedsQL Quality of Life Scale and the PedsQL Multidimensional Fatigue Scale (MFS).

Results: Both patients and caregivers reported impairment in sleep/rest, general fatigue, and cognitive fatigue. Independent samples t-tests revealed that TM patients reported significantly more difficulties with physical health than MS patients ($p=.05$). Caregiver reports indicated significantly more social difficulties for TM patients than MS patients ($p<.05$) but significantly more problems with sleep/rest for MS patients than TM patients ($p<.05$). Multiple regression analyses revealed that self-reported total fatigue and total quality of life accounted for a significant amount of variability ($p<.05$) in performance on a visual-motor integration task across all patient groups. Additionally, caregiver-reported cognitive fatigue accounted for a significant amount of variability ($p<.05$) in performance on a verbal memory task.

Conclusions: Findings underscore the importance of ongoing monitoring of cognition, fatigue, and quality of life to inform appropriate intervention for pediatric patients with demyelinating diseases. These findings emphasize the role of neuropsychology in the multi-disciplinary approach to treatment for this patient group.
Correspondence: *Ana Arenivas, MS, MPH, UT Southwestern Medical Center, 5323 Harry Hines Blvd, Dallas, TX 75235. E-mail: ana.arenivas@utsouthwestern.edu*

J. BERARD, L.A. WALKER, L.I. BERRIGAN, A. CHENG, L.M. REES & M.S. FREEDMAN. Impact of PASAT Scoring Method When Measuring Cognitive Fatigue in Multiple Sclerosis.

Objective: Fatigue is a frequently reported and debilitating symptom in multiple sclerosis (MS). Cognitive fatigue (CF) can be defined as decreased performance with sustained cognitive effort. The Paced Auditory Serial Addition Test (PASAT) requires such effort and is effective at measuring CF, but sensitivity differs with scoring method. Currently it was hypothesized that MS subjects would more likely show evidence of CF on the PASAT than healthy controls (HC). Additionally it was determined if scoring method influenced sensitivity of the PASAT in detecting CF.

Participants and Methods: 40 MS participants and 40 HCs completed the PASAT (3" and 2") in a larger neuropsychological battery. First and second half performance was compared across two inter-stimulus intervals (ISI). Three scoring methods were utilized: correct responses, correct dyad responses and percent dyad responses.

Results: The MS group performed worse than HCs at each ISI. Dyad scoring revealed the MS group was more affected by increased working memory load at the shorter ISI than HCs. Across scoring methods, both groups performed worse on the second half compared to the first with the MS group more significantly affected by sustained effort (i.e. second half worse than first) than HCs when percent dyad scoring was utilized.

Conclusions: The PASAT continues to be sensitive to cognitive impairment in MS. Differences between MS and HCs become more apparent as working memory load increases. Additional information is obtained with different scoring methods, with percent dyad scoring being more sensitive to the heightened susceptibility to cognitive fatigue in MS.
Correspondence: *Jason Berard, The Ottawa Hospital, 737 Parkdale Ave., Ottawa, ON K1Y 1J8, Canada. E-mail: jbera051@uottawa.ca*

L.I. BERRIGAN, L. WALKER, L. REES, A. CHENG & M.S. FREEDMAN. Cognitive Processing Speed is Linked to Vocational Status in Individuals with Relapsing-Remitting Multiple Sclerosis.

Objective: The objective of the present study was to investigate the relationship between different domains of cognitive functioning and vocational status in a group of individuals diagnosed with relapsing-remitting multiple sclerosis (MS).

Participants and Methods: Sixty-five adults with relapsing-remitting MS were divided into two groups: employed and unemployed. Twenty-percent were unemployed. Composite variables representing processing speed, working memory, learning, memory and executive functions were formed by taking the average of multiple test scores measuring each domain. The composite scores emphasized common variance shared across different tests assessing the same domain, thus minimizing concerns regarding construct validity. ANOVAs were employed to investigate the relationship between cognitive domains and vocational status. In addition, possible contributions of age, education and depression to vocational status were examined.

Results: No significant group differences were found for education or depression ($p>.05$); however, a group difference was found for age, $F(1, 63)=5.85$, $p=.019$. The only significant difference observed on the cognitive variables was for processing speed, $F(1, 63)=6.90$, $p=.011$. The significant group difference on processing speed remained even when age was statistically controlled, $F(1, 62)=6.24$, $p=.015$.

Conclusions: Individuals with MS who were not employed evidenced significantly slower processing speed. This suggests the ability to process information quickly is important to maintaining employment for individuals with MS. The results are in agreement with previous work reporting a significant relation between cognitive function and vocational disability in MS. However, while others have noted this is particularly true for executive functions, the present study found reduced processing speed was more strongly related to vocational status.
Correspondence: *Lindsay I. Berrigan, BSc., M.A., Psychology, Carleton University; The Ottawa Hospital, Room B550, Loeb Building, Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada. E-mail: lberrigan@toh.on.ca*

R. FROST, M. MUNAFO, M.J. LARSON, J.F. FOLEY & R.O. HOPKINS. PASAT Performance as a Predictor of Peak Alpha Frequency in Multiple Sclerosis.

Objective: Cognitive deficits in MS occur in 40-70% of individuals. The cognitive deficits are heterogeneous and are attributed to lesion location and lesion load. We assessed quantitative EEG (qEEG) and correlated EEG patterns with cognitive performance in MS patients. The relationship between peak alpha frequency, a measure of cognitive preparedness, and performance on the Paced Auditory Serial Addition Task (PASAT), a measure commonly used in the assessment of MS, was examined.

Participants and Methods: Participants included 9 patients diagnosed with relapse-remitting MS and age and sex-matched normal controls selected from a normative EEG database (Thatcher, et al., 2003).

Results: Relapse-remitting MS patients exhibited lower peak alpha frequency on qEEG on right frontal electrodes compared to controls that approached significance (F8: $t = -1.998$, $p = 0.081$), but not at other sites. More importantly, zero-order correlations showed higher peak alpha frequency was associated with improved PASAT performance at frontal, central, and temporal electrode sites (PASAT 2 second trial: FRONTAL: F7: $r = .677$, $p = .045$, Fz: $r = .733$, $p = .025$; CENTRAL: C3: $r = .715$, $p = .03$, C4: $r = .766$, $p = .016$, Cz: $r = .780$, $p = .013$); TEMPORAL: T3: $r = .745$, $p = .021$, T4: $r = .725$, $p = .027$).

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Better PASAT performance was associated with higher peak alpha frequency in frontal, central, and temporal EEG electrode sites in a group of individuals diagnosed with relapse-remitting MS. These findings suggest that peak alpha frequency may be useful in identifying cognitive impairment in patients with MS.
Correspondence: *R Brock Frost, Clinical Psychology, Brigham Young University, 120 Wymount Terrace, Provo, UT 84603. E-mail: bock.frost@gmail.com*

J. BRUCE & S. LYNCH. Personality Characteristics in Multiple Sclerosis: Association with Depression and Anxiety.
Objective: Patients with multiple sclerosis frequently experience personality change, depression, and anxiety. Few studies, however, have examined the relationship between anxiety/depression and core personality traits in MS. The purpose of the present investigation was to examine the association between emotional and personality disturbances in MS.
Participants and Methods: MS patients and normal controls were recruited from a large multiple sclerosis specialty clinic and by distributing flyers in the Kansas City metropolitan area. A structured psychiatric interview and validated self-report measures of personality, depression, and anxiety were administered to 85 MS patients and 20 normal controls. Patients and controls also completed a battery of neuropsychological tests that measured various aspects of executive functioning, including social judgment, problem solving, and impulsivity.
Results: Findings suggested a significant association between psychopathology and core personality dysfunction in MS. Depressed/anxious MS patients exhibited more neuroticism, less extroversion, less agreeableness, and less conscientiousness than mentally healthy MS patients and normal controls (all p values <.01). In contrast, nondepressed/nonanxious MS patients' core personality traits did not substantially differ from normal controls. Failing to replicate previous research, no significant association was found between personality characteristics and performance on measures of executive functioning.
Conclusions: Though longitudinal studies are needed, findings provide hope that the successful treatment of MS patients' mood and anxiety symptoms may also partially ameliorate disordered personality characteristics. A better understanding of MS patients' personality characteristics may improve the quality of their psychiatric and medical care.
Correspondence: *Jared Bruce, PhD, University of Missouri-Kansas City, 4825 Troost Building, Kansas City, MO 64110. E-mail: brucejm@umkc.edu*

A. CHENG, L.A. WALKER, L.I. BERRIGAN, L.M. REES & M.S. FREEDMAN. Subjective Ratings of MS Subjects and Healthy Controls on Tests of Information Processing Speed.
Objective: Reduction in information processing speed (IPS) is a key deficit in multiple sclerosis (MS). The Paced Auditory Serial Addition Test (PASAT), Symbol Digit Modalities Test (SDMT) and Computerized Tests of Information Processing (CTIP) are used to measure IPS. All are sensitive to detecting deficits in IPS. One limitation of the PASAT is that it often evokes anxiety. Despite this widely accepted view, there is little supporting psychometric evidence. To address this issue subjective ratings of likeability, difficulty and appropriateness of the PASAT, CTIP, and SDMT were obtained. Ratings were compared between MS and healthy controls (HC). It was hypothesized that ratings for the PASAT would differ significantly from those of the SDMT and CTIP. The relationship between subjective ratings and objective performance was also evaluated.
Participants and Methods: 30 MS participants and 30 matched HCs completed a questionnaire rating their perceptions on a Likert scale based on perceived likeability, difficulty, and appropriateness at capturing cognitive deficits often associated with MS.
Results: Both groups rated the PASAT as most difficult and least likeable. No differences were found on perceived appropriateness at measuring MS-related deficits. HC were more likely than MS to rate tests favourably (i.e. less difficult, more likeable) if they performed well objectively, but this was not consistent across tests.
Conclusions: Findings lend psychometric support to the opinion that the PASAT is perceived as unpleasant. More palatable tests are available that are similarly sensitive to deficits in IPS and provide a less aversive alternative.
Correspondence: *Amy Cheng, Psychology, The Ottawa Hospital, 1053 Carling Ave., Ottawa, ON K1Y 4E9, Canada. E-mail: acheng@toh.on.ca*

A. CHENG, L.A. WALKER, L.I. BERRIGAN, L.M. REES & M.S. FREEDMAN. Subjective Ratings of Memory Tests by MS Subjects and Healthy Controls.
Objective: Much research exists regarding patients' perception of their cognitive performance, but little is known about perception of cognitive tests themselves. Clinicians know some tests are perceived as more aversive than others and this perception could negatively affect performance of patients and willingness to remain engaged. The current study examined subject perceptions of three memory tests included in a larger neuropsychological battery. The first goal was to determine if perceptions differed between MS and healthy control (HC) groups. Secondly, differences in perceptions between particular memory tasks were examined to determine if ratings varied by either domain (i.e. verbal vs. visual) or format (e.g. list learning vs. contextual learning). Finally, the relationship between subjective perception and objective performance was examined.
Participants and Methods: 44 MS participants and 44 matched HC completed a questionnaire rating their perceptions on a Likert scale based on perceived likeability, difficulty and appropriateness at capturing cognitive deficits often associated with MS.
Results: Few differences in perception were found between MS and HC groups. Both found the visual memory task to be more likeable and easier than the verbal tasks. In general, the better subjects performed, the more likely they were to rate the task as more likeable, less difficult and more appropriate at measuring MS-related deficits. However, variability was observed.
Conclusions: The current findings confirm that memory tests are not experienced or perceived equally. Clinicians should thus be mindful of the fact that the selection of measures that do not elicit a negative reaction is paramount to the collection of valid psychometric data.
Correspondence: *Amy Cheng, Psychology, The Ottawa Hospital, 1053 Carling Ave., Ottawa, ON K1Y 4E9, Canada. E-mail: acheng@toh.on.ca*

M. DEHNING, N. DENBURG, T. SHIVAPOUR & J. KIM. Neurological Correlates of Multiple Sclerosis.
Objective: The objective of this study was to explore the relationship between cognitive performance, as measured by neuropsychological testing, and brain volume/atrophy, as measured by magnetic resonance imaging (MRI), in patients with Multiple Sclerosis (MS).
Participants and Methods: Two unique databases were utilized to procure patients, namely, the Benton Neuropsychological Laboratory and the MS Registry, both found within the University of Iowa's Department of Neurology. The final sample was limited to MS registrants with neuropsychological evaluation and brain MRIs, which amounted to 61 individuals. The MRIs were analyzed using measures of corpus callosal atrophy and the bicaudate ratio. Each MS patient was age-, sex-, and education-matched to a non-MS normal comparison.
Results: After controlling for self-reported mood (via the Beck Depression Inventory), the MS patients demonstrated deficits in multiple cognitive domains, including abstract reasoning, concentration, verbal list-learning and memory, visuoconstruction, psychomotor speed, and simple executive functions. Additionally, MRI analyses revealed that the bicaudate ratio was inversely correlated with verbal and non-verbal anterograde memory, psychomotor speed, and simple executive functions among MS patients, while no relationships with corpus callosum were observed. Lastly, we investigated neuropsychological predictors of over-the-road driving performance and found MS patients to perform almost one standard deviation below their non-MS comparisons.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The study was effective in demonstrating the pervasiveness of cognitive decline in MS patients, as well as the importance of controlling for self-reported mood. Furthermore, the bicaudate ratio may serve as a reliable proxy for neuropsychological performance. Finally, the data suggest a need to further explore driving ability in MS patients.
Correspondence: *Meaghan Dehning, B.S., University of Iowa Carver College of Medicine, 731 Michael St, #3, Iowa City, IA 52246. E-mail: meaghan-dehning@uiowa.edu*

K. FUCHS, J. DUCHARME, A. MCDERMOTT, A. ESCALONA, I. WINGLER, J. NGUYEN, K. POLLARD & D. BALL. Cognition in MS: Clinic vs. Community Setting.

Objective: Cognitive dysfunction in multiple sclerosis (MS) is associated with unemployment and decreased participation in community activities. Individuals without access to neuropsychological assessment services may struggle to understand how cognitive changes impact their activities of daily living. We compared cognitive and emotional functioning in individuals with MS referred for cognitive screening in a clinic setting vs. those who participated in screening though a rural outreach program.
Participants and Methods: Participants underwent a brief interview and completed the MS Neuropsychological Questionnaire (MSNQ), Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), and the Beck Depression Inventory. They were provided feedback on test results and given recommendations for intervention or follow up as appropriate. Test results from the rural outreach group were compared with a randomly selected sample of individuals who had been evaluated at a multidisciplinary MS clinic.
Results: There were no significant group differences in demographics, RBANS performance, or level of depression. There was not a significant correlation between level of depression and RBANS total score for either group. Those who were employed performed significantly better on the RBANS and had lower levels of depression. Self-ratings of impairment on the MSNQ correlated with increased levels of depression and with reduced performance on the RBANS.
Conclusions: The results of this study suggest that there are not large differences between people with MS who present for multidisciplinary MS care and those who do not have access to this care. The correlation between the MSNQ and test performance supports the use of that instrument as a screening measure.
Correspondence: *Kathleen Fuchs, PhD, Neurology, University of Virginia Health System, PO Box 800394, Charlottesville, VA 22908-0394. E-mail: klf2n@virginia.edu*

L. HANCOCK, J. BRUCE, B. ROBERG, S. PETERSON, M. MURPHY, J. JACOBSON & S. LYNCH. Investigating the Association Between Processing Speed and Neurologic Disability in Multiple Sclerosis.

Objective: Patients with relapsing-remitting multiple sclerosis (RRMS) frequently experience deficits in processing speed. These deficits are often associated with overall neurologic disability. No studies have examined the relationship between processing speed and disability in disparate neurologic domains. The purpose of the present study was to examine the association between processing speed and functional system scores derived from Kurtzke's Expanded Disability Status Scale (EDSS).
Participants and Methods: Patients were recruited from a large MS specialty clinic. A computerized Stroop Task and the oral version of the Symbol Digit Modalities Test were administered to 74 RRMS patients. A neurologist rated patients on seven functional systems of the EDSS: pyramidal, cerebellar, brain stem, sensory, bowel/bladder functions, visual, and mental.
Results: Poor Stroop performance was associated with more disability in brainstem ($r=-.25$, $p<.05$) and sensory ($r=-.27$, $p<.05$) scores. Similarly, poor performance on the SDMT was associated with greater neurologic disability on brainstem ($r=-.24$, $p<.05$), cerebellar ($r=-.45$, $p<.01$), and sensory ($r=-.44$, $p<.01$) scores. Stepwise regression revealed only the sensory score significantly predicted Stroop performance ($R2=.08$, $p<.05$). Both sensory ($R2=.18$, $p<.01$) and cerebellar (R2 change=.06, $p<.05$) scores accounted for unique variance in SDMT performance.
Conclusions: This was the first study to examine the relationship between neurologic functional systems and processing speed in MS. Better performance on processing speed tasks was significantly related to fewer sensory and cerebellar neurologic deficits. Results highlight the need for further investigation of how the EDSS' different neurologic functional systems are associated with cognitive deficits in MS.
Correspondence: *Laura Hancock, M.A., Psychology, University of Missouri-Kansas City, 4825 Troost Ave., Suite 124, Kansas City, MO 64110. E-mail: lmhp99@mail.umkc.edu*

M. KALAHANI-BARGIS, T. CHRISTINE, J. COLEMAN & S. KHAN. Lack of Interhemispheric Cooperation in a Global-Local Visual Processing Task in Pediatric Multiple Sclerosis.

Objective: Visual-spatial ability is a multifactorial process that is commonly impaired in children with multiple sclerosis(MS). However, it has yet to be determined which features of visual-spatial processing are affected in pediatric MS and by what underlying neural mechanisms. This study will allow us to examine whether corpus callosal compromise interferes with the normal development and functioning of systems that analyze both local and global features. We hypothesize that both configural and featural perception will be impaired in children with MS relative to healthy controls. Visuo-spatial functioning requiring bilateral integration will be most compromised in children with MS.
Participants and Methods: Fifteen MS patients diagnosed with clinically definite MS prior to the age of 18 and 15 age-matched healthy controls were administered an experimental global-local paradigm that explicitly assesses components in visual hierarchical processing. Reaction times(RTs) and accuracy were measured for each condition.
Results: Analyses revealed that groups were equally accurate, but MS patients had longer RTs than controls for both local and global level processing. Conversely, the MS group did not show this pattern. As expected, controls exhibited a congruency effect, with faster RTs to congruent than to incongruent trials, whereas the MS group did not show a facilitative effect. This pattern of results suggests visuo-spatial functioning requiring interhemispheric integration of information is compromised in the MS group.
Conclusions: MS patients were slower but as accurate as controls on the task, reflecting a generalized reduction in processing speed. The lack of a congruency effect in the MS group suggests that the MS group does not efficiently integrate hierarchically organized information. Impaired visuospatial processing in MS patients may relate to degraded corpus callosum integrity. These findings are important for improved diagnosis and for designing targeted interventions to improve visual-spatial function in children.
Correspondence: *Martina Kalahani-Bargis, B.Sc., York University, 38 Roselawn Avenue, Toronto, ONM4R 1E4, Canada. E-mail: kathryn_11@msn.com*

K. LAU & A. AU. Cognition, emotions and coping in multiple sclerosis in Hong Kong.

Objective: The prevalence of multiple sclerosis (MS) has an increasing trend in Asia. However, no systematic studies about the conditions and needs of these Chinese individuals have been done. The current study attempted to systematically capture the multi-dimensional profile of the patients with MS in Hong Kong in terms of cognition, emotion, stresses encountered in daily life, and coping styles.
Participants and Methods: A representative sample of fifty Chinese MS patients with mild to moderate severity of disability was recruited from major local hospitals. Most of them belonged to relapsing-remitting MS; the remaining participants had progressive types. The current study adopted mixed methods. The quantitative approach included neuropsychological tests which covered the domains of memory, attention and speed of information processing, executive functioning and visuospatial abilities, and Beck Depression Inventory-II. The qualitative method included in-depth interview of stress and coping methods.
Results: Most of the patients had mild verbal memory and subtle visual memory impairments. They also suffered from slowing in the speed

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

of information processing. Mild depressive symptoms were observed. It was found that depression had correlation with cognitive measures. A MS-induced stress checklist has been developed in the study. Among the stressors, most frequently reported stressors were about the unpredictability of the disease and psychosocial aspects including limitations in social activities and functional ability (e.g. work). Seeking social support was the most commonly adopted coping way.
Conclusions: The complex relationships among cognition, emotion, stress, and coping would be discussed in the light of these findings and rehabilitation needs.
Correspondence: *Kam Mei Lau, MPhil, Applied Social Sciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong. E-mail: sskammei@inet.polyu.edu.hk*

C. MORSE, V. WEISSER & M.T. SCHULTHEIS. Do differences between physical and mental health predict fatigue in multiple sclerosis?
Objective: Fatigue is a common symptom of MS that is not fully understood. Physical and mental health of MS individuals have been shown to be independently associated with fatigue levels. The current study sought to examine fatigue using discrepancy scores between physical and mental health quality of life (QOL) measures.
Participants and Methods: Community-dwelling persons (n=64) with clinically defined MS and mean age of 43.47 years were included. As part of a larger study, QOL was assessed using the Multiple Sclerosis QOL (MSQOL-54) and fatigue was measured using the Fatigue Severity Scale (FSS). Participants who reported a higher level of mental health (n = 51) were selected for analysis. The difference between the two scales was correlated with FSS scores. A subsequent hierarchical regression analysis was conducted to determine whether QOL discrepancy scores remained associated with fatigue after accounting for MS-related physical disability.
Results: Pearson correlations showed that QOL discrepancy scores were associated with FSS ($R2 = 0.20$, $p = .001$) and Expanded Disability Status Scale (EDSS) scores ($R2 = 0.31$, $p < .001$) for participants who reported a higher level of mental health. After entering EDSS as the first step in the hierarchical regression analysis, discrepancy scores remained associated with fatigue.
Conclusions: In the current study, fatigue in MS was associated with a combination of better mental health and worse physical health. An interpretation of these findings is that MS individuals with better mental health are still able to engage in mentally demanding activities, which causes an increased incidence of fatigue.
Correspondence: *Chelsea Morse, Drexel University, 2200 Benjamin Franklin Parkway, West 1014, Philadelphia, PA 19130. E-mail: chelsealmorse@gmail.com*

A. JANSSEN, B.A. PATTERSON, A.L. BOSTER, A.M. ABDULJALIL & R.S. PRAKASH. Examining the association between physical activity, cognition and hippocampal volume in multiple sclerosis.
Objective: Multiple sclerosis (MS) is characterized by demyelination of white matter, along with gray matter atrophy in both cortical and subcortical structures. Among other symptoms, cognitive deficits are now considered to be of prime importance, impacting many domains of functioning and overall quality of life. Animal research has provided evidence for a connection between exercise and hippocampal neurogenesis, along with improvements in tasks of learning and memory. In this study, we investigated the association between higher levels of physical activity, and hippocampal volume in MS patients.
Participants and Methods: Right-handed individuals, aged 30–59 years, with a clinically definitive diagnosis of MS were enrolled in the study. All participants were administered a battery of neuropsychological tests, including an item-relation memory task, assessing both source and relational memory. In addition, high-resolution structural MRI data was collected to measure the volume of the left and right hippocampus. To measure free-living physical activity, participants wore an accelerometer for seven days.
Results: Hierarchical linear regressions were conducted to examine the association between physical activity, cognition and hippocampal volume, after controlling for variance associated with demographic and clinical variables.
Conclusions: Consistent with previous research, greater hippocampal volume was associated with better performance on the relational memory task. Interestingly, we also found evidence for a positive association between physical activity and hippocampal volume, along with better memory for physically active MS patients. Despite the physical challenges associated with MS, physical activity can thus be a valuable neuroprotectant for maintaining cognitive functioning in MS.
Correspondence: *Beth A. Patterson, M.A., Psychology, The Ohio State University, 1835 Neil Ave, Columbus, OH 43210. E-mail: bpatterson@clinicalneurosciencelab.com*

J.S. RANDOLPH, J.J. RANDOLPH, S. CRONENWETT, B. OLIVER, L. KASPER & H.A. WISHART. Further Assessment of the Cognitive Reserve Construct in MS: The Role of Smoking Status.
Objective: Recent research has suggested that cognitive reserve (CR) mitigates cognitive dysfunction in MS. The purpose of this study was to determine whether preliminary findings supporting the applicability of the CR construct to MS were replicable when applying similar methods to an independent sample. We also examined whether smoking status confounded the CR-cognitive dysfunction relationship, as smoking status is highly correlated with education level and has been shown to negatively affect cognition among the middle-aged.
Participants and Methods: Participants included 58 MS patients and 19 healthy controls (HC). A word-reading test to estimate premorbid intelligence served as a proxy measure for CR. Smoking status was determined based on self-report, and all analyses were adjusted for age, gender, and group (patient vs. HC). An interaction term of Group x CR was also introduced into the hierarchical regression analyses to capture differences in patient performance relative to controls as a function of CR. Four dependent cognitive measures representing simple processing efficiency, complex information processing efficiency, verbal learning, and verbal memory were each separately assessed.
Results: In contrast to prior research, there were no significant Group x CR interactions in our analyses. As predicted, smoking status was significantly correlated with CR. Smoking status was the only significant predictor of performance on the measure of simple processing efficiency, ($p<.05$) but was not a significant predictor of the other dependent variables considered.
Conclusions: Initial findings in recent research consistent with a role for CR in MS still need to be replicated in larger and independent samples. Attention should also be given to representing CR more broadly with multiple variables rather than by single variables that correlate highly with socio-economic and lifestyle factors that may also impact cognition.
Correspondence: *Jennifer S. Randolph, MSc, Department of Psychiatry, Dartmouth Medical School, Dartmouth-Hitchcock Medical Center, Lebanon, NH 03756. E-mail: jennifer.randolph@dartmouth.edu*

E.J. REILLY, H.A. WISHART, J.C. FORD, A.J. SAYKIN, B.C. MCDONALD, S. CRONENWETT, J. RANDOLPH, B. OLIVER & L.H. KASPER. Brain Activity During Verbal Working Memory Tasks in Multiple Sclerosis: Effects of Task Difficulty and Performance.
Objective: Studies of brain activity during verbal working memory (VWM) have yielded heterogeneous results in patients with multiple sclerosis (MS). Most suggest that MS patients with intact VWM recruit additional brain areas and exhibit greater activation as compared to healthy controls (HC), commonly interpreted as adaptive mechanisms that mitigate the functional expression of tissue damage. However, other studies suggest abnormal activation patterns may reflect changes in task appropriate deactivation or other forms of neural inefficiency in MS. We hypothesized that both adaptation and inefficiency contribute to altered brain activity in MS dependent upon task difficulty and level of cognitive impairment.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: We directly compared 27 relapsing- remitting MS patients subgrouped by intact (n=14) versus impaired (n=13) VWM to 10 demographically matched controls at three task difficulty levels. Participants completed an auditory N-Back task during 3T fMRI, analyzed using SPM5 ANOVA (cluster level p=0.01), in addition to an out-of-scanner neuropsychological test battery. Controls had slightly higher education than the patient groups, but the groups did not otherwise differ on demographic, estimated baseline intellect, or disease characteristics. Age, gender and education were used as covariates.
Results: Patients with intact VWM showed no difference in activation compared to controls at any task difficulty level. Patients with impaired VWM showed less activity than controls in several brain regions at the most difficult task level, as well as regions of both higher and lower brain activity at lower task difficulty levels.
Conclusions: These findings suggest the adaptive hypothesis does not adequately characterize altered activation patterns in MS, and provide evidence for both regionally specific neural inefficiency and reduced activity depending on task difficulty and performance.
Correspondence: *Evelyn J. Reilly, Psy.D., Neuropsychology, Dartmouth Medical School, One Medical Center Drive, Lebanon, NH 03756-0001. E-mail: evelyn.j.reilly@dartmouth.edu*

L. STROBER & P.A. ARNETT. Variables which lead to unemployment in multiple sclerosis: The role of coping.
Objective: Unemployment in MS has been shown to be related to female gender, younger or older age, less education, greater disability, and a progressive course. Disease and secondary factors such as poor balance, difficulty walking, bladder/bowel incontinence, heat sensitivity, fatigue and cognitive difficulties have also been reported as contributors. The present investigation sought to explore the role that coping may also have on unemployment in MS.
Participants and Methods: Sixty-eight women with MS were asked about their employment status and reason(s) for leaving employment. Participants also completed measures of depression, anxiety, fatigue, and coping.
Results: Of the 68 participants, 27 reported that they left their job because of symptoms related to their MS including, fatigue, depression, cognitive difficulties, physical weakness, fine motor difficulties, vision problems, mobility difficulties, bladder incontinence, heat sensitivity and pain. Those who left were older (p=.011) reported greater disability (p<.001), more fatigue (p=.004) and performed worse on a cognitive measure sensitive to MS-related cognitive impairment (p=.001). There were no differences with regard to education, anxiety or depression. With regard to coping, those who left the workforce reported greater utilization of maladaptive coping behaviors, particularly behavioral disengagement (p=.042) and drug and alcohol use (p=.047). There was also a trend for the suppression of competing activities (p=.076).
Conclusions: Findings suggest that while demographics and disease variables may account for the high rate of unemployment in MS, attention should also be given to intrinsic factors, such as coping when attempting to understand who and when individuals with MS decide to leave the workforce.
Correspondence: *Lauren Strober, Ph.D, Kessler Foundation, 1199 Pleasant Valley Way, West Orange, NJ 07052. E-mail: lstrober@kesslerfoundation.org*

C. TILL, A. DEOTTO, V. TIPU, A. BETHUNE, J. SLED, S. NARAYANAN, D.L. ARNOLD, R. GHASSEMI & B. BANWELL. White Matter Integrity and Math Performance in Pediatric Multiple Sclerosis: A Diffusion Tensor Imaging Study.
Objective: White matter integrity has been associated with math and reading performance in healthy children. This study investigates whether written arithmetic and reading skills are associated with variations in white matter microstructure in children and adolescents with multiple sclerosis (MS).
Participants and Methods: Twenty-seven patients with childhood-onset MS (mean age = 16.6 ± 2.0 years) and 27 demographically-matched healthy controls participated. White matter microstructure was measured using diffusion tensor imaging (DTI). Fractional anisotropy (FA) was calculated in four corpus callosum regions (genu, anterior body, posterior body and splenium) and lateralized, segmented cerebral hemisphere lobes defined using an anatomical mask. Performance on tests of academic achievement (WJ-III Numerical Operations, Letter-Word Reading, Passage Comprehension, Spelling) were correlated with mean FA value.
Results: Overall mean FA was lower in the MS group relative to controls across the genu and splenium and all cerebral regions (p<0.01). Children with MS were found to be at high risk of showing math impairment, with 26.9% of MS patients performing one standard deviation or more below normative values compared with 7.4% of controls (p<0.05). Deficits in reading and spelling were not commonly observed in children with MS. Math performance was robustly correlated with compromised white matter integrity across all segments of the corpus callosum and in right frontal, parietal, and temporal regions, controlling for age (all r values > 0.5, p<0.01). Reading and spelling performance were not as strongly correlated with FA values as compared to written arithmetic.
Conclusions: Findings highlight the functional impact of compromised white matter microstructure across diffuse regions of the brain on math performance.
Correspondence: *Christine Till, PhD, Psychology, York University, 4700 Keele St., Toronto, ON M3J1P3, Canada. E-mail: ctill@yorku.ca*

D. UKUEBERUWA & P. ARNETT. Protective factors in MS: A longitudinal analysis of coping, anxiety, and cognition.
Objective: Maintenance of good cognitive functioning is a major concern for people with multiple sclerosis (MS). Previous research indicates that psychological aspects of MS, such as increased anxiety, influence cognition. Individuals who use adaptive coping strategies experience less stress and may have better cognition than those who use less adaptive coping. The present study investigates the role of coping in the longitudinal relationship between anxiety and cognition, with the hypothesis that coping at time 2 would mediate anxiety at time 1 and cognition at time 2.
Participants and Methods: 48 participants (37 female) with MS completed a battery of neuropsychological tests and were reassessed three years later. The Symptom Checklist-90-Revised Anxiety Scale and an adaptive coping index (the difference between the COPE Active and Avoidant composite scales) at time 1 and 2 were entered in regression models to predict performance at time 2 on tests that are sensitive to cognitive changes in MS.
Results: A hierarchical linear regression model with anxiety entered at time 1 and coping at time 2 showed significant main effects of anxiety (R2change= 0.11, p<0.05) and coping (R2change= 0.11, p<0.05) on cognition at time 2. A model with coping at time 1 and anxiety at time 2 showed a significant main effect of coping (R2change= 0.15, p<0.01); anxiety was no longer significant.
Conclusions: These results indicate that coping style mediates a longitudinal relationship between anxiety and cognition. People with MS who are less anxious may develop more adaptive coping in response to stress, which may result in better cognitive performance.
Correspondence: *Dede Ukueberuwa, The Pennsylvania State University, 115C Moore Building, University Park, PA 16802. E-mail: dedemu@psu.edu*

G.A. VARGAS & P.A. ARNETT. Testing the Learned Helplessness Theory in Multiple Sclerosis.
Objective: The learned helplessness theory states that uncontrollable negative events can lead to depression if an individual develops a depressogenic attributional style. In MS patients, stable and global attributions have been shown to correlate with depression and to interact with stress to predict depression; although findings are mixed. This study differentiated MS-related and non-MS-related attributional style to determine whether the learned helplessness theory applies to this population.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: 52 Caucasian MS patients were given the Attributional Style Questionnaire (ASQ), Beck Depression Inventory Fast Screen (BDI-FS), Chicago Multiscale Depression Inventory (CMDI), Multiple Sclerosis Functional Composite (MSFC), Expanded Disability Status Scale (EDSS), and Hassles and Uplifts Scale (HUS). Daily hassles were used as a measure of non-illness-related negative events and disability as a measure of illness-related negative events.
Results: The majority of causes listed on the ASQ were non-MS related, and more disabled patients listed more MS-related causes than less disabled patients. Neither type of attributional style mediated or moderated the effect of stress or disability on depression. Stable and global attributional style correlated with depression. Perceived stress mediated the effect of non-MS-related attributional style on depression.
Conclusions: Attributional style seems to operate differently when it is illness or non-illness-related. More disabled patients are more likely to attribute negative events to MS-related causes, but they are not more likely to have a depressogenic attributional style. Depressogenic attributional styles do not appear to lead directly to depression but instead to more perceived stress, which in turn leads to depression.
Correspondence: *Gray A. Vargas, MS, Clinical Psychology, Penn State University, 1218 S. Allen St., #19, State College, PA 16801. E-mail: gav111@psu.edu*

V.D. WEISSER, L. BRENNAN, N. GRAFF & M.T. SCHULTHEIS. Examining the Relationship Between Clinical Measures and Driving in Multiple Sclerosis.
Objective: Studies have documented changes in driving capacity among individuals with multiple sclerosis (MS). This study examined the relationship between driving and two common clinical measures of MS progression, the Expanded Disability Status Scale (EDSS) and the Multiple Sclerosis Functional Composite (MSFC). The contributions of the EDSS compared to the Oral Symbol Digit Modality Test (SDMT) were also evaluated.
Participants and Methods: Community-dwelling individuals (n=66) with clinically-defined MS (86% relapsing-remitting, 14% progressive) with a mean age of 43.47 were included. Driving behavior measures included self reported driving frequency, self limiting changes in driving, and driver self-rating. Driving performance measures included pass/no-pass performance on a behind-the-wheel (BTW) evaluation and documented accident/violation history.
Results: Logistic regression analyses including EDSS and MSFC demonstrated that the EDSS was a significant predictor of BTW performance (p = .01) and change in driving status
(p = .04). Multiple regression showed that EDSS also predicted driving frequency (p =.02). Logistic regression including EDSS and SDMT demonstrated both measures and their interaction predicted BTW performance (p = .05). Significant interactions predicting accidents and violations (p = .02) and voluntarily self limiting
(p = .01) were also found.
Conclusions: The EDSS' strengths as a predictor for driving may be due to its comprehensiveness of visual and physical measures, in contrast to the limited sensitivity of the MSFC. Although the SDMT demonstrated little relationship to driving indicators beyond what the EDSS captured, significant interactions between the two potentially suggests that cognition may play a variable role in driving at different levels of disease severity.
Correspondence: *Valerie D. Weisser, M.A., Psychology, Drexel University, 480 Main Street, Apt. C14, West Haven, CT 06516. E-mail: vdweisser@gmail.com*

E. KEE, J.C. FORD, E.J. REILLY, R. GOSWAMI, S. CRONENWETT, J.S. RANDOLPH, Z. LOVERDE, B.N. PERRY, B.J. OLIVER, L.H. KASPER & H. WISHART. Development and Testing of a New Approach to MS Lesion Segmentation using 3T FLAIR Images.
Objective: Our group has developed a semi-automated program for MS lesion quantification. "FLAIRSEG" requires only fluid-attenuated inversion recovery (FLAIR) images as input, and is designed for rapid, reliable segmentation. FLAIRSEG classifies each voxel as lesion, normal tissue, or cerebrospinal fluid using an expectation-maximization model. For this study, we further developed the method, adding a systematic approach for starting with a single user-specified intensity threshold, and tested it with 3T scans.
Participants and Methods: Participants were 48 adults with mild to moderate relapsing-remitting or secondary progressive MS (age 43.7 (9.1) years; 37 females) who were tested and scanned as part of a larger study. Scans were acquired on a 3.0T Philips Achieva scanner and segmented by two experienced, blinded raters.
Results: Mean total lesion volume was 7901.1 cubic mm (95% CI 5497.8-10304.3). Segmentation time averaged 10 minutes, 43 seconds per brain. Inter- and intra-rater reliabilities for total lesion volumes, evaluated using the intraclass correlation coefficient, were 0.95 and above. Three-dimensional spatial overlap in voxels identified as lesion, evaluated using the Jaccard coefficient, averaged 0.69 (0.18) within rater and 0.56 (0.27) between raters. Higher lesion volumes were associated with higher Jaccard coefficients (r=0.55, p=0.002). Total lesion volume showed modest but statistically significant relationships with disability and cognitive impairment on all a priori selected measures (p<.05).
Conclusions: Total lesion volumes obtained using FLAIRSEG show high intra- and inter-rater reliability. Scans with higher lesion volumes showed the highest three-dimensional spatial concordance. Total lesion volumes predicted disability and cognition, indicating they are valid correlates of clinical status in MS. FLAIRSEG provides a solution for segmenting FLAIR-only datasets. FLAIRSEG is based in MATLAB and is therefore accessible and modifiable. FLAIRSEG is freely available to the research community.
Correspondence: *Heather Wishart, Psychiatry, Dartmouth Medical School, DHMC, Lebanon, NH 03756. E-mail: wishart@dartmouth.edu*

M. WOJTOWICZ & J. FISK. Intra-individual Variability in Attention and Executive Functioning in Multiple Sclerosis.
Objective: Intra-individual variability (IIV), defined as within person fluctuation in performance across a set of trials, has been demonstrated to be a sensitive marker of neurologic disorders (Alzheimer's disease, Parkinson's disease), attention deficit hyperactivity disorder, and aging. In this study, IIV was investigated in individuals with multiple sclerosis (MS) and matched controls. The relations between IIV on a task of attention and executive functioning and performance on clinical neuropsychological tests of speeded information processing and new learning were also investigated.
Participants and Methods: 24 females with relapsing-remitting MS and moderate neurologic disability as well as 24 healthy female controls were tested. All completed a version of the Attentional Network Test (ANT-I), a test of attention and executive functioning, the Paced Auditory Serial Addition Test (PASAT) and the California Verbal Learning Test-II (CVLT-II). IIV was calculated for performance on the ANT-I and compared across groups as well as with performance on the CVLT-II and PASAT.
Results: MS subjects demonstrated greater IIV compared to controls [$t(29.099)=3.091, p=.004$]. Among MS subjects, greater IIV was associated with poorer performance on some CVLT-II measures but not on the PASAT. IIV was not associated with CVLT-II or PASAT performance in controls.
Conclusions: Individuals with MS are more variable in their speed of performance on cognitive tasks of attention and executive functioning and those with greater IIV perform less well on tests of new learning. IIV is an important consideration for persons with MS and may provide additional insights into the cognitive functioning of individuals suffering from this condition.
Correspondence: *Magdalena Wojtowicz, Dalhousie University, 1351 Brenton St Apt 3, Halifax, NS B3J 2K5, Canada. E-mail: m.a.wojtowicz@gmail.com*

Autism Spectrum Disorders

M.C. MARSH, M. JERRAM, D.A. GANSLER & G.D. FIREMAN. Model of Social Information Processing in Boys with Asperger's Syndrome.
Objective: Asperger's Syndrome (AS) is characterized by challenges in social functioning or social cognition. Several models of social informa-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

tion processing and social cognition have been hypothesized to explain the development of such functions in children. Yeates and his colleagues (2007) have proposed a new model for understanding social competence in individuals with a childhood brain disorder. It was proposed that processes such as executive functions and pragmatic mediate social problem solving abilities, and therefore impact overall social adjustment and competence. The purpose of this study was to test this model in children with developmental delays in social functioning, namely Asperger's syndrome.

Participants and Methods: Boys, ages 7-16, with and without a diagnosis of AS, participated in this study (18 boys in the Asperger's syndrome group and 18 boys in the non-clinical group). Specific testing measures targeted executive functioning, social-affective functions, social problem solving skills, and overall socialization.

Results: Results of ANCOVA analyses indicated that the boys with AS performed significantly worse than age-matched typically developing boys, after controlling for differences in verbal intellectual functioning, on measures of verbal fluency (Category Fluency), contextual language use (Word Context Test), social attribution (SAT Salience Index), and overall socialization (Vineland Socialization scale). Results of hierarchical regression analyses also confirmed significant relationships within the proposed model of social information processing in boys with AS. In particular, pragmatic language was found to be a significant predictor of social problem solving and overall socialization.

Conclusions: Significant relationships were identified within the proposed social information processing model, particularly related to pragmatic language, social problem solving, and socialization. Future research may further illustrate the nature of these relationships.

Correspondence: *Megan C. Marsh, Ph.D., Epilepsy Center, NYU Medical Center, 111 Lawrence St., Apt. 42C, Brooklyn, NY 11201. E-mail: megan.marsh@nyumc.org*

Paper Session 7: Pediatric Neuropsychology

Moderator: Deborah Waber

10:45 a.m.–12:30 p.m.

I. PALTIN, K.S. WALSH, G. GIOIA, P. ISQUITH, N. KADAN-LOTTICK, P. BROUWERS & J. NEGLIA. Everyday Executive Function in Childhood Acute Lymphoblastic Leukemia (ALL) Survivors Compared with Attention Deficit/Hyperactivity Disorder and Healthy Controls.

Objective: Executive function development is an area of significant risk associated with the neurocognitive late effects of childhood Acute Lymphoblastic Leukemia (ALL) treatment. To evaluate the impact of treatment on executive function compared to healthy controls and children with AD/HD, profiles on the Behavior Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000) parent report were examined.

Participants and Methods: The sample included 266 ALL survivors who had undergone treatment in one of two protocols, which included chemotherapy and steroid regimens. Participants were matched by age, gender, and maternal education to healthy controls (n = 263) and an AD/HD clinical comparison group (n = 73). Multivariate analysis of variance (MANOVA) was used to compare the profiles between the groups.

Results: The analysis revealed significant differences in the subscale profiles between the groups, with the AD/HD group exhibiting greater elevations across all BRIEF scales compared to both the ALL and control groups. The ALL group did not differ significantly from the control group on any scales. There was also no effect of treatment protocol or age at diagnosis on BRIEF profiles.

Conclusions: These results contrast with previous findings of executive function deficits associated with late effects of ALL treatment, and may reflect a tendency for parents of ALL survivors to normalize any residual executive function problems. Comparison between performance-based measures and rating scales of executive functions as well as exploration of the presence or absence of educational supports will be important in future analyses.

Correspondence: *Karin S. Walsh, PsyD, Division of Pediatric Neuropsychology, Children's National Medical Center, 111 Michigan Avenue NW, Suite 1200, Washington, DC 20010-2970. E-mail: kwalsh@cnmc.org*

R. JAYAKAR, A. KOHL, T.Z. KING, R. MORRIS & N. KRAWIECKI. Radiation Impacts CVLT Performance in Long Term Survivors of Childhood Brain Tumors.

Objective: Use of radiotherapy for treating pediatric brain tumors is associated with decreased verbal memory. We assessed if adult survivors of childhood brain tumors exhibit list learning and recall deficits relative to controls and if survivors who were treated with radiotherapy (RT) performed significantly worse than those who were not (noRT).

Participants and Methods: CVLT performance on learning, short- (SDFR) and long-delay free recall (LDFR) of the three groups (34 survivors: 23 RT, 11 noRT; 34 controls) was analyzed. Groups did not differ on age (M=24), education (M=13), gender, and ethnicity. Survivors were an average of 19.1 years (SD=4.3) post-diagnosis.

Results: Learning (Trial5: $F(2,65)=9.7$, $p<.001$), SDFR ($F(2,65)=14.4$, $p<.001$) and LDFR ($F(2,65)=15.3$, $p<.001$) were significantly different between groups. T-tests revealed that RT was significantly lower than control ($p<.001$) and noRT ($p<.01$), and controls and noRT did not differ significantly. This pattern was consistent across CVLT scores. Paired-sample t-tests revealed that the number of words recalled by the controls (M=12.2) was comparable to words encoded (Trial 5: M=12.7). However, a significantly lower number of words were recalled by RTs (M=7.6;$p<.001$) and noRTs (M=11.7;$p<.01$) than the number of words encoded (M=10, M=13.2).

Conclusions: Long-term survivors treated with radiotherapy exhibited verbal learning and memory deficits, highlighting the association of radiation with encoding and retrieval difficulties. Although mean z-score performance was comparable between the noRT and control group, both RT and noRT survivors showed significant declines in number of words recalled from Trial 5 to long-delay suggesting that factors other than radiation may be impacting retrieval.

Correspondence: *Reema Jayakar, B.A. Honours (Psychology), Psychology, Georgia State University, Apt 1402, 1750 Commerce Drive NW, Atlanta, GA 30318. E-mail: reemajayakar@gmail.com*

M.E. BEHEN & W. GUY. Brain Damage and IQ in Sturge-Weber Syndrome: Support for a "Fresh Start" Hypothesis.

Objective: Sturge-Weber syndrome (SWS) with unilateral brain involvement is a clinical model of an early-onset brain lesion affecting cognitive functions (IQ). Here we tested the hypothesis that extent of severe hypometabolism measured by glucose PET has a U-shaped (non-linear) relationship to IQ. We also determined the effect of age and seizure variables on this relationship.

Participants and Methods: Thirty-seven children (mean age=73 months; age range=30-153 months) with unilateral SWS were prospectively recruited for neurocognitive assessment, MRI and interictal glucose PET scans. Regression analyses were used to test whether a quadratic model best accounted for the relationship between extent of severe cortical hypometabolism and IQ, while controlling for age and seizure variables.

Results: The quadratic effect accounted for significant variance in both VIQ and PIQ over and above age, seizure variables and the linear relationship between extent of severe (but not total) hypometabolism and IQ. The threshold for the minimum of the quadratic function (indicating lesion size with worst IQ) was 56% (VIQ) and 62% (PIQ) of the hemispheric surface. Seizure characteristics also contributed significant variance to cognitive outcome.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: Intermediate size of severe hemispheric hypometabolism is associated with the worst, small or absent lesions the best, cognitive outcomes. Children with very large extent of the hemisphere severely affected are likely to have relatively preserved cognitive function. This supports the previously proposed hypothesis that beyond a threshold (around 60% of the hemisphere in the present study), the affected hemisphere is sufficiently damaged to allow the unaffected hemisphere a fresh start for effective reorganization.

Correspondence: *William Guy, Wayne St. University, 3901 Beaubien, Detroit, MI MI. E-mail: willcguy@comcast.net*

C. MRAKOTSKY, A. BOUSVAROS, D. WABER & R. GRAND. Corticosteroids, Inflammation and Memory in Children with Crohn's Disease: Longitudinal Outcomes.

Objective: Pediatric Crohn's disease (CD) is a remitting-relapsing autoimmune illness with chronic intestinal and systemic inflammation. Both inflammation and steroid treatment can disrupt brain systems critical for memory and mood. Nevertheless, little is known about cognitive outcomes following steroid and immune challenges in CD. Following our reports of acute steroid effects on cognition, we investigate longitudinally the effects of steroids and inflammation on memory and executive functions.

Participants and Methods: Behavioral and biomarker data from this ongoing study were available on 74 children age 8-16 years. CD patients on steroids (n=34) were compared to inflammation-free abdominal pain (n=23), CD and healthy controls on measures of memory, executive functions, IQ, mood, and disease variables during and 6 months post-treatment.

Results: During treatment, the CD Steroid group showed poorer word list recall, spatial learning and recall, and reported more emotional control problems than controls. Steroid effects remained after adjusting for inflammation. Immune marker analyses (SedRate, cytokines) showed higher inflammation to be associated with poorer neurobehavioral outcome (memory, working memory, mood, behavior) independent of steroids. Post-treatment, CD patients improved more than controls in emotion regulation. In contrast, cognitive steroid effects improved only for spatial, but not verbal memory. Higher steroid dose predicted poorer memory outcome post treatment.

Conclusions: Results suggest differential impact of steroids and immune markers on memory and emotion regulation in children with CD. Emotional effects of steroids may be transient, whereas effects on memory may persist post-treatment. Predictions about drug safety and brain-immune involvement warrant investigation of underlying neural substrate.

Correspondence: *Christine Mrakotsky, Ph.D., Children's Hospital Boston, 300 Longwood Avenue, Boston, MA 02115. E-mail: christine.mrakotsky@childrens.harvard.edu*

M.S. SADY, J.M. FLETCHER, H.J. HANNAY, P.T. CIRINO & M. DENNIS. Cerebellar Motor Task Performance in Three Etiologies of Congenital Hydrocephalus.

Objective: The cerebellum is widely recognized as a modulator of behavioral output in many domains, including motor limb coordination and adaptation/learning. Adult lesion studies implicate the lateral cerebellum in these tasks, though research in children and adolescents has produced mixed results. Congenital hydrocephalus can occur in relative isolation (e.g., Aqueductal Stenosis; AS) as well as part of other conditions that also include cerebellar dysmorphology (spina bifida meningomyelocele, SBM; and Dandy-Walker Malformation, DWM).

Participants and Methods: In the current study, the ability to complete tasks of upper limb coordination and motor learning/adaptation were explored in 27 individuals with AS, 158 with SBM, and 15 with DWM, compared to 49 typically-developing (TD) comparison children and adolescents. Group differences were evaluated with AN(C)OVAs, and effect sizes were calculated between pairs of interest.

Results: Statistically significant differences, accompanied by sizeable effect sizes, were detected between AS and the two cerebellar groups, such that SBM and DWM were less accurate, slower, and committed more errors on most components of the tasks evaluated. Few differences were detected between AS and TD groups. Volumetric analyses of cerebellar volumes and task performance yielded few significant relationships.

Conclusions: Individuals with SBM and DWM display a pattern of intact motor adaptation/learning and decreased coordination and error correction that are not due simply to the effects of hydrocephalus, but rather reflect the impact of cerebellar dysmorphology.

Correspondence: *Maegan S. Sady, Ph.D., Pediatric Neuropsychology, Children's National Medical Center, 15245 Shady Grove Road, Suite 350, Rockville, MD 20850. E-mail: maegan.sady@gmail.com*

D. WABER, C. BRYCE, D. EAGLESFIELD, A. DEBASTOS, S. MAILLOUX, J. GIRARD, T. BYLSMA, D. BERGER, M. ZICHLIN & J. GALLER. Infantile Malnutrition and Childhood Socioeconomic Circumstances Independently Predict Adult Neurocognitive Outcomes: The Barbados Nutrition Study.

Objective: Early childhood malnutrition is a widespread public health concern, afflicting an estimated 200 million children worldwide. We evaluated the lifelong impact of moderate to severe infantile malnutrition (MAL) on neuropsychological outcomes at midlife while simultaneously considering childhood socioeconomic circumstances (SES).

Participants and Methods: Participants were Barbadian adults who had experienced moderate to severe malnutrition in the first year of life and were successfully rehabilitated with adequate nutrition documented throughout childhood (N=76, mean age=37.7, sd=2.1). A healthy comparison group (N=60, mean age=37.5, sd=2.3) was recruited from the same classrooms and matched for age and sex. Detailed ecological data were obtained in childhood and adolescence. Comprehensive neuropsychological testing was completed. Regression analyses were applied to evaluate independent contributions of MAL and childhood SES to neurocognitive outcomes.

Results: MAL and SES independently predicted outcomes. After adjusting for effects of SES, MAL predicted IQ ($p<.0001$), Digit Symbol, WRAT-III Achievement, Word Fluency ($p<.001$), Letter-Number Sequencing ($p<.01$), WRAML Sentence Memory, D-KEFS Trails and ROCF Copy ($p<.05$). Effects of SES were generally smaller and less prevalent, emerging for IQ ($p<.001$), Sentence Memory ($p<.01$), Letter-Number Sequencing, WRAT-III Reading and Calculation, Word Fluency, and D-KEFS Color-Word Inhibition ($p<.05$). No effects emerged for CPT or Purdue Pegboard.

Conclusions: Infantile malnutrition has significant lifelong consequences for adult neurocognitive functioning even after malnourished children have been rehabilitated and independent of childhood socioeconomic circumstances. These findings have major implications for parts of the developing world where childhood malnutrition is endemic.

Correspondence: *Deborah Waber, Ph.D., Psychiatry, Children, 300 Longwood Avenue, Boston, MA 02115. E-mail: deborah.waber@tch.harvard.edu*

N. BARRE, A. MORGAN, L.W. DOYLE & P.J. ANDERSON. Language Abilities in Very Preterm/Very Low Birth Weight Children: A Meta-Analysis.

Objective: Very preterm (VPT, <32 weeks' gestational age) and/or very low birth weight (VLBW, <1500 g) children are at risk for a range of cognitive impairments, but there is little consensus regarding language difficulties in this population. Due to the methodological inconsistencies in this area, a meta-analysis was conducted to characterise differences between VPT/VLBW children and term-born controls in language ability.

Participants and Methods: The electronic databases MEDLINE, PsycINFO, CINAHL and ERIC were systematically searched for English language articles published between 1990 and November 2009 inclusive. Twelve studies met the inclusion criteria. Effect sizes were calculated within different language sub-domains.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: The results demonstrated that VPT/VLBW children performed between 0.63 and 0.77 SD below controls in the areas of expressive and receptive language overall, and between 0.38 and 0.59 SD below controls in expressive and receptive semantics. Results for expressive and receptive grammar were equivocal. A subgroup analysis of school-aged children revealed similar results. No studies assessing phonological awareness, discourse, or pragmatics were identified.

Conclusions: These results indicate that language ability is reduced in VPT/VLBW children, and is still present at school age, suggesting that their difficulty appears to be ongoing. Rigorous studies examining a range of language sub-domains must be conducted to fully understand the specific nature of language difficulties in this population.

Correspondence: *Natalie Barre, Murdoch Childrens Research Institute; The University of Melbourne, Level 2 Main Building, Royal Children's Hospital, Flemington Road, Parkville, VIC 3052, Australia. E-mail: n.barre@alumni.unimelb.edu.au*

SATURDAY AFTERNOON, FEBRUARY 5, 2011

Symposium 18: Self and Awareness in Dementia

Chair: Daniel Mograbi

Discussant: Robin G. Morris

12:30–2:00 p.m.

R.G. MORRIS, M.L. RIES, D. MOGRABI & M. SCHROETER. Self and Awareness in Dementia.

Symposium Description: The current symposium will discuss the relationship between self and awareness in the context of dementia. Loss of awareness about illness or cognitive impairment is a common feature of dementia and the symposium will present evidence suggesting this may be due to changes in neural networks dedicated to processing of self-related information.

Dr. Michele Ries will present data indicating reduced functional connectivity in cortical midline structures, such as PCC and the VMPFC, in Mild Cognitive Impairment (aMCI) and Alzheimer's disease (AD) patients with reduced insight into their own memory difficulties. This finding provides additional evidence for physiologic changes in cortical midline structures that underlie changes in awareness in MCI and AD.

Mr. Daniel Mograbi will present a theoretical framework linking loss of awareness to the specific profile of memory impairments in AD. The presenter will review evidence indicating preserved remote memory, especially of the semantic type, but impaired recent memory in AD, providing support for the idea of an outdated self-concept that would explain the inaccurate evaluations of AD patients.

Dr. Matthias Schroeter will present results from a systematic and quantitative meta-analysis of neuroimaging studies (MRI and PET) investigating the neural basis of frontotemporal dementia (FTD). Loss of awareness is a core diagnostic feature of FTD and the meta-analysis indicates that FTD is mainly characterized by impairments in frontomedian networks, a key region for theory of mind (ToM) and self-related processing.

Prof. Robin Morris will be the discussant, providing a summary and discussing the findings at the end of the session.

Correspondence: *Daniel Mograbi, MSc BSc, Psychology, King's College London, Institute of Psychiatry, De Crespigny Park, London SE58AF, United Kingdom. E-mail: daniel.mograbi@kcl.ac.uk*

M.L. RIES. Impaired Awareness of Memory Difficulty in MCI and AD: Relation to Connectivity of Cortical Midline Structures.

Objective: Awareness of cognitive dysfunction in people with Mild Cognitive Impairment (aMCI) and Alzheimer's disease (AD) is variable. Prior research from our lab shows that aMCI patients' blood-oxygen level dependent (BOLD) activation of cortical midline structures during self-appraisal shows tight covariance with level of insight into cognitive difficulties. The proposed study tested our hypothesis that aMCI and AD patients with reduced insight into their own memory difficulties show reduced functional connectivity (i.e., correlated low frequency changes in BOLD signal) in cortical midline structures. We collected resting fMRI scans for functional connectivity analyses in 15 individuals with MCI and AD and 10 controls; we used posterior cingulate and medial prefrontal seed regions in the analyses. Our measure of awareness of memory ability was the Memory Awareness Rating Scale. We hypothesized that MCI and AD participants with reduced awareness of memory difficulties would show reduced functional connectivity in midline cortical regions important for self-appraisal. A test of group differences in functional connectivity revealed that MCI and AD participants show attenuated connectivity in the PCC and a ventromedial prefrontal region compared to controls. Results of our regression analysis revealed that individuals with less awareness of memory impairment showed reduced functional connectivity within the medial frontal cortex. This finding provides additional evidence for physiologic changes in cortical midline structures that underlie changes in awareness in MCI and AD.

Correspondence: *Michele L. Ries, William S. Middleton VA Hospital, 2500 Overlook Terrace (11G), Madison, WI 53705. E-mail: mlr@medicine.wisc.edu*

D.C. MOGRABI. Anosognosia in Alzheimer's Disease – The Petrified Self.

Objective: Anosognosia – lack of awareness concerning a disease or loss of cognitive function – is a common feature in Alzheimer's disease (AD). We will present a theoretical model exploring the relationship between the preservation of the self and anosognosia in AD. More specifically, it is our hypothesis that the particular pattern of memory impairments in AD, with deficits in recent memory but sparing of older information, especially in semantic memory, leads to an outdated sense of self. For this purpose we will briefly review the relationship between self and memory and the profile of memory impairments in AD, suggesting the hypothesis of a petrified self as the cause for anosognosia. We will show how this is in accordance with evidences from studies that point to an outdated self-evaluation in Alzheimer's disease and previous accounts of anosognosia, such as the views of Ramachandran (1999), Weiskrantz (1997) and Morris (Agnew & Morris 1998, Morris & Hannesdottir 2004).

Correspondence: *Daniel C. Mograbi, De Crespigny Park, London SE58AF, United Kingdom. E-mail: daniel.mograbi@kcl.ac.uk*

M. SCHROETER. Losing your Self: Neural Correlates of Frontotemporal Dementia.

Objective: Frontotemporal dementia (FTD), is characterized by alterations in behavior and personality, namely decline in social interpersonal conduct, impairment in regulation of personal conduct, emotional blunting, and loss of insight ('diagnostic core features'). Although FTD is clinically well characterized and several hints for specific cognitive deficits were recently published, there is still controversy with regard to the neural basis of the disease. Accordingly, the aim of our study (Schroeter et al., 2008) was to focus neural impairments in FTD to

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

specific brain regions and discuss the disease in a framework of cognitive neuropsychiatry. We conducted a systematic and quantitative meta-analysis including morphometric studies with magnetic resonance imaging (MRI) and functional imaging studies applying (18F) fluorodeoxyglucose positron emission tomography (FDG-PET). Seven significant above-threshold clusters were identified. They were located in several frontomedian regions, medial thalamus, left superior frontal sulcus, and right anterior insula. Our study indicates that FTD is mainly characterized by impairments in frontomedian networks. This brain region has been previously suggested as the key region for theory of mind (ToM) or 'mentalizing', where mental states have to be attributed to self and other people, and which enables social cognition. Moreover, it has been related to self-related processing, and it was suggested that permanently processing self-referential stimuli constitutes the self of a person. In sum, our study suggests that FTD selectively affects neural networks related to social cognition, finally leading to the aforementioned clinical symptoms. Hence, the disease FTD enables an understanding of the ''condition humaine", the neural networks that make us human.

Correspondence: *Matthias Schroeter, Stephanstraße 1A, Leipzig 04103, Germany. E-mail: schroet@cbs.mpg.de*

Symposium 19: Implementing qualitative scoring of neuropsychological tests in a community-based cohort: Framingham Heart Study

Chair: Rhoda Au

12:30–2:00 p.m.

R. AU. Implementing qualitative scoring of neuropsychological tests in a community-based cohort: Framingham Heart Study.

Symposium Description: The Boston Process Approach, championed by Edith Kaplan, provides an in-depth and comprehensive analysis of neuropsychological test (NP) performance. From a clinical perspective, this technique has allowed practitioners to create an individualized assessment strategy that reflects the distinct circumstances of the patient. For researchers, the issue is how to capitalize on the strengths of the process approach while maintaining the reliability of data collection across all subjects. For epidemiologic studies, implementing a qualitative scoring method that can be adhered to reliably by trained technicians poses unique challenges not faced by smaller scale case-control experiments. Since 2005, the Framingham Heart Study (FHS) has added to its traditional quantitative scoring protocol, additional methods for obtaining qualitative measures. Currently all participants across FHS' three generation cohorts and two generation multi-ethnic cohort are invited to participate in studies of brain aging and dementia that include administration of a neuropsychological test battery. The purpose of this symposium is to introduce how FHS has integrated qualitative neuropsychological scoring into our test battery. In our first study, we present normative data on qualitative executive function measures. In our second and third studies, we report findings that relate qualitative measures of executive function to cardiovascular risk factors to determine how results differ from that found using traditional quantitative NP scores. And in our last study, we present normative data from an expanded scoring system of the Clock Drawing Test (CDT), which serves as another example of how qualitative NP scoring can be a reliable and informative research tool.

Correspondence: *Rhoda Au, Ph.D., Neurology, Boston University School of Medicine, B608, 72 E. Concord Street, Boston, MA 02118. E-mail: rhodaau@bu.edu*

L. DRAXLER HANKEE, A. BEISER, S. ROSNER PREIS, S. DEVINE, S. SESHADRI, P.A. WOLF & R. AU. Distribution of qualitative performance on executive functioning tasks: Results from the Framingham Offspring Cohort.

Objective: As dementia prevention efforts expand, the early detection of preclinical cognitive changes remains an essential focus of research. In order to facilitate differentiation of normal from early/preclinical disease, we sought to maximize the sensitivity of measurement tools by including a systematic and standardized protocol for scoring qualitative variables. This study provides normative data for qualitative performance on executive functioning tasks in a community based cohort.

Participants and Methods: 1,508 (815 women, mean age = 68 +/- 9 years) Framingham Offspring cohort participants who were dementia- and stroke-free completed executive functioning tasks (e.g., Trailmaking B, Letter and Category fluency, e.g., FAS and Animals, respectively) as part of a neuropsychological battery administered from 2005-2007. Qualitative performance was assessed by documenting types of error responses within each test (e.g., set-shifting errors, pencil lifts, perseverations, wrong first letter and other broken rule errors).

Results: Participants completed the Trailmaking Test B in a mean of 1.6+1.3 minutes; 62% made at least one pencil lift and 44% made at least one other error. On the FAS test, the overall mean score was 38+12; 60% of participants made 1 or more perseverations and 43% at least 1 error. On the Animal test, the overall mean score was 19+5 ; with 31% making 1 or more perseverations and 2% other errors.

Conclusions: Conclusions:

Qualitative scoring methods documented substantial numbers of errors made on executive function tests by a community-based sample. The types of errors made are thought to be distinctive to neuropathological processes and may reveal the presence of very early, preclinical cognitive changes.

Correspondence: *Lisa Draxler Hankee, 73 Mt. Wayte Avenue, Framingham, MA 01702. E-mail: lhankee@bu.edu*

A. NISHTALA, A. BEISER, S. ROSNER PREIS, S. DEVINE, L. DRAXLER HANKEE, S. SESHADRI, P.A. WOLF & R. AU. Relationship of Cardiovascular Risk and Qualitative Measures of Executive Function in the Framingham Offspring Study.

Objective: Cardiovascular (CVD) risk factors have been related to cognitive dysfunction in the elderly, but as research emphasizes earlier detection of deficits, the sensitivity of measurement tools needs consideration. We investigate whether qualitative measures of executive function increase sensitivity in detecting mild impairment among subjects with cardiovascular risk.

Participants and Methods: 1,435 stroke and dementia-free Framingham Offspring participants (mean age = 68.9+9 years; 54% women) who attended health examinations in 1991-95 (Exam 5) and 1998-2001 (Exam 7), were administered the Letter Fluency Test (FAS) as part of a neuropsychological test battery in 2005-2007. CVD risk factors (e.g., hypertension, smoking, diabetes) were related to the traditional FAS total score, to the number of errors (e.g., perseverations, and other errors - broken rules and wrong first letter), and to whether or not the participant made at least 2 errors, using multivariable linear and logistic regression.

Results: After adjusting for age, sex, education and time interval, only diabetes (at Exam 5, p=0.010 and marginally at Exam 7, p=0.088) was related to poorer performance on the FAS total. Participants with hypertension at Exam 5 were 1.4 times as likely to make at least 2 errors (p=0.031), and smokers at Exam 5 (p=0.008) or exam 7 (p=0.015) were more than 1.6 times as likely to make at least 2 errors.

Conclusions: CVD risk factors, not associated with quantitative measures, were related to qualitative indicators of executive deficits; results suggest that use of qualitative scoring methods may increase sensitivity to detect early cognitive impairment at mid and later-life.

Correspondence: *Arvind Nishtala, 72 E. Concord Street, B608, Boston, MA 02118. E-mail: nishtala@bu.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. GUPTA, A. BEISER, S. ROSNER PREIS, S. DEVINE, L. DRAXLER HANKEE, S. SESHADRI, P.A. WOLF & R. AU. The Association between Cardiovascular Risk Factors and Qualitative Measures of Trails B: Framingham Offspring Study.

Objective: Research has documented associations between cardiovascular (CVD) risk factors and cognition. With research in dementia increasingly focused on identifying preclinical markers, more discerning measurement tools are needed. We hypothesized that using qualitative measures will provide increased sensitivity in identifying cognitive deficits in subjects with cardiovascular risk.

Participants and Methods: The study sample was comprised of 1,293 stroke- and dementia-free subjects (54% women, mean age= 67 + 9 years) from the Framingham Offspring Cohort who attended two health examinations (Exam 5 - 1991-1995 and Exam 7 - 1998-2001) and were also administered Trailmaking B as part of a neuropsychological test battery (2005-2007). Hypertension, smoking, and diabetes were related to time-to-completion score, to the number of pencil lifts, and to indicators of at least one and at least 2 errors, using multivariable linear and logistic regression.

Results: After adjusting for age, sex, education, and time interval, we found significant relationships between smoking (p=0.003) and diabetes (p=0.003) measured at Exam 7 and time-to-completion. No significant results were found between CVD risk factors at Exam 5 and time-to completion. However, participants with hypertension at Exam 5 were 1.45 times as likely to make at least 2 pencil lifts (p=0.010) and those with diabetes at Exam 5 were nearly twice as likely to make at least 1 pencil lift (p=0.044).

Conclusions: CVD risk factors at mid-life, that were not associated with quantitative responses, were related to qualitative indicators of executive dysfunction, giving validity to the use of qualitative measures as a potential tool for detection of subtle, early impairment.

Correspondence: *Apar Gupta, 73 Mt. Wayte Avenue, Framingham, MA 01702. E-mail: gupta88@bu.edu*

J. NYBORN, J. HIMALI, A. BEISER, S. DEVINE, Y. DU, E. KAPLAN, M.K. O'CONNOR, W. RINN, H. DENISON, S. SESHADRI, P.A. WOLF & R. AU. Framingham Heart Study Clock Drawing Performance 2005-2008: Normative Data from the Offspring Cohort.

Objective: While the Clock Drawing Test (CDT) is a popular tool used to assess cognitive function, limited normative data on CDT performance exist. We expanded on preliminary CDT results by Devine et al. (2007) to provide normative data in a large sample of participants in a community based cohort.

Participants and Methods: We administered standard CDT Command and Copy conditions to 1476 (680 men, 796 women) Framingham Heart Study Offspring Cohort participants without dementia, stroke, or other neurological disorders. To assess performance, we used the Framingham Heart Study Clock Drawing Scoring Protocol, which assigned error scores for qualitative features involved in drawing and copying a clock. We computed mean error scores and error percentages overall and by gender, age, and education for subscales pertaining to Outline, Numerals, Time-Setting, Center, and "Other".

Results: Our results show that mean error scores overall were low for Command and Copy conditions (1.5 and 1.25 out of 20.5 possible points, respectively). Higher levels of education were significantly associated with fewer errors for Time-setting (Command: p<.001; Copy: p=.003), and Numerals (Command: p<.001) and "Other" (Command: p<.001) subscales. Older age was significantly associated with more errors for Time-setting (Command: p<.001; Copy: p=.003), Numeral (Command: p<.001) and "Other" (Command: p<.001) subscales.

Conclusions: We noted considerable variability in CDT errors in this healthy aging population. Our results provide a baseline comparison for individuals with cognitive impairment.

Correspondence: *Justin Nyborn, 72 E. Concord St, B608, Boston, MA 02118. E-mail: justin.nyborn@bu.edu*

Poster Symposium: Concussion in Female Collegiate Athletes: Examining Gender Differences

12:30–2:00 p.m.

TBI (Adult)

A. JACKSON, R. PERNA & D. COOPER. Concussion in Female Collegiate Athletes: Examining Gender Differences.

Symposium Description: Sports concussion research has grown over the past two decades. Recognition and management of these injuries has changed dramatically to reflect advances in the research. Many of the studies on concussion, however, have been completed with a sample of mostly male athletes - especially given the predominance of men in the field of professional sports. Women's participation in sports, however, has risen significantly within the last decade (Covassin, Schatz, & Swanik, 2007). In fact, some research has shown that women may be more prone to concussion than men in certain sports (Covassin, Swanik, & Sachs, 2003). Given that there are significant gender differences in brain function, more research comparing concussion symptoms, history, and outcomes are warranted (Murphy et al., 1996; Covassin, Schatz, & Swanik, 2007).

This symposium was designed to examine possible gender differences in concussion symptoms, symptom duration, and the effect of prior concussions on both of the aforementioned variables. The first three abstracts pertain to a small pilot study in a sample of female recreational hockey players. The second three abstracts pertain to a larger sample of female collegiate athletes. Both data sets utilized a prospective research design derived from two online surveys distributed by email.

While the results discussed in the abstracts are preliminary, the symposium will discuss any limitations of the applicability of current concussion research to female athletes and highlight potential gender differences in the diagnosis and management of sports concussion.

Correspondence: *Alexandra Jackson, Psy.D., NeuroRehabilitation Services of Goodwill, 618 Main St, Lewiston, ME 04240. E-mail: alexandra.jackson@goodwillnne.org*

A. JACKSON, R. PERNA & D. COOPER. Sports Concussion and Symptom Severity: A Sample of Female Recreational Ice Hockey Players.

Objective: Epidemiological studies in sports concussion have typically focused on male athlete populations. This is despite the fact that recent studies have shown that females are consistently at higher risk for concussion (Covassin, Swanik, & Sachs, 2003). This study was designed to examine the implications of the existing research on this understudied population.

Participants and Methods: 40 adult female recreational ice hockey players completed an online survey. The majority of the sample (60%) was over the age of 35. 10 questions were asked regarding concussion history, concussion symptoms and duration, medical treatment for concussion, and if the player stopped playing. Number of symptoms was examined as it related to the aforementioned variables. Number of symptoms was bracketed into 3 groups: 0-2 (N=24); 3-6 (N=10); 7-11 (N=6).

Results: ANOVA's showed that players who reported 3 or more symptoms were more likely to have had a concussion while playing hockey (p< .001). Players remained symptomatic longer if they had 3 symptoms (p< .001). Players who reported 3 symptoms were more likely to stop playing and seek treatment (p= .002). Post-hoc testing showed the 3-6 and 7-11 groups were similar and statistically different than the 0-2 group on the aforementioned variables.

Conclusions: Data shows that the more symptoms a player experiences, the more likely they may be to suffer a concussion. Number of symptoms was also predictive of symptom duration, which can be a proxy for concussion severity. Generalizability is limited given the age and gender of the sample, however it shows that concussions affect female recreational hockey players.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *David Cooper, 618 Main St, Lewiston, ME 04240. E-mail: david.cooper@goodwillnne.org*

D. COOPER, A. JACKSON & R. PERNA. Do Prior Sports Concussions in Females Affect Subsequent Concussion Symptoms?

Objective: Studies in high school and college athletes have shown that players who experienced one concussion are more likely to sustain an additional concussion than players without (Guskiewicz, et al., 2000). Athletes with three prior concussions were more likely to exhibit more symptoms on-field following a subsequent concussion (Collins, et al., 2002). The present study is an attempt to examine the effects of prior concussion in female recreational hockey players. Our hypothesis is that players with prior concussions would experience more symptoms with subsequent concussions.

Participants and Methods: A 10-question survey regarding concussion history and symptomatology was distributed to female adult recreational hockey players. 40 players returned the survey; the majority of this sample (60%) was over the age of 35. Players were asked about the occurrence and number of prior concussions. 12 of the 40 players had sustained a prior concussion.

Results: ANOVA's showed that prior concussions, even when multiple prior concussions occurred, did not affect a player's decision to stop playing or seek treatment. Prior concussions, even multiple, did not affect symptom duration. Prior concussion, however, significantly affected the number of symptoms experienced (p=.001). Players with a prior concussion had more symptoms than players without. Specifically, the more prior concussions, the more symptoms the player experienced (p=.006).

Conclusions: Results indicate that, although players with prior concussions experience more symptoms than players without, this does not impact their choice to stop playing or seek treatment. Results demonstrate that prior concussions, even in female recreational hockey players, increase the number of symptoms experienced with subsequent hits.

Correspondence: *David Cooper, 618 Main St, Lewiston, ME 04240. E-mail: david.cooper@goodwillnne.org*

D. COOPER, A. JACKSON & R. PERNA. Symptoms of Prolonged Recovery from Sports Concussion in Females.

Objective: Research shows that some concussion symptoms are predictive of protracted recovery. A study of male high school athletes demonstrated that difficulty concentrating, feeling foggy, and dizziness were among the top 4 predictors of protracted recovery in concussion (Lau, Lovell, Collins, & Pardini, 2009). Research to determine if this is true for females is lacking. The purpose of this study is to determine if similar symptoms are predictive of protracted recovery in females.

Participants and Methods: An online survey was distributed to female recreational ice hockey players. 40 players completed the 10-question survey regarding concussion history, symptoms, and duration. 60% was over the age of 35. 37.5% of the sample had been diagnosed with a concussion at some point.

Results: Difficulty concentration, feeling "foggy", and dizziness were three symptoms that significantly correlated with a diagnosis of concussion. Multiple regression showed these three symptoms contributed to a significant amount of the variance in concussion diagnosis (R2=.73; p<.01). Of the 31 people in the sample who did not experience difficulty concentrating and feeling foggy, 25 of them (80%) were not diagnosed with a concussion. All 9 people who experienced both of these symptoms were diagnosed with a concussion. ANOVA demonstrated that players with both concentration difficulty and fogginess took longer to recover than players without both of those.

Conclusions: Results demonstrate that difficulty concentrating, feeling foggy, and dizziness may be predictive symptoms for diagnosing concussion. It appears that female players who experienced these symptoms had longer recoveries, consistent with data from male athletes.

Correspondence: *David Cooper, 618 Main St, Lewiston, ME 04240. E-mail: david.cooper@goodwillnne.org*

A. JACKSON, R. PERNA & D. COOPER. Diagnosis of and Recovery from Sports Concussion in Female Athletes.

Objective: Difficulty concentrating and feeling "foggy" are among the top five symptoms experienced following concussion (Lovell, et al., 2004). In addition, these two symptoms have been associated with worse prognosis in male athletes. However, very few studies have examined if this symptomatology is consistent between the sexes. The purpose of this study is to determine whether female athletes experience similar symptoms as male athletes following concussion.

Participants and Methods: 65 female athletes from the New England Small College Athletic Conference, and Division 3 athletic programs completed an online survey regarding concussion symptoms and duration. 11 of the 65 respondents were diagnosed with concussion, although 37 respondents reported experiencing symptoms following a hit in the head.

Results: Feeling "foggy" and difficulty concentrating correlated significantly with a diagnosis of concussion (r=.70, p<.001; r=.89, p<.001, respectively). Multiple regression demonstrated that these two symptoms explained a significant amount of the variance in being diagnosed with a concussion (adjusted R2=.83, p<.001). Of the 58 athletes who did not experience both difficulty concentrating and fogginess, 54 of them (93.1%) were not diagnosed with a concussion. 100% of the athletes who experienced a both symptoms were diagnosed with a concussion. Finally, athletes who endorsed both symptoms experienced longer recoveries than athletes who did not.

Conclusions: The results of this study show that female athletes experience similar symptoms to male athletes. In addition, difficulty concentrating and fogginess are significantly associated with concussion diagnosis. Finally, experiencing both of these symptoms may lead to a prolonged recovery period in females.

Correspondence: *Alexandra Jackson, 618 Main St, Lewiston, ME 04240. E-mail: alexandra.jackson@goodwillnne.org*

A. JACKSON, R. PERNA & D. COOPER. Predicting Concussion Severity in Female Athletes.

Objective: Predicting concussion severity with regard to duration of symptoms and return to play protocols is an important clinical tool. Research has shown that number of symptoms is positively correlated with longer symptom expression and delayed return to play (Makdissi et al., 2010). Many of these studies, however, have been completed in mostly male samples. The present study was conducted to determine if concussion severity, as measured by duration of symptoms and return to play, can be estimated using number of symptoms.

Participants and Methods: An online survey of concussion history was distributed to female collegiate athletes, 65 responded. All athletes are part of Division 3 programs in the New England Small College Athletic Conference and are between the ages of 17 and 21. Questions on the survey referenced concussion history, symptoms, duration, and demographics. 11 respondents had been diagnosed with a concussion.

Results: ANOVA showed that experiencing more symptoms tended to result in a diagnosis of concussion (p<.001). The duration of symptoms was typically longer in those athletes who had more symptoms (p<.001). Athletes with a history of concussion experienced more symptoms (p=.001), and the more prior concussions an athlete suffered, the more symptoms they experienced (p<.001).

Conclusions: This study demonstrates that predicting symptoms duration in females can be done using similar guidelines to those established for males. Female athletes with more symptoms tended to experience symptoms longer and had more diagnoses of concussion. Finally, females with prior concussions experienced more symptoms and number of prior concussions with positively correlated with number of symptoms.

Correspondence: *Alexandra Jackson, 618 Main St, Lewiston, ME 04240. E-mail: alexandra.jackson@goodwillnne.org*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. JACKSON, R. PERNA & D. COOPER. Impact of Prior Concussions in Female Collegiate Athletes.

Objective: Research has shown the repetitive concussions increase the risk of subsequent concussions, (Guskiewicz, et al., 2000) and may also be factors in prolonged recoveries (Collins, et al., 2004). Much of this research has been conducted in samples of male athletes. This study aims to determine the effects of prior concussions in a sample of female athletes.

Participants and Methods: An online survey regarding concussion history, symptoms, and duration was distributed to female athletes in Division 3 athletic programs. All athletes were at schools in the New England Small College Athletic Conference. Currently 65 athletes have responded to the survey, 11 of which had been diagnosed with at least one concussion. 10 respondents had a history of concussions prior to college.

Results: Having a concussion prior to college was significantly correlated with having a concussion in college (χ^2 (4)=25.47, r_s=0.55, p<.001). 60% of the athletes with prior concussions were diagnosed with a subsequent concussion. 93% of athletes without a prior concussion had not been diagnosed with a subsequent concussion. Athletes with prior concussions experienced more symptoms with subsequent concussions (p=.001), and these symptoms lasted longer than in athletes without prior concussions (p<.001).

Conclusions: Results of this study demonstrate that prior concussions in female athletes predispose them to subsequent concussions. In addition, females with prior concussions experienced more symptoms, and these symptoms lasted longer. Prior concussions may be an indicator of prolonged recovery. Overall, the results for female athletes with regard to prior concussions appear to be similar to that of male athletes.

Correspondence: *Alexandra Jackson, 618 Main St, Lewiston, ME 04240. E-mail: alexandra.jackson@goodwillnne.org*

Poster Session 12: Neuropsychology in HIV, Infectious Diseases, Neurological and Medical Disorders, TBI

12:30–2:00 p.m.

HIV/AIDS/Infectious Disease

A. ARENTOFT, J. MONZONES, K. CROTTY, A. FUENTES, F. FRASER, A. ROSARIO & M. RIVERA MINDT. The impact of acculturation on neuropsychological test performance among HIV+ Latino/a individuals.

Objective: Some research suggests that acculturation is associated with neuropsychological (NP) performance, but this hasn't been examined among HIV+ Latina/os, a group disproportionately impacted by HIV/AIDS. Research also suggests that between group (Latino/a vs. non-Hispanic) differences on executive functioning (EF) measures are not attenuated by reading level (Rivera Mindt et al., 2008). We hypothesized that acculturation would significantly correlate with NP performance (particularly EF) among HIV+ Latino/a adults.

Participants and Methods: 42 HIV+ Latino/a participants (33% female; age=45.29±7.26, education=11.86±2.80) completed NP & medical evaluations, as well as the Abbreviated Multidimensional Acculturation Scale (AMAS; Zea et al., 2003). Demographically-corrected average T-scores were used for Global-NP & NP domains (EF, Attention/Working Memory (AWM), Learning, Memory, Processing Speed & Motor). Reading level (WTAR) was not significantly correlated with Global-NP or NP domains, and was thus not included in the following analyses.

Results: Higher Latino/a acculturation was negatively correlated with EF (r=-0.47, p=.01), but no other domains (all p's >.05). Within EF, Latino/a acculturation was negatively correlated with Wisconsin Card Sorting Test-64 (WCST-64) Perseverative Responses (p=0.01), with a trend in Trails B (p=.06). Higher American acculturation (relative to Latino acculturation) was positively correlated with EF (r=0.42) & AWM (r=0.36; all p's<.05).

Conclusions: Higher Latino acculturation was associated with poorer EF performance, particularly on a largely nonverbal measure (WCST-64), and higher American acculturation was associated with better EF & AWM performance. Acculturation significantly impacts NP test performance on EF & AWM in HIV+ Latina/os, and should be considered when examining NP performance in this group.

Correspondence: *Alyssa Arentoft, MA, Psychology, Fordham University, 441 East Fordham Road, Dealy Hall 226, Bronx, NY 10458. E-mail: alyssa.arentoft@gmail.com*

B.W. BECKER, S.A. CASTELLON & C.H. HINKIN. Interpersonal Functioning and Neuropsychological Performance in HIV/AIDS.

Objective: HIV-associated neuropsychological(NP) impairment can have profound functional consequences. Interpersonal factors also impact functional capability, with higher levels of isolation contributing to greater impairments in daily living skills. Interpersonal functioning, however, can also be conceived as a "real world" activity involving its own complex set of cognitive skills that has not been closely studied in the HIV-infected population. We hypothesized that NP functioning is associated with perceived interpersonal functioning independent of demographic, mood, and personality factors.

Participants and Methods: HIV-infected participants(N = 196) underwent a detailed NP evaluation. Raw scores were converted to demographically-corrected T-scores and were used to derive domain and global T-scores. The Millon Clinical Multiaxial Inventory-III (MCMI-III) was administered to assess personality and mood functioning. The Social Provisions Scale (SPS) was administered as a measure of perceived interpersonal functioning. Partial correlations- controlling for demographics as well as personality and mood-related variables (MCMI-III) were used to examine the relationship between NP performance and global SPS score.

Results: SPS score was significantly associated with global NP performance. Among individual domains, information processing speed had the strongest significant association with SPS score followed by learning and memory, executive abilities, and attention.

Conclusions: Perceived interpersonal functioning is associated with NP performance beyond the influence of demographic, personality, and mood-related factors. Although this relationship is likely bidirectional, longitudinal research will help to further examine whether the neurological sequelae of HIV attenuates interpersonal functioning as is the case with other more frequently studied activities of daily living.

Correspondence: *Brian W. Becker, Ph.D., West Los Angeles VA Healthcare/UCLA, 11301 Wilshire Blvd., B256, Los Angeles, CA CA. E-mail: beckerb24@sbcglobal.net*

U.S. CLARK, R.A. COHEN, A. GONGVATANA, T.L. WHITE, M.L. WESTBROOK, K.N. DEVLIN & K.T. TASHIMA. Relation of HIV-Associated Brain Volume Abnormalities to Facial Emotion Recognition Impairments in Individuals with HIV.

Objective: HIV is characterized by frontostriatal dysfunction and is associated with cognitive and psychological abnormalities. Several studies have noted impaired facial emotion recognition abilities in disorders associated with frontostriatal dysfunction; however, assessment of this ability in HIV samples has been largely overlooked. The current study examined facial emotion recognition in HIV and assessed the relation of this ability to HIV-associated brain volume changes.

Participants and Methods: Participants included 44 non-demented HIV-seropositive (HIV) and 44 age, education, and gender-matched healthy control (HC) adults (mean age=45.3 years). Facial emotion recognition was assessed outside of the MRI scanner using a dataset of Ekman & Friesen photographs (12 each: Angry, Disgust, Fear, Happy,

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Neutral, Sad, Surprise). A non-emotional categorization control task was also administered, which included 84 landscape images matched to facial images according to difficulty level. Bilateral volumes of 5 brain structures (amygdala, anterior cingulate cortex [ACC], orbital frontal cortex, caudate, putamen) implicated in emotion recognition and/or HIV-neuropathology were measured using voxel-based morphometry.
Results: Compared with HC, HIV performed normally on the control task but demonstrated impairments in emotion recognition ($p<.05$), specifically for fear ($p<.01$). No significant group differences were observed in total brain volume ($p=.28$). HIV displayed volume reductions in the ACC ($p<.05$) and enlargements in the amygdala ($p<.05$). Regression analyses in HIV indicated that fear recognition impairments ($R^2=.13$; $p=.057$) were related to reductions in the ACC ($\geq=.35$, $p<.05$) (amygdala: $\geq=.04$, $p=.78$).
Conclusions: These results implicate HIV-related abnormalities of the affective (i.e., rostral-ventral) subdivision of the cingulate in the development of facial emotion recognition impairments in HIV.
Correspondence: *Uraina S. Clark, PhD, Department of Community Health, Brown University; Brown University, Box G-S121-4, Providence, RI 02912. E-mail: urainac@yahoo.com*

K. CROTTY, A. ARENTOFF, J. MONZONES, A. FUENTES, F. FRASER, A. ROSARIO & M. RIVERA MINDT. An Expanded Model of Frontotemporal Dysfunction in Prospective Memory with HIV/AIDS.
Objective: Prospective memory (ProM) refers to remembering to remember. In HIV/AIDS, frontotemporal functioning (i.e., executive functioning, learning, & memory) is implicated in ProM (Carey et al., 2006). However, no study to date has examined the relationship between medial orbitofrontal/ventromedial prefrontal (mOF/vmP) function (i.e., decision-making ability) and ProM. This study investigated the role of mOF/vmP function in ProM, within a comprehensive battery of neurocognitive (NC) functioning, with HIV+ adults.
Participants and Methods: Forty HIV+ adults (M age=45.45±8.95; M years education=13.0±2.68; 15.8% CD4<200; 72.5% Latina/o & 27.5% non-Hispanic White) completed the Memory for Intentions Screening Test (MIST); a standard battery of NC measures (executive, learning, delayed recall, attention/working memory, processing speed, & verbal); & the Iowa Gambling Task (IGT; mOF/vmP function).
Results: Spearman's Rho correlations revealed that the IGT Net Total (IGT-NT) & Brief Visuospatial Memory Test-Revised (BVMT-R) Learning Total were both positively associated with the MIST Summary Score ($r=.33$ & $r=.32$, respectively; all p's<.05). IGT-NT, WCST-64 Total Errors & BVMT-R Learning were each negatively associated with MIST ProM Errors (r's= -.34 to -.42; all p's<.05), Similarly, worse Hopkins Verbal Learning Test-Revised (HVLT-R) Learning and Delayed Recall were negatively correlated with increased MIST Loss-Time Errors ($r=-.36$ & $r=-.35$, respectively, all p's<.05).
Conclusions: This study is the first to demonstrate that poorer mOF/vmP function is related to worse prospective memory, and bolsters previous research on the import of frontotemporal dysfunction in prospective memory among HIV+ adults. Further examination of mOF/vmP function within this population is needed as decision-making ability may be especially germane to planning and following medication regimens.
Correspondence: *Kelly Crotty, MA, Fordham University, 515 W 110th St, 6D, New York, NY 10025. E-mail: kellyccrotty@gmail.com*

L.A. CYSIQUE, J. MYUNG-LEE, T. LANE, K. MOFFAT, N. DAVIES, A. CARR, B.J. BREW & C. RAE. Cortical and subcortical neuronal damage as potential markers of chronic brain HIV infection: A 1H-MRS and neuropsychological study.
Objective: Characterize potentially new neuropathological processes in chronic brain HIV infection in middle-aged individuals.
Participants and Methods: 54 HIV+ adults aged 54±7 on HAART (Plasma and CSF (N=26) HIV RNA<50 cp/mL in 96%; median CD4=526) and 11 demographically-comparable controls underwent neuropsychological testing, mood examination, blood tests, and single voxel 1H-MRS at 3T: Right frontal white matter (FWM), posterior cingulate cortex (PCC) and right caudate area (Caud) metabolites were quantified using jMRUI with baseline and water corrections. Regression models investigated factors associated with brain metabolites: 1. Neurocognitive model; 2. HIV biomarker model, 3. Cardiovascular model, 4. Multivariate model combining factors at $p<.10$. Overall neurocognitive impairment was defined by the Global Deficit Score.
Results: Relative to controls, HIV+ individuals demonstrated decreased PCC N-Acetylaspartate (NAA) ($d=.50$; $p=.07$), PCC increased myo-Inositol/Creatine (mIo/Cr) ($d=.57$; $p<.16$); and decreased Caud NAA ($d=.59$; $p<.02$). 20% of the HIV+ group were classified as neurocognitively impaired versus 0% in the HIV- group; $p<.05$. Caud NAA was decreased in the impaired HIV+ group ($d=.50$; $p<.20$). Memory performance; serum ≥2-microglobulin, HIV duration and Framingham cardio-vascular risk were retained in the multivariate model and showed: serum ≥2-microglobulin positively correlated with PCC mIo/Cr ($p<.05$). Lower memory performance ($p=.05$) was associated with lower PCC NAA. In the HIV+ group, higher depressive, and apathy complaints were associated with lower Caud NAA ($p<.05$).
Conclusions: In this middle-aged cohort, ongoing neuronal injury despite viral suppression was found in brain areas that have been classically involved in HIV infection, and newly in the PCC which was associated with lower memory performance.
Correspondence: *Lucette A. Cysique, PhD, Brain Sciences, University of New South Wales, Neurology Department, St. Vincent's Hospital, 390 Victoria Street, Darlinghurst, NSW 2010, Australia. E-mail: lcysique@unsw.edu.au*

R. FAMA, S.A. SASSOON, M.J. ROSENBLOOM, R. MIGLIORINI, A. PFEFFERBAUM & E.V. SULLIVAN. Visuomotor Procedural Learning in HIV Infection, Alcoholism, and Their Comorbidity.
Objective: Differential patterns of declarative memory impairments are well-established in HIV infection (HIV) and chronic alcoholism (ALC), and recent work indicates that impairment can be exacerbated by HIV-alcoholism comorbidity (HIV+ALC). Less known is whether these disorders affect visuomotor procedural learning, which could be differentially affected by neuropathology unique to each condition: frontostriatal dysfunction in HIV infection and frontocerebellar dysfunction in alcoholism.
Participants and Methods: Rotary pursuit, a test of visuomotor procedural learning, was administered in 6 sessions over 3 days to 113 men and women (28 HIV, 36 ALC, 30 HIV+ALC, and 19 normal controls (NC)). Scores on motor, declarative memory, and nonmnemonic cognitive tests were available to use as predictors of procedural learning performance.
Results: Z-scores corrected for baseline speed of NC were subjected to ANOVA over the 6 sessions and yielded a group effect ($p=.01$); HIV and HIV+ALC had significantly less time on target than NC on all 6 sessions yet achieved normal learning rates. Although ALC performed comparably to NC on the first 2 days of testing, a significant group x session interaction indicated continued learning from the second to third test day in NC but not ALC. In HIV, the women were more impaired than the men, and higher Beck Depression Index scores were correlated with lower learning rates in HIV+ALC. Multiple regression analyses indicated that psychomotor speed uniquely predicted rotary pursuit scores over and above other cognitive predictors in HIV.
Conclusions: Visuoperceptual procedural memory can occur at normal rates but can also be moderated by psychomotor speed in HIV infection, possibly related to frontostriatal disturbance. We further speculate that the attenuated visuomotor procedural learning rates in alcoholism are related to frontocerebellar disruption characteristic of the disorder. (Support: AA017347, AA005965, AA010723, AA017168)
Correspondence: *Rosemary Fama, PhD, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, 401 Quarry Road, Stanford, CA 94305. E-mail: rfama@stanford.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

P.L. FAZELI. The Effect of Age and HIV on Neuropsychological and Everyday Performance.

Objective: Despite the ability of anti-retroviral viral medications to extend life, those aging with HIV may be more vulnerable to neuropsychological and functional deficits. In this study, we examined the neuropsychological and functional performance of younger (21 to 49 years) and older (50+ years) adults with and without HIV.

Participants and Methods: Participants (N = 172) were administered a cognitive battery and a functional measure (the Timed Instrumental Activities of Daily Living test). ANCOVA's were used to test the main effects of age and HIV status and the interaction, after controlling for gender and education.

Results: For psychomotor speed, there was a significant effect of age, with those who are younger performing better. For speed of processing, there was a significant main effect of both HIV status and age for 3 measures, with those who are older and HIV-positive performing worse. Another speed of processing measure only yielded HIV status as a main effect, and age emerged as a trend (p =. 06). For the memory and executive functioning domains, no statistically significant differences across groups were detected. In the Timed Instrumental Activities of Daily Living test, there was an HIV x age interaction, as well as a main effect of HIV status, with those who are older with HIV performing worse on such everyday tasks (e.g., looking up a phone number).

Conclusions: The results of this study indicate that those with HIV may be at risk of poorer cognitive performance compared to their HIV-negative counterparts and this deficit may transfer to performance of everyday tasks.

Correspondence: *Pariya L. Fazeli, M.A, Psychology-Graduate School, University of Alabama at Birmingham, 3454 Manor Lane APT 106, Birmingham, AL 35209. E-mail: plfazeli@uab.edu*

K. VAN DYK, S.A. GOLUB, B.J. PORTER, K. ROBIN, W. KOWALCYK, J. TOMASSILLI & N.S. FOLDI. Aging and HIV: the roles of speed and attention.

Objective: The growing population of older adults with HIV (HIV+) requires investigation of age-related cognitive effects in HIV, particularly on attentional mechanisms (Vance & Hardy, 2009). Attention, as measured by cognitive and motor speed processing, was examined in an adult HIV+ sample. We hypothesized age-related slowing on reaction times and age-related effects to fastest presentation rates. We also hypothesized that both cognitive and motor processing speed would account for independent variation in attentional function.

Participants and Methods: : Forty-two HIV+, non-demented participants (age range 34-75) who functioned in everyday activities were recruited at the Center for HIV Educational Studies and Training. All were screened for neuropsychiatric disorders and visual deficits, and administered neuropsychological tests, including measures of cognitive (Letter Fluency) and motor (Purdue Grooved Pegboard) processing speed. Additionally, a rapid serial visual detection task (Simple Detection Task [SDT]), measured reaction time to stimuli presented at varied stimulus onset asynchrony (range 350-1400ms). Fast and slow-presentation conditions were defined as presentation SOA was ∧500ms or >500ms respectively.

Results: Regression analysis of fast and slow-presentation SDT predicted age (F(2,29)=3.40, p=.04, R2=.14) and revealed that, contrary to expectation, only slow-presentation had a unique contribution to the model (≥=.55, p=.03). In addition, correlations between slow-presentation SDT and Letter Fluency and Grooved Pegboard were nonsignificant.

Conclusions: No age effect to fastest presentation rates was observed; however, rate of slow presentation to detect stimuli in HIV implicates age-related deficiency to maintain vigilance, which may be a supplementary component of age-related slowing in HIV not captured by other measures of cognitive and motor speed.

Correspondence: *Nancy S. Foldi, Ph.D., Department of Psychology, Queens College - CUNY, 65-30 Kissena Blvd., NSB E318, Flushing, NY 11367. E-mail: nancy.foldi@qc.cuny.edu*

R.K. HEATON, D.R. FRANKLIN, R.J. ELLIS, S.P. WOODS, J. MCCUTCHAN, S.L. LETENDRE, S. LEBLANC, S. CORKRAN, N. DUARTE, D.B. CLIFFORD, A.C. COLLIER, C.M. MARRA, S. MORGELLO, M. RIVERA-MINDT, M.J. TAYLOR, T.D. MARCOTTE, J. ATKINSON, T. WOLFSON, B.B. GELMAN, J.C. MCARTHUR, D.M. SIMPSON, I. ABRAMSON, C. FENNEMA-NOTESTINE, T.L. JERNIGAN & I. GRANT. HIV-associated Neurocognitive Disorders Before and During the Era of Combination Antiretroviral Therapy.

Objective: Combination antiretroviral therapy (CART) has greatly reduced the incidence of opportunistic disease and mortality in HIV-infected individuals, but evidence of CART effects on neurocognitive impairment (NCI) has been mixed. This study examined the prevalence of NCI in the pre-CART and CART eras at various stages of HIV infection.

Participants and Methods: 678 HIV+ individuals from the pre-CART era (1990-1995) were compared to 843 HIV+ individuals from the CART era (2000-2007) on the basis of having received comparable comprehensive neuromedical and neuropsychological evaluations.

Results: Overall, 40% of individuals had NCI in the CART era vs. 33% in the pre-CART era (p=.004). Analysis by CDC Stages showed significantly higher CART era NCI in CDC A only (36% CART vs 25% pre-CART, p =.001). CART era individuals were more likely to be on ARVs (70% vs. 47%; p<.0001) and more likely to have an undetectable plasma viral load (65% vs. 5%; p<.0001). Low nadir CD4 predicted NCI in both eras, whereas degree of current immunosuppression, estimated duration of infection and viral suppression in CSF (on treatment) were related to impairment only pre-CART. Pattern of NCI also differed: pre-CART had more impairment in motor skills, cognitive speed and verbal fluency; whereas CART era involved more learning and executive function impairment.

Conclusions: NCI remains prevalent despite CART. Of interest, more CART era non-AIDS cases have NCI than pre-CART. This suggests negative CNS effects of longer survival in a pre-AIDS state during which the brain remains exposed to repeated fluxes in HIV and/or chronic immune stimulation.

Correspondence: *Donald R. Franklin, BS, Psychiatry, University of California San Diego, 220 Dickinson Street, Suite B, San Diego, CA 92103. E-mail: dofranklin@ucsd.edu*

W. GONGVATANA, R. COHEN, S. CORREIA, K.N. DEVLIN, J. MILES, U.S. CLARK, M. WESTBROOK, G. HANA, H. KANG, H. OMBAO, B. NAVIA, D.H. LAIDLAW & K.T. TASHIMA. Impact of Hepatitis C and HIV Coinfection on Cerebral White Matter Integrity.

Objective: Hepatitis C virus (HCV) is a common coinfection with HIV. Direct effects of HCV on the brain have been demonstrated, and HCV infection has been shown to exacerbate HIV-associated neurocognitive impairments. Few neuroimaging studies have examined the structural brain impact of HCV infection, especially in the context of HIV.

Participants and Methods: We utilized diffusion tensor imaging (DTI) to examine white matter integrity in 67 HIV-infected individuals and 28 seronegative controls with significant prevalence of HCV coinfection. Measures of anisotropy (FA) and diffusivity (MD) were obtained in the frontal and parietal white matter and the corpus callosum. Regression analyses were performed to examine the independent effects of HIV, HCV, alcohol/substance use history, and age on white matter integrity in these brain regions.

Results: HCV infection was significantly associated with white matter damage in the frontal and parietal white matter bilaterally. No adverse white matter effects of HIV or lifetime alcohol/substance use history were found. Age was associated with white matter damage in the frontal/parietal white matter and all subregions of the corpus callosum.

Conclusions: The current findings reinforce existing evidence of the brain impact of HCV, specifically showing adverse effects on cerebral white matter. Adverse white matter effects of HIV were not found in this cohort of medically stable HAART-treated people, though the observed HCV effects may have been augmented by coinfection with HIV. These findings point to the importance of examining comorbid conditions of HIV in preventing the development of brain dysfunction.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Win Gongvatana, Ph.D., Brown University, 481 Lloyd Ave., Providence, RI 02906. E-mail: assawin_gongvatana@brown.edu*

D.J. HARDY, K. GOODKIN, K. OLSON, E. LOPEZ, G. MORALES & M. BUITRON. Antisaccade Errors Relate to Working Memory in Older but not Younger HIV-1-Seropositive Adults.

Objective: Working memory (WM) impairment has been demonstrated in HIV-1-seropositive adults relatively early in the course of infection, and recent evidence from our laboratory has shown WM in older adults with HIV-1 to be associated with several neurocognitive domains. In the present study, we examine the association between inhibition, processing speed, and working memory in younger and older HIV-1-seropositive adults. Because WM and inhibitory processing both rely on frontostriatal systems, we predict that these will be associated with each other. In addition, because of the similarity in neurocognitive sequelae in HIV and aging, this association will be especially prominent in older adults with HIV-1.

Participants and Methods: Participants included 180 HIV-1-seropositive adults: 74 younger (< 40 years old, mean age = 33.4) and 106 older (> 50 years old, mean age = 56.1), as part of a larger longitudinal study of the neurocognition of HIV and aging. Analyzed for the present study were measures of WM (Digit Span Backwards), inhibition (the antisaccade subscale of the HIV Dementia Scale), and processing speed (a computerized reaction time test). Group comparisons were statistically analyzed as well as correlations among the measures within each group.

Results: Inhibition, but not processing speed or WM performance, was worse in the older group ($p = .02$). In the older group, both inhibition and processing speed were correlated with WM ($p < .01$), and processing speed and inhibition were correlated with each other ($p < .01$). In the younger group, only processing speed was correlated with WM ($p = .01$), and there was no association between processing speed and inhibition ($p = .91$).

Conclusions: In general, results support our hypotheses. It appears that in older HIV-1 seropositive adults, inhibitory processing is impaired and plays a more prominent role in both processing speed and WM functioning.

Correspondence: *David J. Hardy, Loyola Marymount University, 1 LMU Drive, Suite 4700, Los Angeles, CA 90045. E-mail: dhardy@lmu.edu*

J.M. HEAPS, B. ANCES, E.M. LANE, R.H. PAUL & N. PARKER. Diffusion Tensor imaging and neuropsychological performance in HIV/HCV coinfection.

Objective: To determine if a synergistic interaction between HIV infection and Hepatitis C (HCV) impacts white matter(WM) structural integrity in prefrontal WM and genu of the corpus callosum(CC) as assessed by diffusion tensor imaging (DTI). Standard DTI metrics (fractional anisotropy (FA) and mean diffusivity (MD)) were used to measure white matter integrity. In addition, the relationship between performance on neuropsychological measures and DTI metrics was examined.

Participants and Methods: A subset of 10 HIV+ patients (mean age= 40.3) and 10 HIV+/HCV+ patients (mean age = 49.10) were recruited from a larger study for MRI data collection. Detailed substance use history, and a battery of neuropsychological tests were administered. Raw scores from the neuropsychological tests were used for analyses.

Results: No significant differences in education or substance use existed between the two groups; however, age was significantly higher in the coinfected group. Using MANCOVA covaried for age, results indicate no additive detrimental effect of HIV/ HCV coinfection status on DTI metrics in prefrontal white matter or CC genu. Correlational analyses did not reveal any significant relationships between the DTI measures in any of the selected regions and the neuropsychological measures.

Conclusions: Although no differences were found between the groups on measures of white matter integrity or the neuropsychological measures the small sample size may have limited our ability to detect differences in the groups. Additional studies utilizing different imaging techniques will help determine the effects of HIV/HCV coinfection on the brain.

Correspondence: *Jodi M. Heaps, MA, Psychology, University of Missouri-St. Louis, One University Blvd, 442-A Stadler Hall, Saint Louis, MO 63121. E-mail: jmhfx3@umsl.edu*

L.J. HINES, S. PANOS, R. AMIR, S. LAWRENCE, A. THAMES, B. BECKER, S. CASTELLON & C. HINKIN. Intra-Individual Variability and Aging in HIV+ Adults.

Objective: To investigate the relationship between measures of intra-individual variability (IIV) and age in an HIV+ population.

Participants and Methods: Data from 136 HIV+ adults (>50 years, N=108, <40 years, N= 28) who completed self report questionnaires and a neuropsychological battery yielding mean domain scores of processing speed (PS), working memory (WM), executive functioning (EF), immediate and delayed memory recall (IR, DR), verbal, and motor skills were analyzed. Within-person variability across tasks (dispersion) was assessed using intra-individual standard deviations, and variability over time within tasks with the variability score from the Connor's CPT.

Results: Groups did not differ on IIV scores. Backward stepwise multiple regressions demonstrated that IR was the best predictor of variability, and PS, EF, IR, and motor were the best predictors of dispersion. Analyses within age groups revealed that for younger adults motor skills best predicted variability, whereas for older adults, motor and IR were reliable predictors. Dispersion was best predicted by PS and IR in younger adults, and PS, Motor, EF, and DR in older adults. Self-report HIV variables, depression, and age were not significantly correlated with either IIV measure. Dispersion was significantly correlated with anxiety. Although dispersion was not significantly correlated with overall mean performance, variability was.

Conclusions: Dispersion and variability measure separate constructs that diverge as a function of age for HIV+ adults. Although age groups did not differ on measures of IIV, predictors of IIV were different among groups. For younger adults, fewer cognitive domains were associated with IIV measures, which may suggest greater efficiency in maintaining consistent performance.

Correspondence: *Lindsay J. Hines, Ph.D., Neuropsychology, UCLA Semel Institute, 760 Westwood Plaza, C8-746, Los Angeles, CA 90095. E-mail: lhines@mednet.ucla.edu*

C.J. HOEBEL, E. PIROGOVSKY, A. COLLAZO, M.V. CAMERON, A. ROONEY, S.P. WOODS & P. GILBERT. HIV Associated Deficits in Visuospatial Temporal Order Memory.

Objective: The frontal lobes have been shown to be important for accurate temporal order memory. Since frontal-striatal loop dysfunction and episodic memory deficits are characteristic of HIV infection, temporal order memory may be sensitive to neuropathological changes in individuals living with HIV. Disruption of temporal order memory may impair cognitive processes that are critical to the execution of daily living skills.

Participants and Methods: In the present study, 18 individuals with HIV and 18 demographically similar seronegative persons were administered a visuospatial temporal order memory task on a computerized radial 8-arm maze. On the study phase of each trial, the participant was shown a random sequence of circles presented one at a time at the end of each of the eight arms. On the choice phase, the participant was presented with a circle at the end of two of the study phase arms and was asked to choose the circle that came earlier in the sequence. Manipulations of temporal interference were carried out by systematically changing the temporal separation lag between the two choice phase circles across trials.

Results: The performance of both groups increased as a function of increased temporal separation lag. However, individuals with HIV demonstrated significant impairments relative to seronegative persons across lags.

Conclusions: These results suggest that temporal order memory may be impaired in individuals with HIV. Research examining the cognitive and neural mechanisms of HIV-associated impairment in temporal order memory may elucidate a fundamental deficit that could potentially inform behavioral interventions that structure daily living tasks to mitigate temporal interference.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Calhuei J. Hoebel, Psychology, San Diego State University, 5445 Baltimore Drive, #47, La Mesa, CA 91942. E-mail: calliehoebel@live.com*

E. LOPEZ, D.J. HARDY, K. GOODKIN, G. MORALES & M. BUITRON. A Validity Study of the HUMANS Battery: A Comparison of an Adapted Spanish Neuropsychological Test Battery to a Standard English-Language Battery in Younger HIV-Positive Adults.

Objective: Recent estimations of HIV incidence show that new infections disproportionately affect Hispanic populations. HIV/AIDS in the U.S. Hispanic population is also exacerbated by various socio-cultural risk factors, which may increase transmission risk and the risk for clinical disease progression. HIV-associated neurocognitive impairment is associated with increased mortality beyond the impact of systemic disease progression. Comparisons between matched test batteries between English- and Spanish-speaking cohorts have been limited.

Participants and Methods: This paper uses NP data collected on two cohorts of young (18-39) HIV seropositive adults, one being tested in English, and the other tested using the HIV/University of Miami Annotated Neuropsychological test battery in Spanish (HUMANS). Twenty-one NP measures from the domains of language, memory, attention/concentration, executive functioning, visuospatial abilities and psychomotor speed were analyzed. Analyses were conducted using ANCOVAs, controlling for education, CD4 cell count, plasma viral load, and CDC clinical stage of disease.

Results: The results showed no statistically significant group differences on 16 out of the 21 NP measures. Because of the large number of comparisons made, the level of significance was set at .01.

Conclusions: Thus, the results support the equivalence of HIV-infected Spanish speakers compared to English speakers on NP test performance for individuals tested appropriately in their primary language. This is in contrast to previous findings that suggest that HIV seropositive Hispanics are more likely to suffer from neurocognitive impairment than Caucasians – a conclusion that is confounded by the issue of the primary language of the testee. This study indicates the need to assess bilingual individuals according to their current frequency of use of their native vs. their acquired language in order to test in the appropriate language and ensure the validity of the diagnosis of HIV-associated neurocognitive impairment and disorder.

Correspondence: *Enrique Lopez, PsyD, CSMC, 8730 Alden Drive-E-106, Los Angeles, CA 90048. E-mail: drelopez@yahoo.com*

T.D. MARCOTTE, S. LETENDRE, R. MEYER, R. HEATON, T. ALEXANDER, D. FRANKLIN, R. KAMAT, I. GRANT, S. MEHENDALE & M. GHATE. Neuropsychological Consequences of HIV in India.

Objective: HIV infection often results in HIV-associated neurocognitive disorders (HAND). Most studies of HAND have been conducted in Western societies where clade B virus is most common. This study was designed to examine neuropsychological (NP) functioning in individuals infected with clade C virus, which has been hypothesized to be less neurovirulent than clade B.

Participants and Methods: 186 HIV seropositive (HIV+) and 168 HIV seronegative (HIV-) participants in Pune, India completed a Marathi-translated NP test battery. The groups were similar with respect to age, education, and gender. Pending clade-typing, participants were presumed to be infected with clade C (present in approximately 90% of HIV+ individuals in India). No participants were receiving antiretroviral treatment. Overall NP functioning was estimated using the Global Deficit Score, a summary score that weights levels of impairment across the entire NP battery.

Results: Cases with AIDS (n=94) had a median (IQR) CD4 cells/mm3 of 129.5 (8, 170); the non-AIDS group had a median of 448.5 (387, 521) cells/mm3. With respect to NP functioning, the AIDS group (GDS = .43 [.37]) performed significantly worse than the non-AIDS (.29 [.37]) and control groups (.22 [.25]); there was a non-significant trend for the non-AIDS group to have worse NP performance than the control group.

Conclusions: In untreated HIV-infected individuals in India, advanced disease was associated with significantly worse neurocognitive functioning than controls. Individuals with early stage disease had only marginally worse NP performance, supporting the possibility that the NP presentation of clade C may differ from clade B.

Correspondence: *Thomas D. Marcotte, PhD, University of California, San Diego, 220 Dickinson Street, Suite B, San Diego, CA 92103. E-mail: tmarcotte@ucsd.edu*

E. MARTIN, J. VASSILEVA, D. OSTROW, J. WELLER & A. BECHARA. Decision Making and Drug Abuse in HIV+ Men Who Have Sex with Men: A Preliminary Report from the Chicago Multicenter AIDS Cohort Study.

Objective: Impaired decision making is common among HIV+ substance dependent individuals (SDIs) but has not been studied specifically among drug-using men who have sex with men (MSMs), a group with very different risk factors compared with previously studied HIV+ SDIs. We administered two decision making tasks to groups of HIV+ and HIV- substance-using MSMs in order to determine if defects in decision making would be evident among this HIV+ group; and to evaluate underlying cognitive mechanisms contributing to impaired task performance.

Participants and Methods: We tested 28 HIV+ and 13 HIV- MSMs enrolled in the Multicenter AIDS Cohort Study (MACS) with DSM-IV substance use disorders (SUDs). All participants were verified abstinent at testing. Subjects completed the Iowa Gambling Task (IGT) and the Cups Task. Both tasks measure propensity for risky decisions but only the IGT includes a learning component. The Cups Task provides explicit information on probability of risk while subjects must deduce these probabilities for successful performance of the IGT.

Results: Groups were well-matched on demographic, substance use severity, and comorbid characteristics. HIV+ subjects made significantly more disadvantageous decisions compared to controls on the IGT, ($p < .005$) but there were no significant differences in the groups' propensity for risky choices on the Cups Task, $F < 1$.

Conclusions: These preliminary results indicate that decision making is impaired among HIV+ compared with HIV- MSMs with SUDs but only on the IGT. This task requires probabilistic learning and may be more sensitive to HIV- associated cognitive impairment attributable to greater dysfunction of frontostriatal systems. Supported by R03 DA025977

Correspondence: *Eileen Martin, PhD, University of Illinois, Dept of Psychiatry, 1601 W. Taylor St, Chicago, IL 60612. E-mail: emmartin@uic.edu*

S. WICKS, M. WILSON, R. GONZALEZ, J. VASSILEVA & E. MARTIN. Effects of HIV and Attention Deficit Disorder Symptoms on Procedural Learning Performance.

Objective: HIV infection and Attention Deficit Hyperactivity Disorder (ADHD) are associated with dysfunction of frontostriatal brain systems. We tested substance dependent individuals (SDIs) stratified by HIV serostatus and severity of self-reported symptoms of ADHD on two measures of procedural learning, to address the question of additive effects of HIV and ADHD symptoms on memory systems dependent on frontostriatal integrity.

Participants and Methods: We tested 136 HIV+ and 306 HIV- SDIs. Using scores on the Wender Utah Rating Scale of ADHD symptoms we classified each subject as "High WURS" or "Low WURS." All subjects completed the Rotary Pursuit Task (RPT) and the Weather Prediction Task (WPT), measures of motor and cognitive procedural learning, and a measure of vigilance as a comparison task.

Results: Neurocognitive data were analyzed controlling for education, substance use severity and hepatitis C. HIV+/High WURS and HIV+/Low WURS groups performed significantly more poorly overall on the RPT ($p < .01$) and the WPT ($p < .001$) compared with the HIV-/High WURS and HIV-/Low WURS groups. In comparison the HIV+/High WURS and HIV-/High WURS groups performed significantly more poorly on the vigilance task compared with the two Low WURS groups, $p < .05$

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: A positive HIV serostatus was associated with impairment on procedural learning tasks regardless of ADHD symptom severity; however, non-SDI subjects must be tested to evaluate more precisely the potential additive effects of ADHD and HIV. Supported by R01DA12828
Correspondence: *Eileen Martin, PhD, University of Illinois, Dept of Psychiatry, 1601 W. Taylor St, Chicago, IL 60612. E-mail: emmartin@uic.edu*

R.C. MCINTOSH, K. EDDINGER & M. ROSSELLI. Stress-Coping and Outcomes in Women with HIV/AIDS: A Meta-analysis.

Objective: Clinical observations suggest that not all persons with HIV experience the same psychological or physical outcomes (e.g. depression, physical health). This meta-analysis examines the spectrum of stressors and coping mechanisms along with their measurable effect on disease-related outcomes in women with HIV/AIDS.

Participants and Methods: Thirty-two primary studies with a combined sample of 4,893 adult women (Mage = 35.4 years) were selected for the analysis. Eligible studies provided effect size data (Cohen, 1988) and sampled exclusively female participants between 1997 and 2009. The majority of the sample (72%) were African-American/Black women recruited from urban areas.

Results: HIV-symptoms was the type of stressor shown to have the greatest effect on poor mental health outcomes e.g. depression, anxiety (R = 0.42). Problem-Focused Coping was found to be the greatest resilient resource to negative affect (R = -0.25) in contrast to social isolation and avoidance which were observed to be the most robust maladaptive coping mechanisms related to poor mental health (0.56 to 0.64). Effect sizes obtained for positive mental health outcomes revealed moderate negative relationships between both the perceived stress of daily events and interpersonal conflicts for women with HIV/AIDS (-0.31 to -0.41). Spirituality and Positive Reappraisal were found to have a moderate effect with positive psychological adjustment of (R = 0.32). Small negative correlations were also obtained for Positive Reappraisal and Spirituality-based coping with poor medical regimen adherence (-0.16 to -0.18).

Conclusions: These findings indicate despite the advancements in antiretroviral treatment (ART) HIV symptomology still has a robust effect on poor mental health outcomes in women living with HIV/AIDS. In conclusion, both emotion-focused and problem-focused coping strategies can have clinical utility for women in the management of HIV/AIDS-related stressors.
Correspondence: *Roger C. McIntosh, M.S. M.A., Psychology, Florida Atlantic University, 2912 College Ave., Fort Lauderdale, FL 33314. E-mail: rmcinto5@fau.edu*

J. MONZONES, A. ARENTOFT, K. CROTTY, A. FUENTES, F. FRASER, A. ROSARIO & M. RIVERA MINDT. Medial Orbitofrontal/Ventromedial Prefrontal Function is Uniquely Related to Neurocognitive Complaints in HIV.

Objective: HIV research indicates that neuropsychological functioning & depressed mood are significantly related to neurocognitive complaints (NCs; Heaton et al., 2004; Rourke et al., 1999). However, these studies lacked executive functioning (EF) tests of medial orbitofrontal/ventromedial prefrontal (mOF/vmP) function (i.e., areas associated with judgment abilities; Bechara, 2007). This study investigated whether a measure of mOF/vmP function uniquely predicts NCs, beyond traditional EF measures & mood, within an HIV+ cohort.

Participants and Methods: The sample included 47 HIV+ adults (29.8% female; 76.6% Hispanic; 23.4% non-Hispanic White; 18.2% CD4<200), with a mean age & education of 45.17 (SD=8.62) and 12.49 (SD=2.92) years, respectively. Study measures included: Traditional EF [Wisconsin Card Sorting Test -64 (WCST-64), Trails-B (TB), Controlled Word Association Test (FAS), Paced Auditory Serial Addition Test-50 (P50)]; depressive symptoms [Beck Depression Inventory-II (BDI)]; mOF/vmP function [Iowa Gambling Task (IGT)]; & NCs [Patient's Assessment of Own Functioning Inventory (PAOF; Chelune et al., 1986)].

Results: Correlational analyses revealed that higher NCs (PAOF Total Score) were significantly correlated with worse performance on traditional EF tests, BDI & IGT (all p's<.05). Multiple regression showed that after accounting for traditional EF tests & BDI, IGT Deck A (≥=-.26, p=.03) significantly predicted PAOF (R2=.60, F(6,30)=7.53, p<.0001; R2Δ=.07, p=.03). WCST-64 & BDI were also significant (p's<.05).

Conclusions: Worse mOF/vmP function (i.e., IGT) significantly predicts increased neurocognitive complaints, even after accounting for other EF measures & depression. Thus, frontal systems pathology, particularly mOF/vmP function, appears to be an important consideration for better understanding subjective complaints of neurocognitive decline in HIV. Further study of the accuracy of subjective reports to actual neuropsychological functioning is warranted.
Correspondence: *Jennifer Monzones, MA, Fordham University, 441 East Fordham Road, Dealy 226, Psychology Dept, Bronx, NY 10458. E-mail: iamjennm@gmail.com*

D.J. MOORE, K. BLACKSTONE, B. GOUAUX, S.P. WOODS, J.H. ATKINSON & I. GRANT. Delayed Recall Impairment Among HIV+ Methamphetamine Users is Associated with Medication Nonadherence.

Objective: Previous studies have indicated that significant neurocognitive impairments are consistently reported among HIV+ methamphetamine (HIV+/METH) users (e.g., Rippeth et al., 2004). Although substance use is consistently a strong predictor of antiretroviral (ART) nonadherence among HIV+ individuals, few studies have examined cognition as a predictor of medication adherence in HIV+/METH; our aim is to investigate the role of cognitive impairment in predicting ART adherence in HIV+/METH.

Participants and Methods: We examined HIV+ persons with a lifetime history of DSM-IV-diagnosed METH abuse or dependence (HIV+/METH; n=150); subanalyses focused on a subset of currently METH using individuals (n=35; self report METH use in past 30 days or positive urine toxicology for METH at visit). Neurocognitive functioning was assessed with a comprehensive clinical battery, covering seven neuropsychological domains. Medication adherence was evaluated with the ACTG 4-day adherence questionnaire and nonadherence was defined as report of any skipped dose in the last 4 days.

Results: No association was found between global neuropsychological functioning and nonadherence among HIV+/METH+ users; however, we did observe an association between memory (e.g., delayed recall) impairment and ART nonadherence (Likelihood ratio = 6.0; p=0.01) such that 16% (17/104) of the persons with unimpaired delayed recall were nonadherent whereas 35% (16/46) of those with impaired delayed recall were nonadherent. Among those participants who evidenced current METH use, a similar, but non-significant, pattern emerged: 4% (5/24) of unimpaired as compared to 36% (4/11) impaired reported nonadherence.

Conclusions: Results suggest that the presence of episodic memory impairment among HIV+/METH users increases the risk of antiretroviral nonadherence. Future studies are needed to develop interventions to circumvent the observed difficulties that HIV+/METH users may have in remembering to take their ART medications.
Correspondence: *David J. Moore, Ph.D., Psychiatry, University of California, San Diego, 150 W. Washington St., 2nd Floor, San Diego, CA 92103. E-mail: djmoore@ucsd.edu*

S. PANOS, L.R. PERRY, T. LO, L.J. HINES, A. RAMEZANI, A.D. THAMES, B.B. BECKER, S. CASTELLON & C.H. HINKIN. HIV and Aging: The Interactive Effects of Aging and Cocaine use on Neurocognition.

Objective: Research has shown that both older age and cocaine abuse adversely affect neurocognitive function among HIV infected adults. However, few studies have assessed the interactive effects of cocaine

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

abuse and increased age. This question is particularly relevant given the high rates of cocaine use in this population and the increasing longevity of individuals living with HIV. The present study extends our previous work by assessing the interactive effects of aging and cocaine use on neurocognition.
Participants and Methods: Participants included 146 HIV-positive individuals who underwent urine toxicology and comprehensive neurocognitive testing. Two-way ANOVAs were employed with age (<40 and > 50 years as cut-point) and cocaine use (defined by presence/absence of positive urine toxicology) as the between group factors and neuropsychological (NP) test scores grouped by cognitive domain (e.g. executive function measures) as the dependent variables.
Results: While main effects for age or cocaine use were seen for a number of NP domains, of greatest interest were the presence of significant interactions between age and cocaine use. Older cocaine users performed significantly worse in overall global cognitive functioning as well as the domains of information processing speed, attention (at trend levels), and motor speed.
Conclusions: Older HIV+ adults appear to be particularly sensitive to the deleterious neurocognitive effects of cocaine use. Given the overlapping neurophysiologic substrate underlying these conditions, this finding is theoretically consistent with our current understanding of the effects of HIV and cocaine use on the aging brain and provides possible avenues for treatment and intervention.
Correspondence: *Stella Panos, Room 234B, UCLA/ West Los Angeles, 11301 Wilshire Blvd., Los Angeles, CA 90073. E-mail: StellaPanos740@msn.com*

D. PATTON, S.P. WOODS, D. FRANKLIN, R.K. HEATON, A. COLLIER, C. MARRA, D. CLIFFORD, B. GELMAN, J. MCARTHUR, S. MORGELLO, D. SIMPSON, A. MCCUTCHAN & I. GRANT. Relationship of Medication Management Test-Revised (MMT-R) Performance to Neuropsychological Functioning and Antiretroviral Adherence in Adults with HIV.
Objective: Examine the relationship of MMT-R performance to neuropsychological (NP) functioning and medication adherence in adults with HIV, given increasing demands for performance-based tests of everyday functioning.
Participants and Methods: 448 HIV-infected participants (mean age = 44.7) in the CHARTER study currently on antiretroviral therapy (ART) were included. They were mostly male (81%), Caucasian (45%) or African-American (42%), and high school educated (mean = 12.9). Approximately 75% had historical AIDS diagnoses, but rates of severe current immuno-suppression were low (CD4<200 = 12%). Participants completed the MMT-R, which measures ability to accurately dispense medications according to a fictitious prescription regimen and answer questions about mock medications. The MMT-R was part of a broader neuromedical, psychiatric, and NP research evaluation. Self-reported adherence levels 95% on the ACTG Adherence Questionnaire were classified as "adherent."
Results: MMT-R performance was significantly related to age and education, with younger, more-educated performing better. MMT-R scores were not significantly related to AIDS status, biological markers of disease severity, self-reported adherence, or number of pills prescribed. MMT-R scores also were not significantly related to depression, alcohol, or drug use. MMT-R scores were significantly related to global NP functioning, working memory, episodic memory, verbal fluency, executive functions, and information processing speed. Regression analyses showed MMT-R was significantly (R^2=.27,p<.001) predicted by (descending order of part correlations): education, working memory, learning, and age.
Conclusions: The MMT-R is a performance-based measure of medication management capacity that appears heavily influenced by education and working memory. Self-reported adherence was not predicted by impaired medication management capacity in this large sample.
Correspondence: *Doyle Patton, Ph.D., Children's Diagnostic & Treatment Center, 1401 South Federal highway, Fort Lauderdale, FL 33316. E-mail: d1patton@browardhealth.org*

S. WOODS, E. WEBER, B.M. WEISZ & I. GRANT. Prospective Memory Deficits Are Associated with Unemployment in Persons Living With HIV Infection.
Objective: Unemployment rates are high among individuals infected with HIV, particularly among persons with advanced disease, psychiatric comorbidities, and HIV-associated neurocognitive disorders. HIV infection is also associated with mild-to-moderate deficits in prospective memory (i.e., "remembering to remember"), which are independently predictive of poorer everyday functioning outcomes. The present study extends this research by evaluating the hypothesis that HIV-associated deficits in prospective memory confer an increased risk of unemployment (e.g., forgetting application deadlines or interview appointments).
Participants and Methods: Study participants included 108 HIV-infected individuals aged 25-60 years who underwent comprehensive psychiatric, medical, neurocognitive research evaluations, including the Memory for Intentions Screening Test. Participants who reported currently working full-time were classified as "Employed" (n=49) and were demographically matched to a sample of Unemployed (n=59) subjects.
Results: The Unemployed participants demonstrated significantly lower performance on scales of time- and event-based prospective memory (ps<.05), which was characterized by higher rates of omission errors (p<.05). There were no between-group differences in other error types (e.g., commission), the ongoing task, or the post-test recognition trial (ps>.10). Importantly, prospective memory impairment was an independent predictor of Unemployment in a series of logistic regression models that included measures of retrospective memory and executive functions, mood disturbance, and HIV disease severity (e.g., AIDS diagnosis).
Conclusions: These findings suggest that prospective memory impairment may be a risk factor for unemployment in persons living with HIV and therefore might be of value in developing vocational rehabilitation plans.
Correspondence: *Steven Paul Woods, Psy.D., Department of Psychiatry (8231), UC San Diego, HIV Neurobehavioral Research Center, 220 Dickinson St., Ste. B, San Diego, CA 92103. E-mail: spwoods@ucsd.edu*

C. POSADA, D.J. MOORE, B. GOUAUX, S.L. LETENDRE, P.K. RIGGS, R. DEUTSCH, H. ATKINSON & I. GRANT. Emotional Stroop Performance Among HIV-Infected Individuals with Bipolar Disorder.
Objective: The Emotional Stroop Task (EST) has been increasingly used to assess the ability to inhibit emotionally laden stimuli. It has been reported that both bipolar patients and HIV-infected individuals show longer reaction times for emotionally laden words than for neutral words. This study aims to examine EST performance in a group of HIV-infected individuals with bipolar disorder (HIV+/BD+), as compared to HIV-infected individuals without bipolar disorder (HIV+/BD-).
Participants and Methods: HIV+/BD+ (n=29) and HIV+/BD- (n=29) were administered the EST. The EST includes both traditional Stroop conditions and emotional Stroop conditions. Groups were comparable on most demographic, HIV disease, and current substance use characteristics; however, the HIV+/BD- group was significantly older. We conducted group comparisons for the time to complete the color-word interference for each of the conditions (depressed, happy, and neutral). We also split the whole cohort by their current mood state (euthymic, depressed, manic) and compared them on the same variables.
Results: Groups were not significantly different on the traditional Stroop task; however, HIV+/BD+ individuals had significantly longer time to complete than HIV+/BD-individuals on the neutral condition of the EST (p=0.02). Similarly, HIV+/BD+ individuals were slower than HIV+/BD- individuals on the depressed (p=0.09) and happy (p=0.10) conditions of the EST. When examining mood state within the entire cohort, group differences were found on the happy and neutral conditions (both ps=0.02), and for the depressed condition (p=0.09). In all three conditions, individuals in a manic state performed the slowest while euthymic individuals performed the fastest.
Conclusions: Results indicate that HIV+/BD+ individuals experienced greater difficulties inhibiting emotionally laden stimuli than HIV+/BD- individuals, as evidenced by longer times to complete on both the neutral and emotionally-laden conditions of the EST.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Carolina Posada, SDSU/UCSD Joint Doctoral Program in Clinical Psychology, 220 Dickinson Street, Suite B, San Diego, CA 92103. E-mail: cposada@ucsd.edu*

A. RAMEZANI, T. MARCOTTE, A. THAMES, L. HINES, B. BECKER, S. PANOS, E. SINGER, C. HINKIN & S. CASTELLON. Neuropsychological Impairment and Cocaine Use Reduce Simulated Driving Performance in HIV+ Patients.

Objective: To examine whether HIV+ individuals with cocaine use and neuropsychological (NP) impairment are at increased risk for impaired driving.

Participants and Methods: Fifty-one HIV+ adults completed a neuropsychological (NP) evaluation, PC-based Driving Simulation tasks, and self-report driving questionnaire. Participants were divided into Cocaine (Total n= 32; Current use n=14 and Past use n=18) and Non-Cocaine (n=19) groups based upon urine toxicology screening and the SCID. Groups did not differ in age, CD4 count, viral load, or alcohol, stimulant, and cannabis use. Based upon cocaine use and global impairment score from NP testing, participants were further divided into risk groups of No-Risk (no cocaine use or NP impairment, n=14); Single-Risk (either cocaine use or NP impairment, n=26); and Two-Risk (cocaine use and NP impairment, n=11).

Results: Cocaine users took less efficient driving routes, deviated off road more frequently, and had greater number of driving errors compared to non-cocaine users ($p<.05$). No group difference in self-reported driving ability was found. Cocaine users performed worse on NP measures ($p<.05$). J-T test suggested that as the number of risks increase driving performance decrease ($p<.05$). The Single-Risk group drove slower, was less efficient, and had more off-road deviations relative to No-Risk group, and had less driving errors than the Two-Risk group. The Two-Risk group performed worse on all driving measures when compared to participants with no risk factors.

Conclusions: Concomitant cocaine use and HIV-related neuropsychological impairment pose significant risk for poor driving performance.

Correspondence: *Amir Ramezani, Ph.D., UCLA, 760 westwood plaza c8-746, Los Angeles, CA 90095. E-mail: aramezani@mednet.ucla.edu*

E. WEBER, S.P. WOODS & I. GRANT. Exploring the Age-Prospective Memory Paradox in HIV+ Adults: Evidence in Time- and Event-Based Semi-Naturalistic Tasks.

Objective: According to the age-prospective memory (ProM) paradox, healthy older adults perform comparably to younger adults on semi-naturalistic ProM tasks despite demonstrating significant ProM deficits in the laboratory. The present study examined the nature and predictors of this discrepancy in older adults with HIV, who represent a growing epidemic due to success of antiretroviral treatment and are at increased risk for HIV-associated neurocognitive impairment.

Participants and Methods: Participants included 48 older (50+ years) and 42 younger (<40 years) HIV-infected individuals, who completed the Memory for Intentions Screening Test (MIST) in addition to time-based (i.e., 24-hour telephone call) and event-based (i.e., hidden object) semi-naturalistic tasks.

Results: Interactions emerged between tasks and age group ($ps<0.05$), such that the older HIV+ individuals demonstrated significantly lower MIST summary scores than younger HIV+ participants ($d=0.58$; $p<0.01$), but there were no between-group differences on either semi-naturalistic task (24-hour call: $d=0.04$; hidden object: $d=0.02$; $ps>0.10$). These effects were not better explained by other demographic, psychiatric, or disease variables. Furthermore, self-reported compensatory ProM strategy use predicted time-based, but not event-based, semi-naturalistic task performance within the older HIV+ adults, whereby greater strategy use was associated with 24-hour call success but not with success on the hidden object task.

Conclusions: These findings suggest that although older HIV-infected adults exhibit moderate ProM deficits on laboratory measures versus their younger counterparts, these impairments are not evident on ecologically relevant ProM activities, perhaps due to effective utilization of ProM-based compensatory strategies during more cognitively demanding tasks.

Correspondence: *Erica Weber, HIV Neurobehavioral Research Center, 220 Dickinson Street, Suite B, San Diego, CA 92103. E-mail: eweber@ucsd.edu*

Medical/Neurological Disorders/Other (Adult)

M. ALOSCO, M.B. SPITZNAGEL, V. POTTER, R. COHEN, N. RAZ, L. SWEET, L. COLBERT, R. JOSEPHSON, D. WAECHTER, J. HUGHES, J. ROSENECK & J. GUNSTAD. Cognitive Impairment Is Independently Associated With Reduced IADLs In Persons With Heart Failure.

Objective: Heart failure (HF) is a disabling disease that often affects instrumental activities of daily living (IADL). Despite high rates of disability in this population, little is known about the effects of cognitive functioning on IADL. The current study examined whether cognitive functioning predicts IADL performance in persons with HF.

Participants and Methods: Persons with HF (N = 126; 68.69±9.49 years; 36% female) completed neuropsychological testing, fitness assessment, and reported IADL function as part of a larger protocol. Neuropsychological tests included the MMSE and Trail Making Test A and B. The 2-minute step test estimated fitness. IADL function was based on self report on the Lawton-Brody Instrumental Activities of Daily Living Scale. To promote comparison to past studies, we focused on reported independence in driving, medication management, and finances.

Results: A separate hierarchical regression model was generated for each IADL. Participant age, depression (as assessed by the Beck Depression Inventory), and fitness were entered in the first block with MMSE and Trail Making Tests entered in the second block. Cognitive function showed incremental predictive validity over demographic variables for driving (R2 change = .07, p = .03) and medication management (R2 change = .14, $p<.001$). In each case, poorer neuropsychological test performance was associated with poorer IADL function.

Conclusions: In persons with HF, cognitive performance is an independent predictor of independence in driving and medication management. Strategies to maintain or improve cognitive functioning in HF may help patients remain functionally independent in some aspects of their daily living.

Correspondence: *Michael Alosco, B.A., Kent State University, 4710 Waterford Circle, Stow, OH 44224. E-mail: malosco@kent.edu*

D.M. DINISHAK & G. RICHARDSON. Neuropsychological Deficits of Adult Polyglucosan Body Disease Over Time: A Case Study.

Objective: The purpose of this study is examine the neuropsychological function of a 57 year-old female diagnosed with Adult polyglucosan body disease (APBD), a rare neurological condition characterized by progressive upper and lower motor neuron involvement, early urinary dysfunction, and cognitive impairment. This case is unique because the patient had premorbid neuropsychological testing done 7 years before she was diagnosed with APBD and again during the early stages of the disease. We hope to add to the body of literature examining the cognitive effects over time of this rare neurological disease.

Participants and Methods: Quantitative serial neuropsychological testing and MRI in one female with APBD and review of the literature.

Results: A comparison between neuropsychological function at baseline (in 2002) and at the time of diagnosis of APBD (in 2009) demonstrates significant change in cognitive function. Specifically, the patient demonstrated impairments in immediate memory, executive function, processing speed, and motor functions; in addition, she demonstrated normal, but reduced, ability in visuospatial construction, naming, and attention compared to baseline.

Conclusions: The results of this study add to the limited body of data regarding the neuropsychological effects of APBD. This case study is unique because of the availability of premorbid test data that add to the validity of results. The patient in this study is being followed by the authors and additional testing is planned in the coming year to track changes in function.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *David M. Dinishak, MA,MS, Palo Alto University; Kaiser Permanente, Palo Alto VA, 1791 Arastradero, Palo Alto, CA 94304. E-mail: dinishak@gmail.com*

S.L. GARCIA, M. SPITZNAGEL, V. POTTER, R. COHEN, N. RAZ, L. SWEET, L. COLBERT, R. JOSEPHSON, D. WAECHTER, J. HUGHES, J. ROSNECK & J. GUNSTAD. Depression is Independently Associated with Cognitive Dysfunction in Older Adults with Heart Failure.

Objective: Heart failure (HF) is becoming increasingly prevalent and is associated with numerous adverse outcomes. Both cognitive dysfunction and depression are common in persons with HF, though the linking mechanism(s) is poorly understood. We examined the relationship among HF, depression, and cognitive dysfunction in a sample of older adults with HF to better clarify their association and expected depression to be more closely associated with frontal-mediated tasks.

Participants and Methods: Older adults with HF (N=116; 68.53±9.30 years; 36.2% female) underwent neuropsychological assessment, including the CVLT-2, Complex Figure Test, Trail Making Test A and B, Digit Symbol Coding, Grooved Pegboard, Frontal Assessment Battery, Boston Naming Test, and Animal Naming. The Beck Depression Inventory (BDI) quantified depressive symptoms.

Results: Partial correlations between the BDI and neuropsychological tests were computed adjusting for sex, history of bypass surgery, and cardiac fitness (as assessed by 2-minute step test). Results showed multiple significant correlations between the BDI and cognitive test performance, including Trail Making Test B (r=0.29, p=.002), Digit Symbol Coding (r=0.23, p=.02) and Boston Naming Test (r=.20, p=.04). Trends were also noted for Trail Making Test A (r=.19, p=.06) and Grooved Pegboard (r=.17,p=.08).

Conclusions: Results suggest a relationship between depression and cognitive dysfunction in persons with HF. Several possible explanations for these findings exist, including that structural brain changes associated with HF are a common pathway to both cognitive impairment and depression. Prospective studies employing neuroimaging are needed to clarify this possibility.

Correspondence: *Sarah L. Garcia, B.A., Clinical Psychology; Kent State University, 1641 Franklin #134, Kent, OH 44240. E-mail: SGarcia6@kent.edu*

M. GONZALES, T. TAKASHI, D.E. EAGAN, H. TANAKA, K. GOUDARZI & A.P. HALEY. Increased Atherogenic Lipoproteins at Midlife Relate to Altered Functional Activation.

Objective: High cholesterol is a strong predictor of cardiovascular disease, yet its relation to dementia remains unclear. Accurate assessment has been complicated by the decades separating the onsets of high cholesterol and dementia, particularly as dementia itself is associated with cholesterol modifications. The aim of the current study was to determine how serum cholesterol levels at midlife affect functional brain activation during cognition.

Participants and Methods: Thirty-nine adults aged 40 to 60 years performed a 2-back verbal working memory task during functional magnetic resonance imaging (fMRI). Fasting blood concentrations of HDL-cholesterol and non-HDL-cholesterol were determined using standard enzymatic techniques. The relation between the two cholesterol indices and task-related brain activation in a priori regions of interest was modeled using hierarchical linear regression corrected for multiple-comparisons (two-tailed $p < .02$).

Results: Non-HDL-cholesterol was significantly related to reduced working memory-related activation in the left inferior parietal lobule (beta=-3.055, p=0.004), independent of age, sex, and systolic blood pressure ($F(4,35)=3.476$, p=0.017). HDL-cholesterol had no independent associations with task-related activation.

Conclusions: Elevations in non-HDL-cholesterol were associated with decreased functional brain activation during a working-memory task in middle-aged adults. Non-HDL-cholesterol is a surrogate marker for apolipoprotein B, the major atherogenic lipoprotein, implicating endothelial dysfunction and intima-thickening of the cerebral arteries as potential mechanisms. Considering the modifiable nature of serum lipids and the necessity for find preventive strategies for dementia, additional investigations at midlife are warranted.

Correspondence: *Mitzi Gonzales, Psychology, University of Texas at Austin, 1 University Station, A8000, Austin, TX 78712. E-mail: mitzi.m.gonzales@gmail.com*

C. GRAVER, K. SCHWARTZ GOEL & L. BIELIAUSKAS. Undiagnosed Delirium in a Hospital Setting.

Objective: Delirium is common in medical settings, ranging from 25-60%, and is associated with increased morbidity, making an early and accurate diagnosis essential. Nevertheless, studies show that as many as 50% of patients with delirium are undiagnosed by physicians. We hypothesized that delirium would routinely go undiagnosed in our hospital setting, but that the detection rate could be improved with the use of a standardized measure, the Memorial Delirium Assessment Scale (MDAS).

Participants and Methods: Participants were 108 consecutive admissions to the Extended Care Clinic at the Ann Arbor VAMC with a mean age of 75 years. Medical records were reviewed for a diagnosis or symptoms of delirium documented by a healthcare provider. To determine the rate of undiagnosed delirium, these reports were then compared to lab results and scores on the MDAS, which was administered by the Neuropsychology service to all participants during their hospital stay.

Results: Thirty-eight participants met criteria for delirium on the MDAS. Only 21% of those had a diagnosis or symptoms of delirium notated by healthcare providers in the medical record, despite 87% having abnormal lab values suspicious for delirium. Moreover, MDAS scores were moderately correlated (r = -0.42) with overall cognitive functioning as measured by the MMSE.

Conclusions: This study demonstrated that delirium is frequently undiagnosed (79%) when assessment methods are not standardized even when other evidence supports the diagnosis. The routine use of a brief, standardized instrument like the MDAS greatly improved detection rates, which has important implications given the relationship demonstrated between delirium and cognitive dysfunction.

Correspondence: *Christopher Graver, Ph.D., Madigan Army Medical Center, Neuropsychology, MCHJ-CP, 9040 Jackson Ave., Tacoma, WA 98431. E-mail: chris.graver@amedd.army.mil*

M.C. GROSCH & M.T. BARISA. Herpes Simplex Encephalitis: A Neuropsychological Case Study.

Objective: Herpes Simplex Encephalitis (HSE) is the most common cause of viral encephalitis and one of the most severe CNS infections. It is thought to be caused by direct neuronal transmission of the herpes simplex virus type 1 to the brain and occurs in approximately 1 in 250,000-500,000 individuals per year. In most cases the encephalitis affects the temporal and frontal lobes of the brain. This poster presents an overview of HSE and neuropsychological correlates through a case involving a woman with a history of the disease.

Participants and Methods: The case presentation includes basic demographic information and results from the medical diagnostic work-up and neuropsychological evaluation of a 30 year old, Caucasian female.

Results: The patient was diagnosed with HSE approximately 8 years before this evaluation. At onset, she developed flu-like symptoms which quickly progressed into slurred speech and dizziness. Her course was complicated by seizures and migraine headaches. At the time of evaluation, she reported difficulties with short term memory, learning new information, and word-finding. Neuropsychological findings demonstrate deficits associated with damage in the left temporal and frontal lobes. The patient demonstrated diffuse cognitive declines along with prominent impairments in acquisition and retention of a word list, confrontation naming, functional vocabulary, and verbal fluency.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Conclusions: The case study is significant due to the rare occurrence of HSE and the paucity of literature on the cognitive effects of this disease despite the significant neuropsychological deficits.
Correspondence: *Maria C. Grosch, B.S., University of Texas Southwestern Medical Center, 3230 Maple Ave, #126, Dallas, TX 75201. E-mail: maria.grosch@utsouthwestern.edu*

A.E. GROSSMAN, M.A. WILLIAMS & P.J. DONOVICK. Treatment Compliance in Persons With End-Stage Renal Disease.
Objective: Patients receiving hemodialysis are required to comply with a medical regimen which is complex and multidimensional. Due to the risks associated with non-compliance it is crucial to determine factors that effect compliance in patients. We sought to investigate the relationship between compliance and various measures of neurocognitive functioning, health beliefs, education, social support and psychological well-being.
Participants and Methods: 31 hemodialysis patients completed the SCS, Cognitive failures Questionnaire, Hemodialysis Beliefs and Behaviors Survey, MSPSS, and BSI. Neuropsychological testing included the KBIT, CVLT, Stroop and Gambling Task. Retrospective data of regimen compliance was collected. The high compliant group was composed of individuals compliant on at least 4 of the 5 compliance domains and the low compliant group contained individuals compliant with 3 or less domains.
Results: Participants were most compliant with attending hemodialysis sessions and least compliant with fluid restriction. Most individuals were compliant with diet restriction and medication dosage; these two measures were significantly correlated. Significant differences were found between the groups in number of months since first hemodialysis session and CVLT scores. Both groups performed at an impaired level on the Stroop and the Gambling task and reported high levels of distress on the BSI.
Conclusions: These results suggest that compliance with hemodialysis in ESRD patients is influenced by cognitive and psychosocial factors.
Correspondence: *Amy E. Grossman, B.S., Binghamton University, Psychology Department Binghamton University, P.O. Box 6000, Binghamton, NY 13902. E-mail: amy.grossman11@gmail.com*

J. JONES, J. DIETZ, L. KIRSCH-DARROW, L. JORDAN, M. OKUN & D. BOWERS. Self Perceived Changes in Apathy and Executive Function: Parkinson Disease and Dystonia.
Objective: Recent longitudinal studies suggest that apathy, a prominent neuropsychiatric feature of Parkinson's disease (PD), increases over time in parallel with motor decline. The purpose of the present study was twofold: a) to assess PD patients' perception of changes in apathy and executive function, relative to disease onset; and b) to compare responses to another movement disorder group, dystonia. We hypothesized that PD patients would endorse worsening of apathy and executive function relative to disease onset due to disruption of frontal circuitry, whereas dystonia patients would not.
Participants and Methods: A convenience sample of 151 idiopathic PD patients and 24 dystonia patients completed the Frontal Systems of Behavior (FrSBe)questionnaire, the Beck Depression inventory (BDI) and disease specific measures during a routine clinic visit to the UF Movement Disorders Center. The FrSBe is a self-report measure assessing current and before illness status along three domains- apathy, disinhibition, and executive function.
Results: Data were analyzed using repeated measures ANOVA's and multiple regression analyses. The PD group endorsed significant worsening across all FrSBe scales. Post hoc analyses revealed the greatest change for apathy, then executive dysfunction, followed by disinhibition. Regression analyses indicated that both apathy and executive subscales were significantly predicted disease severity (UPDRS motor), the BDI, and age (only for executive). In contrast, the Dystonia group only endorsed significant increase in apathy sypmtoms.
Conclusions: Consistent with longitudinal studies, we found that PD patients endorsed worsening of apathy symptoms that surpassed changes in executive or disinhibition scales. A similar pattern was observed in dystonia patients, who endorsed worsening apathy but no changes in other areas. In PD, these changes likely reflect ongoing dopaminergic disruption of frontal-subcortical systems.
Correspondence: *Jacob Jones, BA, CHP, University of Florida, 3901 SW 20th ave apt 206, Gainesville, FL 32607. E-mail: jacob.jones126@ufl.edu*

E. KOZORA, J. PELZMAN, L. ZHANG, D. ERKAN, M. LOCKSHIN, A. ULUG, G. RAMON, C. FILLEY & S. WEST. Comparing Cognitive Function in Non-neuropsychiatric SLE Patients from Denver, Colorado and New York, New York.
Objective: This study aimed to compare cognitive function in SLE patients without prior or overt neuropsychiatric disorders (nonNPSLE) at National Jewish Health in Denver, CO and the Hospital for Special Surgery in New York, NY.
Participants and Methods: Subjects included 84 participants (94% female) from Denver (mean age = 36.7±-8.7, mean education = 15.6±2.5 years, 63.1% Caucasian, mean disease duration of 90.2±78.7 months and mean SLEDAI = 4.2±6.3) and 20 female participants in New York (mean age = 36.5±11.7, mean education = 15.6±2.4 years, 40% Caucasian, mean disease duration of SLE = 154.8±122.9 months and mean SLEDAI = 3.7±4.6). There was no group difference between the demographics and most health factors. New York participants had longer disease duration compared to Denver (p=0.005). Participants at both sites were screened similarly and evaluated with same battery of tests.
Results: 23.8% of the Denver subjects and 60% of the New York subjects were cognitively impaired. The mean number of impaired tests was higher in New York (4.4 ±2.7) compared to Denver (2.6±2.3; p=0.005). No correlation between length of disease and cognitive impairment was found. New York participants were impaired in semantic fluency, visuomotor speed and motor sequencing compared to Denver. SLE subjects at both sites had over 25% impairment on measures of verbal memory, verbal fluency, information processing, and visual learning and memory.
Conclusions: NonNPSLE patients in New York, NY, with significantly higher disease duration, showed greater cognitive impairment compared to patients in Denver, CO. Analysis of biomedical and psychosocial factors may increase understanding of these differences.
Correspondence: *Elizabeth Kozora, Ph.D., Medicine, National Jewish Health, 1400 Jackson Street, Denver, CO 80206. E-mail: Kozorae@njheatlh.org*

M.A. LANGILL, G.L. IVERSON, S. APPEL-CRESSWELL & A.J. STOESSL. Feasibility of Computerized Cognitive Testing in Parkinson's Disease.
Objective: The purpose of the study was to examine the feasibility of computerized cognitive testing in Parkinson's disease (PD).
Participants and Methods: Participants were 55 outpatients with clinically probable or definite PD. The sample was 76% male, their average age was 64.3 (SD=8.9) years, and their average education was 15.5 (SD=3.2) years. They had been diagnosed with PD 8.6 years prior (SD=5.9). Mean Unified Parkinson's Disease Rating Scale (UPDRS) motor scores (part III; on-medication) and Modified Hoehn and Yahr Scale (MHYS) scores were 19.4 (SD=10.8) and 2.3 (SD=0.5), respectively. Participants were administered the CNS Vital Signs (CNS-VS) computerized neurocognitive battery, Montreal Cognitive Assessment (MoCA), finger tapping test, and self-report measures. A demographically-matched control sample was obtained from the CNS-VS normative sample.
Results: Approximately one third (35%, n=19) of the sample spoiled one or more tests on CNS-VS due to not understanding what to do, motor symptoms, or a sensory problem. Those with spoiled tests were older (Cohen's d=1.1) and had the disease for longer (d=0.8). They also had

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

greater cognitive impairment on the MoCA (d=1.8), slower right handed finger tapping speed (d=.7), and more advanced disease as measured by the UPDRS (d=1.1) and MHYS (d=0.8), and had greater disease duration. The remaining 36 participants, compared to matched controls, performed more poorly on the Psychomotor, Complex Attention, and Cognitive Flexibility Domains (Cohen's d = .69, .67, .57).
Conclusions: PD patients with spoiled tests on computerized testing tend to be older, cognitively impaired, and have greater disease severity. For PD patients who were able to complete the computerized testing without spoiling any tests, this is an efficient methodology for cognitive screening.
Correspondence: *Michelle A. Langill, Ph.D., Psychiatry, University of British Columbia, 109-2485 W.Broadway, Vancouver, BC V6K 2E8, Canada. E-mail: malangill@gmail.com*

S. LEININGER, A. FREELAND, J. WARD, J. TANNER, P. NGUYEN, S. MITCHELL, D. BOWERS, D. LIBON & C. PRICE. Rey-Osterrieth Complex Figure (ROCF) Flowchart Units and Associations to Memory Performance in Parkinson's Disease.
Objective: Although the ROCF is a common neuropsychological instrument, examiner flowcharts and trial drawing times of speed have only generally been used as task approach measures. The current study prospectively examined the clinical utility of time to completion and unit segments (derived from examiner flowcharts) for understanding memory in idiopathic Parkinson's disease (PD) patients. PD patient's time to completion at copy and number of copy segments identified from flowcharts were predicted to correlate with worse copy and memory scores.
Participants and Methods: Thirty-five control and 48 PD patients enrolled in a larger study examining cognition in PD, completed the ROCF copy, immediate, and delay conditions. Three trained examiners recorded time to completion and detailed flowcharts. ROCF scores, using Denman scoring criteria, were compared to time to completion and flowchart units. The Unified Parkinson's Disease Rating Scale (UPDRS)-III (Motor Exam) was compared to time to completion.
Results: PD and controls matched on demographics. PD displayed slower copy times than controls, with PD time correlating with the UPDRS-III (r=.40). Slower copy times were generally related to worse memory performance for both groups. There were no group differences in flowchart units and trial scores. Controlling for copy time, control participant copy units were associated with improved scores for copy (r=.45), immediate (r=.41), and delay (r=.42). For PD, copy units were associated with worse scores on copy (r=-.21) and immediate memory (r=-.20).
Conclusions: Findings support the concept of processing speed and motor function for PD, but also suggest unique use of ROCF flow units as a predictor of memory performance.
NINDS K23NS060660(CP)
Correspondence: *Shelley Leininger, M.A., University of Florida, 3700 Windmeadows Blvd. Apt. #72, Gainesville, FL 32608. E-mail: shelley.leininger@hotmail.com*

F. WOON, C.J. BECK & R.O. HOPKINS. Long-term Psychiatric Sequelae in Survivors of Critical Illness.
Objective: Critically ill patients may develop long-term psychiatric sequelae. This prospective study formally assessed the prevalence of depression, anxiety, posttraumatic stress disorder (PTSD), and general distress in critically ill patients at 6-month post-hospital discharge.
Participants and Methods: Patients completed the questionnaires, including the Beck Depression Inventory-II, Beck Anxiety Inventory, Outcome Questionnaire-45.2 (OQ-45.2), and Posttraumatic Diagnostic Scale, 6-month post-hospital discharge. Study inclusion criteria were mechanical ventilation >48 hours and patient age >18 years. Study exclusion criteria were disease states that are irreversible, central nervous system injury, and preexisting cognitive impairment. Fifty-three patients (25 males and 28 females) with a mean age of 53±16 years and mean education of 14±2.1 years completed the questionnaires at 6-month follow-up.
Results: Ten (19%) patients had moderate to severe symptoms of depression and 16 (31%) had moderate to severe symptoms of anxiety. Thirty-seven (70%) of our 53 patients identified "life-threatening illness" (i.e., critical illness) as their significant primary traumatic event, and 9 (17%) of these patients met full PTSD criteria. Twenty five (47%) patients met partial-PTSD criteria. On the OQ-45.2, 18 (34%) had elevated scores on Symptom Distress, 6 (11%) on Interpersonal Relationship difficulties, 11 (21%) on Social Role Performance difficulties, and 11 (21%) on Total Score, indicating general psychological distress.
Conclusions: Critically ill patients had significant depression, anxiety, PTSD, and general psychological distress at 6-month follow-up. Global and specific psychiatric sequelae (depression, anxiety and PTSD) are common in survivors of critical illness. Psychiatric dysfunction may negatively impact quality of life and return to work in these patients.
Correspondence: *Fu Lye Woon, Psychology, Brigham Young University, 3474 Cummings Dr, Ann Arbor, MI 48105. E-mail: fliszt74@gmail.com*

L.A. MILLER, M. SPITZNAGEL, V. POTTER, R. COHEN, N. RAZ, L. SWEET, L. COLBERT, R. JOSEPHSON, D. WAECHTER, J. HUGHES, J. ROSNECK & J. GUNSTAD. Associations Between Cardiovascular Fitness, Cerebral Perfusion, and Cognitive Outcomes in Heart Failure.
Objective: Heart failure (HF) is a risk factor for decline in multiple cognitive domains. The mechanisms linking HF to cognitive function are unclear, though both cardiovascular fitness and cerebral perfusion are likely contributors. We examined the associations between cognitive performance, cardiovascular fitness and cerebral perfusion.
Participants and Methods: Older adults with HF (N=105, mean age=68.9 ± 9.7 years; 66% male) completed a comprehensive neuropsychological battery, and underwent a test of fitness (2-minute step test) and transcranial Doppler sonography (TCD). Neuropsychological tests included 3MS, CFT, TMT, Digit Symbol, LNS, SCWT, FAB, Animal Naming, BNT, Grooved Pegboard, FAB, and ARCPT. TCD measures included mean flow velocity and pulsatility index (PI) of the ACA, MCA, and PCA.
Results: Partial correlations adjusting for age indicated that fitness was associated with performance on 3MS (r=.29, p=.003) and tasks of memory (e.g. CFT-Delay, r=.24, p=.02), attention/executive function/psychomotor speed (e.g. TMT-B, r=-.33, p=.001; Digit Symbol, r=.42, p<.001), and language (e.g. BNT, r=.38, p<.001). After controlling for fitness level, TCD indices were correlated with memory (e.g. CFT-Delay and ACA-PI, r=-.21, p=.02) and attention/executive function/psychomotor speed (e.g. TMT-B and MCA-velocity, r=-.30, p<.01; Digit Symbol and ACA-PI, r=-.32. p<.001). The relationship between fitness and cognitive performance was further examined for moderating effects of cerebral perfusion, though only one emerged (Digit Symbol and ACA-PI, ≥=-.19, p =.04).
Conclusions: Both cardiovascular fitness and cerebral perfusion indices were associated with multiple cognitive outcomes. Overall, cerebral perfusion did not moderate the relationship between cardiovascular fitness and cognitive performance in this sample. This finding indicates the association between HF and cognitive function is more complex than anticipated and different pathophysiological mechanisms may be involved.
Correspondence: *Lindsay A. Miller, Psychology, Kent State University, 238 Kent Hall, Kent, OH 44242. E-mail: lmille92@kent.edu*

C. MYERSON, M. LANCASTER, S. LACY, M. WEINER, M. LACY & D. FRIM. Decompression Surgery and Cognitive Functioning in Adults with Chiari Malformation.
Objective: Type 1 Chiari malformation (CM1) is a congenital disease characterized by downward displacement of the cerebellum and brainstem resulting in abnormal cerebrospinal fluid dynamics. Adults with CM1 report a number of physical and sensory disturbances. We previously presented data also indicating a general decline in intellectual functioning and inefficiencies in verbal memory, semantic fluency, attention, and bilateral manual dexterity due to the disease process (Assuras et al., 2009). Treatment of CM1 often involves decompression surgery. At present there are no studies examining the cognitive impact of such an intervention.
Participants and Methods: Nine pre-surgical CM1 patients, eight post-surgical CM1 patients (CM1 mean age = 29.9, SD = 9.4), and twelve

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

control participants (mean age = 40.4, SD = 12.2) underwent detailed neuropsychological testing. Measures included tasks of memory, language, attention, processing speed, visuospatial skills, and executive function. Comparison of neurocognitive functioning between groups was conducted using ANCOVA, with age as a covariate.
Results: At baseline, the pre-surgical CM1 group performed more poorly on tasks of processing speed (Trails A, p = .019), mental flexibility (Trails B, p = .043) and visual memory (BVMT, p = .031). Investigation of group means revealed additional areas of inefficiency for the pre-surgical group. Importantly, post-surgical CM1 patients demonstrated no indication of cognitive decline.
Conclusions: Pre-surgical CM1 patients were found to perform more poorly than controls on a number of neurocognitive tasks. Preliminary data suggests no adverse consequences following decompression surgery. We continue to collect data and hope to further delineate the cognitive profile associated with Chiari Malformation and treatments.
Correspondence: *Connie Myerson, M.S., University of Chicago, 5841 S. Maryland Ave., Chicago, IL 60637. E-mail: cmyerson@yoda.bsd.uchicago.edu*

D.G. NEMETH, L.T. WHITTINGTON, T.W. OLIVIER, J.R. HAMILTON, A.P. STEGER & A. GREMILLION. Frog Man: A Unique Case of Eosinophilic Meningitis.
Objective: 1.) To distinguish residual attentional effects of Eosinophilic Meningitis from Attentional Deficit Hyperactivity behaviors. Eosinophilic meningitis is an infection of the brain occurring in association with an increase in the number of eosinophils, a type of white blood cell, in the cerebrospinal fluid. The parasite most commonly causing eosinophilic meningitis is a rat lung worm called angiostrongylus cantonensis. 2.) To procure extended time on the GMAT exam.
Participants and Methods: A once gifted 25 year old Caucasian male developed Eosinophilic Meningitis in March 2006, after ingesting raw tree frog legs. This caper was a part of a college beer party in which peers were dared to exhibit risk taking behaviors. Post meningitis hospitalization and rehabilitation, this student's symptoms included inattention, irritability, impatience, intolerance, reading comprehension problems, and working memory difficulties. He also exhibited disorganization. His primary care physician prescribed Adderall. A comprehensive neuropsychological evaluation including measures of educational achievement, reading, attention, intelligence, neurocognition, memory, affect and personality was administered.
Results: Results of this 2009 assessment revealed major impairments in processing speed, attention, immediate memory, visual spatial construction, language, reading skills, and executive functions. A loss of intellectual functioning from previous gifted status was also noted. Personality structure appeared to be unaffected, yet significant anxiety was apparent.
Conclusions: This student, having been allowed extra time on his GMAT test, was successfully able to complete an MBA and is now in the process of applying to law school. He has now, however, learned to reign in his risk taking behaviors.
Correspondence: *Darlyne G. Nemeth, Ph.D., M.P., A.B.M.P., The Neuropsychology Center of Louisiana, LLC, 4611 Bluebonnet Blvd, Ste. B, Baton Rouge, LA 70809. E-mail: dgnemeth@gmail.com*

D. PAULSON, A. ESHELMAN & M.S. ABOUJOUD. Validation of a three-factor model of cognitive functioning for hepatic encephalopathy and implications for quality of life.
Objective: The primary objective of this study was to validate a 3-factor model of neuropsychological functioning comprised of factors representing global intellectual functioning, psychomotor speed, and learning and memory among patients with end-stage liver disease (ESLD). The second objective was to relate this model to physical and mental health quality of life (QoL).
Participants and Methods: The sample included 246 patients with ESLD who were candidates for liver transplant at a large, mid-western health care center. Measures included the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), the Trail Making Test (TMT), Shipley Institute of Living Scale (SILS), SF-36 version 2, and the Hospital Anxiety and Depression Scale. The global intellectual functioning latent factor was composed of the two SILS indices, RBANS Visuospatial/Constructional and Attention indices. The psychomotor speed latent factor included the two TMT indices. The learning and memory latent variable included the RBANS Immediate Memory and Delayed Memory indices.
Results: Confirmatory factor analysis results indicated that the 3-factor solution model fit the data well (RMSEA=.080, NNFI=.952, CFI=.971). Addition of physical and mental QoL latent factors resulted in a structural model with good fit (RMSEA=.0799, p=.004; NNFI=.927, CFI=.949). Significant directional relationships were found from global functioning to physical QoL and mental health QoL, and from psychomotor speed to mental health QoL.
Conclusions: The proposed factor structure was supported by these data. Global cognitive functioning deficits contributed to physical QoL declines. Mental health QoL, depression and anxiety were adversely affected by global cognitive functioning and psychomotor speed deficits.
Correspondence: *Daniel Paulson, MA, Department of Psychology, Wayne State University, 5057 Woodward Ave, 7th Floor, Detroit, MI 48202. E-mail: paulson@wayne.edu*

C.P. PECK, P.B. HALL, B.A. PYYKKONEN, J.J. WASHBURN & B.J. LEAHY. Differences in Quality of Life Between Individuals with and without Freezing of Gait in Parkinson's Disease.
Objective: Parkinson's disease (PD) is characterized by deficits in physical functioning. Among these functional deficits is freezing of gait (FOG), which reportedly affects approximately 40‰ of all individual diagnosed with PD (Lewis and Barker, 2009). PD is associated with decreased quality of life. The Parkinson's disease Quality of Life (PDQUALIF) questionnaire, a self-report, objective measure, consists of seven domains: Social/Role, Self image/Sexuality, Sleep, Outlook, Physical, Independence, and Urinary functions. Previous research has reviewed the utility of the PDQUALIF within various clinical populations (Sethi, 2010). However, no study has investigated the differences between PD subgroups. Therefore, the current study reviewed the differences in quality of life between individuals with and without freezing of gait in PD utilizing the PDQUALIF.
Participants and Methods: Archival data from 51 individuals diagnosed with Parkinson's disease (PD) and Parkinsonisms who were administered the PDQUALIF as a part of a movement disorders evaluation was reviewed. Participants were divided into two groups: freezing (PD F; N=20) and without freezing (PD W; N=31). PDQUALIF scores were compared utilizing one-way ANOVA.
Results: Results suggested a significant difference between groups on the total score [F (1,49) 7.160, p .01]. Post hoc t tests revealed significant differences between groups on the Social/Role function domain [F (1,49) 6.329, p .015], and moderate differences on the Sleep [F (1,49) 3.383, p .071] and Self Image/Sexuality [F (1,49) 3.036, p .088] domains.
Conclusions: The current findings suggest that freezing of gait impacts an individual's social functioning, and to a lesser degree sleep and self image/sexuality functioning. Implications, limitations and areas for future research are discussed.
Correspondence: *Caleb P. Peck, Psychiatry and Behavioral Sciences, University of Kansas School of Medicine, 143 N. Sedgwick Street, Wichita, KS 67203. E-mail: calebppeck@yahoo.com*

C.P. PECK, P.B. HALL, B.A. PYYKKONEN, J.J. WASHBURN & B.J. LEAHY. The Association Between Neuropsychological Functioning and Freezing of Gait in Parkinson's Disease.
Objective: Freezing of gait (FOG) is a well established physical deficit in Parkinson's disease with prevalence rates reported at 40‰ (Lewis and Barker, 2009). In addition to a range of functional deficits, studies estimate that 19 to 40‰ of individuals with Parkinson's disease experience cognitive disturbance (Troster & Fields, 2008). While previous research demonstrated cognitive differences between freezing and nonfreezing groups, the focus has been domain specific. The current study reviewed the association between neuropsychological functioning and FOG in Parkinson's disease across multiple domains of neuropsychological functioning.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Archival data from 51 individuals diagnosed with Parkinson's disease (PD) and Parkinsonisms was examined. Each was administered a neurological exam and a comprehensive neuropsychological battery. Participants were divided into two groups: FOG (PD□F; N=20) and without FOG (PD□W; N=31). Scores from neuropsychological measures were converted to z-scores and then averaged to create a single composite score for each domain: attention, executive functioning, auditory memory, visual memory, language, visuo-spatial, and working memory functioning. Mood scores were directly compared by t-test.
Results: Contrary to expectations, MANOVA revealed no main effect for groups on cognition. Subsequent, exploratory post-hoc t□test analysis revealed no differences between groups on any individual domain. No difference between groups was evident on measures of mood.
Conclusions: The current findings are contrary to expectations, as previous research documents greater impairment in individuals with FOG across domains of attention, executive functioning and aspects of psychological functioning. Implications, limitations and areas for future research are discussed.
Correspondence: *Caleb P. Peck, Psychiatry and Behavioral Sciences, University of Kansas School of Medicine, 143 N. Sedgwick Street, Wichita, KS 67203. E-mail: calebppeck@yahoo.com*

R. READY, K. FLAVIN, M. CHAUDHRY & J. PAULSEN. Quality of Life and Psychological Well-being in Populations affected by Huntington's Disease: Prodromal, At-risk, and Early Stage HD.
Objective: The quality of life (QOL) and psychological well-being of three HD affected groups (prodromal/gene positive [prHD], at-risk, early stage) were compared to each other and to age-matched controls.
Participants and Methods: Participants (prHD N = 32; at-risk N = 39; early HD N = 28; controls N = 77) rated global QOL and completed the Perceived Stress Scale, Positive and Negative Affect Schedule, and Satisfaction with Life Scale.
Results: The groups were significantly different (ps < .05) on Global QOL, life satisfaction, stress, positive affect (PA), and negative affect (NA). Life satisfaction was higher in prHD than in controls and early HD. Participants at-risk for HD reported higher PA than controls. Early HD reported more NA than prHD and controls. Early HD reported more stress than the other groups. Early HD reported lower QOL than at-risk but this difference was not significant after controlling for income and physical symptoms.
Conclusions: Lower QOL in early HD may be driven by economic limitations and physical symptoms. After accounting for these factors, QOL of persons with early HD was not different than healthy controls, prHD, and persons at-risk, who themselves did not significantly differ. However, early HD was not without psychological liabilities, which included greater NA and stress. Knowing one's gene status is associated with greater life satisfaction; potential directions of this effect will be discussed. Of note, PA was not lesser or greater in HD groups as compared to controls, suggesting that attention to psychological assets in HD is warranted.
Correspondence: *Rebecca Ready, Ph.D., Psychology and Neuroscience, University of Massachusetts, 135 Hicks Way, Tobin Hall, Amherst, MA 01003. E-mail: ready@psych.umass.edu*

B. SPICKARD & J. SUHR. Cogniphobia and Pain Avoidance Behavior as Contributors to Cognitive Performance in Headache.
Objective: Cogniphobia, or fear of headache pain due to cognitive exertion, follows the well-established Fear Avoidance Model of pain. We report on a revised cogniphobia scale and its relation to performance on a measure of noncredible effort (WMT) and a stressful working memory task (PASAT) among individuals with frequent headaches.
Participants and Methods: Young adults with at least 3 headaches/month were administered a cogniphobia scale, several additional measures of pain anxiety and pain catastrophizing, depression and state anxiety measures, and a short cognitive battery including the WMT and the PASAT.
Results: Factor analysis revealed three cogniphobia subscales (dangerousness, worry, and avoidance behavior), which were moderately correlated. All three were strongly related to other measures of pain anxiety/catastrophizing, but only the last two were related to pain avoidance and loss of control over pain, as well as depression, while the first subscale was related to severity of headache, distress about headaches, and anxiety at the start of the session. Only the third scale was related to performance on the WMT and the PASAT. Performance on the WMT was also related to other measures of pain avoidance, while the PASAT was related to depression and to anxiety after testing, but not to the WMT.
Conclusions: Results suggest it is not the anxiety/distress/dangerousness components of cogniphobia that are related to cognitive performance, but negative beliefs about pain and avoidance of potentially pain-inducing behaviors, such as cognitive exertion. Results suggest that pain-related fear can lead to invalid performance during neuropsychological testing in headache.
Correspondence: *Julie Suhr, Psychology, Ohio University, 200 Porter Hall, Athens, OH 45701. E-mail: suhr@ohio.edu*

M. TAKAGI, Y. OKA & E. MORI. Cognitive Deficits in Patiens with Type 1 Diabetes and GAD Autoimmunity.
Objective: Glutamic acid decarboxylase (GAD) is the rate-limiting enzyme to synthesize GABA. Autoantibodies to GAD is involved in neurological disorders including stiff-person syndrome, epilepsy, limbic encephalitis, cerebellar ataxia, as well as Type 1 diabetes. We describe here neuropsychological features in two patients with Type 1 diabetes with GAD autoimmunity in which cognitive impairment was the main neurological manifestation.
Participants and Methods: Patient 1, a 70 y.o., right-handed female, who had Type 1 diabetes, was referred to us for memory decline. Laboratory examination showed antibodies against GAD. Intrathecal synthesis of GAD antibody (IS-GAD ab) was positive (3.16). Brain MRI, FDG-PET, and CBF SPECT were not remarkable. Treatment with intravenous high-dose immunoglobulin did not show clinical benefits. Patient 2 was a 49 y.o., right-handed female with Type 1 diabetes and epilepsy. The patient complained of longstanding forgetfulness since her first seizure attack 7 years ago. Anti-GAD antibody was 152000 U/l, and IS-GAD ab was positive (1.61). MRI and CBF SPECT showed an abnormality in the bilateral medial temporal structures. Neuropsychological evaluations were conducted in these patients.
Results: Inattention, difficulty in repetition, mild anterograde amnesia, working memory deficits, and mild executive dysfunction were noted in Patient 1. A severe anterograde amnesia, working memory deficits, and reduced processing speed were noted in Patient 2.
Conclusions: Cognitive decline as an isolated neurological manifestation may develop in diabetic patients with GAD autoimmunity. Although multiple cognitive domains were involved, impairments of working memory and episodic memory were more or less accentuated.
Correspondence: *Masahito Takagi, Department of[\#12288#\]Behavioral Neurology and Cognitive Neuroscience, Tohoku University Graduate School of Medicine, 2-1, Seiryou-machi Aoba-ku, Sendai-city 980-8575, Japan. E-mail: mastakagi@med.tohoku.ac.jp*

J.C. WERTHEIMER, J. SMITH FITZGERALD, D. YEH, V. TREPATSCHKO & C. WALTON. Understanding Pain in Parkinson's Disease for Individuals with and without Deep Brain Stimulation: The Patient's Perspective.
Objective: Parkinson's disease (PD) patients suffer disabling motor complications; however, they also experience non-motor symptoms affecting daily functioning and quality of life (QoL). Pain in PD is complex and debilitating, with significant implications. Further understanding about patients' experience with pain, clinical presentation of pain, and treatment effects are indicated. The objective is to obtain a clinical profile of pain in PD patients and whether PD patients with Deep Brain Stimulation (DBS) differ from Non-DBS patients in reporting pain symptoms.
Participants and Methods: Participants included 162 PD patients who underwent DBS and 193 PD patients without DBS (Non-DBS). Using survey-based methodology, participants completed the Brief Pain Inventory (BPI), the Short-Form McGill Pain Questionnaire (SF-MPQ), and general questions about pain-related variables.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Results: Eighty-six percent of the DBS group and the Non-DBS group reported experiencing pain [more than minor day-to-day pain], yet significantly fewer participants reported having pain management. The most helpful interventions were medications and exercise. There was no statistically significant difference between the DBS group and Non-DBS group relating to pain severity and interference level from pain. There was no significant difference in the qualitative description of pain experience between the two groups. Overall, sensory pain appeared more prevalent than affective pain for both groups based on the SF-MPQ. Pain variables were significantly correlated with mood and psychosocial variables.
Conclusions: Pain in PD is prevalent and under-assessed and undertreated, and it has a pervasive psychosocial impact on many PD patients. Pain treatment recipients usually perceive treatment as helpful. Implications for understanding pain in PD from a neuropsychological perspective are described.
Correspondence: *Jeffrey C. Wertheimer, Ph.D., Physical Medicine and Rehabilitation, Cedars-Sinai Medical Center, 8700 Beverly Blvd., Suite 7215, Los Angeles, CA 90048. E-mail: Jeffreycwertheimer@yahoo.com*

L.B. ZAHODNE, M. MARSISKE, M.S. OKUN & D. BOWERS. Naturalistic Trajectories of Mood and Motor Symptoms in Parkinson's Disease: A Multivariate Latent Growth Curve Analysis.
Objective: Apathy is a common neuropsychiatric feature of Parkinson's disease (PD), but little is known about its natural progression in medically-managed patients. We aimed to characterize the trajectories of apathy, depression, and motor symptoms in PD over 18 months. Based on previous studies linking apathy to reduced dopamine, we predicted linear worsening of both apathy and motor symptoms. We predicted patchy changes in depressive symptoms based on prior studies suggesting a more complex progression of PD depression.
Participants and Methods: Data on an unselected convenience sample of 186 idiopathic PD patients were obtained from the UF INFORM database. Scores on Apathy Scale, Beck Depression Inventory, and Unified PD Rating Scale at three time-points (baseline, 6-month, 18-month) were analyzed.
Results: Growth models indicated that apathy and motor symptoms increased linearly. A quadratic (U-shaped) slope best described depression changes. Apathy, depression, and motor severity were positively correlated. Higher education was associated with lower apathy, depression, and motor severity. Advanced age was associated with greater apathy and motor severity. Female sex and longer disease duration were associated with attenuated motor worsening. We were unable to identify predictors of apathy or depression slopes due to insufficient interindividual variability. Models controlled for antidepressant use.
Conclusions: Results support the dissociation of apathy and depression in PD. Apathy and motor symptoms show similar linear worsening. Depression follows a non-linear trajectory of improvement and worsening. Like motor progression, apathy progression may be linked to dopaminergic neurodegeneration, while depression may be related to other neuropathological changes (e.g., serotonin).
Correspondence: *Laura B. Zahodne, MS, Clinical & Health Psychology, University of Florida, P.O. Box 100165, Gainesville, FL 32610-0165. E-mail: lzahodne@phhp.ufl.edu*

TBI (Adult)

L. CHANDLER, S. KURTZ & A. CERNICH. Relationship Between Psychiatric Complaints and Report of Postconcussive Symptoms in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) Veterans.
Objective: The presence of mild traumatic brain injury (mTBI) and co-occuring psychiatric disorders in veterans of the OEF/OIF conflicts is a leading concern in the VA system. While much attention has been paid to the relationship between posttraumatic stress disorder (PTSD) and mTBI, the contribution of depression and alcohol abuse to postconcussive complaints has been studied less frequently.
Participants and Methods: Two hundred ninety-six veterans with positive screens for mTBI were also administered screens for PTSD, depression, and alcohol abuse, as well as the Neurobehavioral Symptom Inventory (NSI), a measure of postconcussive symptoms. Hierarchical multiple regressions were used to examine the relative contribution of each screen to report of postconcussive symptoms.
Results: Overall, the three screens accounted for 19% of the variance in NSI scores (r2=.194, p<.001). After controlling for PTSD and alcohol abuse, depression scores accouted for 8.6% (r2 change = 0.86, p<.001). When controlling for depression and alcohol abuse, PTSD scores accounted for 2% of the variance (r2 change = 0.02, p<.001). Both depression and PTSD scores had a significant unique contribution to overall scores on the NSI (≥=.338 and .168, respectively). Alcohol was not uniquely associated with NSI scores.
Conclusions: These results suggest that depression is more strongly associated with postconcussive symptoms beyond that which is often reported in veterans with PTSD symptoms. In particular, depression may have a significant impact on the cognitive symptoms reported by veterans with mTBI. As such, careful attention should be paid to the impact of psychiatric complaints on symptom reporting during follow-up and treatment.
Correspondence: *Lauren Chandler, M.S., Baltimore VAMC, 10 N Greene St, Baltimore, MD 21201. E-mail: laurenachandler@gmail.com*

E. LANNI, N.K. LUC, S.F. SORG, D. SCHIEHSER, M.W. BONDI, D.D. BRAGA, A.J. JAK, S. DEV, D.C. DELIS & L. DELANO-WOOD. Right Hemisphere White Matter Changes Predict Psychiatric Distress in Veterans with Mild to Moderate TBI.
Objective: Although white matter macrostructural alterations have been demonstrated across a variety of neuropsychiatric syndromes, no study has investigated white matter lesion (WML) pathology in the context of mild to moderate TBI (mTBI). We therefore examined the association between regional WML and mood (post-traumatic stress symptomatology, anxiety, and depression]) in a sample of veterans with mTBI.
Participants and Methods: Fifty-five participants were divided into two demographically-comparable groups on the basis of diagnosis (mTBI: n=33; Normal Control [NC]: n=22). Fluid-attenuated inversion recovery (FLAIR) images were examined for deep white matter lesion (DWML) and periventricular WML (PVL) volumes, and mood was evaluated using the following scales: Beck Depression Inventory, Beck Anxiety Inventory, and the Posttraumatic Stress Checklist–Military Version.
Results: Independent samples t-tests demonstrated that, compared to the NCs, the TBI group showed higher WML volume, and this result was driven by PVL (p =.009) but not DWML (p=.20). Adjusting for age and diagnosis, multiple hierarchical regression analyses showed that increased right hemisphere PVL (but not left PVL) significantly predicted higher levels of PTSD, anxiety, and depressive symptomatology (all p-values<.01).
Conclusions: Compared to NCs, mTBI patients showed significantly higher WML, and this association was driven by PVL versus DWML. After adjusting for age and diagnosis, increased right hemisphere PVL were predictive of elevated psychiatric distress across all domains measured. Findings suggest that neurotrauma may preferentially cause PVL pathology, possibly caused by inflammation and/or stretching/distention of the ependymal lining. Moreover, these lesions—particularly those in the right hemisphere—may lead to poor psychological outcome in mTBI.
Correspondence: *Lisa Delano-Wood, Ph.D., Psychiatry, University of California, San Diego, 3350 La Jolla Village Dr, Bldg 13 —151B, San Diego, CA 92161. E-mail: ldelano@ucsd.edu*

J. DEMERY, N. DIXIT, S. MONDELLO, C. CARRIN, L. PAPA, K. WANG, J. STREETER & R. HAYES. Serum Biomarker Levels Predict Memory Impairment Following Traumatic Brain Injury: A Pilot Study.
Objective: Rapid diagnosis and clinical decision-making in acute traumatic brain injury (TBI) are complicated by equivocal neuroradiologi-

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

cal findings, neurological indices (e.g., GCS) impacted by factors unrelated to neurotrauma (e.g., alcohol), and imprecise subjective report. Serum biomarkers (SB) offer an alternative to these diagnostic approaches by providing a rapid, objective, and comparatively inexpensive means of diagnosing brain injury and informing treatment interventions. While some SB have shown good sensitivity to acute TBI, they have yet to demonstrate adequate specificity and subsequently have limited clinical utility. In the present study, we provide pilot data that shows the utility of using levels of an acute TBI SB (Ubiquitin C-terminal hydrolase; UCH-L1) to predict memory impairment one-month following injury.

Participants and Methods: Research participants in an ongoing study sustained either a mild (n=10) or moderate (n=2) TBI as defined by CT scan results and/or GCS score. Participants had blood samples taken for up to 24-hours after injury and these were analyzed using a standard enzyme-linked immunosorbent assay protocol. In order to evaluate outcome, patients completed tests of cognition, mood status and functional independence at one-month post-injury.

Results: Patients were classified as memory impaired/non-impaired based on California Verbal Learning Test - 2nd Edition performance and between group analyses showed patients with memory impairment had significantly higher levels of UCH-L1 following injury than those without memory impairment ($p<.05$).

Conclusions: Preliminary findings in this sample indicate that UCH-L1 may be a good biological predictor of memory functioning following acute TBI.

Correspondence: *Jason Demery, Ph.D., Neuropsychological Sciences, LLC, 10247 SW 98th Terrace, Gainesville, FL 32608. E-mail: jasondemery@gmail.com*

N. MCGRATH, F. LAVECCHIA & W. DINN. Neuropsychological Assessment of Iraq/Afghanistan Veterans with Blast Injury.

Objective: A comprehensive neuropsychological test battery was administered to OIF/OEF veterans who had served in Iraq or Afghanistan. Veterans were referred by a state brain injury agency after having reported postconcussive-type symptoms following at least one IED blast exposure while on active duty.

Participants and Methods: Seventeen male veterans participated in the present study. The mean number of months from most recent concussive injury to assessment was 37.7. Veterans ranged in age from 22 to 36 years.

Results: Intellectual and cognitive test results were generally in the average-low average range but veterans demonstrated a pattern of poor performance on tests of information processing speed and impairment in copy drawing organization and accuracy. A computerized neurocognitive test battery (ImPACT) was also administered, which revealed performance deficits on tests of verbal and visual memory, processing speed, and reaction time. Moreover, veterans showed elevated scores on measures of postconcussive symptoms and posttraumatic stress disorder (PTSD). Sixteen of 17 veterans met diagnostic criteria for PTSD. Only 18% reported a pre-injury history of mental health services. A significant number (41%) were unemployed at the time of testing.

Conclusions: OIF/OEF veterans who had reported postconcussive-type symptoms following blast injuries continued to exhibit neurocognitive deficits and PTSD symptoms over three years after returning from active duty.

Correspondence: *Wayne Dinn, Private Clinical Neuropsychology Practice, 42 Washington Terrace, Whitman, MA 02382. E-mail: dinn@bu.edu*

J. DOUGLAS, S. VASSALLO & E. WHITE. Encoding Facial Expression after Severe Traumatic Brain Injury.

Objective: A person's visual scanpath represents the pattern of eye movements and fixations that are made during visual processing and provides an index of overt attention to stimuli. In this study, our objective was to compare the eye movement patterns displayed by adults with TBI when encoding facial expressions to the patterns displayed by neurologically normal, matched controls.

Participants and Methods: Participants were 7 men with severe TBI (posttraumatic amnesia > 14 days) who were at least 2 years postinjury and 7 controls matched for gender and age. All participants were required to have no less than 6/12 vision (corrected or uncorrected), no visual filed defects and no visual neglect. Stimuli were 18 pictures of facial expressions depicting the six basic emotions and 15 pictures of objects. The Tobii 1750 binocular infrared eye tracker recorded eye movements as participants viewed stimuli displayed on the eye tracker monitor.

Results: As hypothesized the TBI group performed significantly more poorly than the control group on the facial expression task and their mean latency of response was three times greater than that of controls. In addition, the visual scanpaths of the TBI group differed significantly from that of controls. Differences included increased number, duration and dispersion of fixations in the scanpaths of TBI participants. Visual scanpath differences between the groups were limited to the facial stimuli.

Conclusions: These results indicate that in some cases impaired visual scanning contributes to impaired interpretation of facial expression after TBI.

Correspondence: *Jacinta Douglas, PhD, Human Communication Sciences, La Trobe University, Kingsbury Drive, Bundoora, VIC 3086, Australia. E-mail: J.Douglas@latrobe.edu.au*

A. GIAZKOULIDOU, A. DARDAGANI, M.H. KOSMIDIS & I. KAMPELIS. Invalid MMPI-2 Profiles and Neuropsychological Test Performance in Traumatic Brain Injury Patients.

Objective: Given the potential influence of cognitive deficits after traumatic brain injury (TBI) on responding on the Minnesota Multiphasic Personality Inventory-2 (MMPI-2), we explored the relationship between performance on specific neuropsychological tests and validity indices of the MMPI-2.

Participants and Methods: We recruited individuals with a TBI through hospital records. Of 110 called, 40 agreed to participate and met inclusion criteria: (a) no history of neurological or psychiatric disease; (b) time post injury over 6 months; (c) age range from 18 to 55; (d) at least 12 years of education. Average time since injury for our sample was 3.5 (SD=2.2) years. None of our participants was in litigation. Our neuropsychological battery comprised the following tests: Trail MakingTest, Ruff's 2 & 7 Selective Attention Test, Stroop Word and Color Test,Word List Learning Test, Logical Memory (WAIS-III), Verbal Fluency Test, Rey-Osterrieth Complex Figure Test (ROCFT), Judgment of Line Orientation Test, Sentence Span Test, Visual Patterns Test, Vocabulary and Abstract Reasoning Test, Test of Memory Malingering, and MMPI-2.

Results: We found a negative correlation between infrequency validity scales F, Fp and Fb and performance on both semantic and phonemic verbal fluency, and between Fp and Fb validity scales and performance on vocabulary and abstract thinking. Additionally, the Fb validity scale correlated with performance on delayed recall of the ROCFT and the inconsistency scale VRIN correlated with performance on semantic verbal fluency.

Conclusions: Elevations of the MMPI-2 may not necessarily reflect malingering or psychopathology, but may be one of the sequelae of persistent cognitive dysfunction after TBI.

Correspondence: *Aikaterini Giazkoulidou, School of Psychology, Aristotle University of Thessaloniki, University Campus, Thessaloniki 54124, Greece. E-mail: giazkoulidou@yahoo.com*

A. DARDAGANI, A. GIAZKOULIDOU, I. KAMPELIS & M.H. KOSMIDIS. Assesing Motivation for Rehabilitation after Traumatic Brain Injury: The Role of Psychopathology.

Objective: We explored the relationship between motivation for rehabilitation in individuals who sustained a traumatic brain injury (TBI) and their MMPI-2 profiles.

Participants and Methods: We recruited individuals with a TBI through hospital records. Of 110 called, 40 agreed to participate and met inclusion criteria: (a) no history of neurological or psychiatric disease;

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

(b) time post injury over 6 months; (c) age range: 18-55; (d) at least 12 years of education. Average time since injury for our sample was 3.5 (SD=2.2) years. None of our participants was in litigation, nor had any been in cognitive rehabilitation in the past. Participants completed the Motivation for Traumatic Brain Injury Rehabilitation Questionnaire (MOT-Q) and the MMPI-2.

Results: Factor analysis yielded four factors on the MOT-Q: Denial, Interest in Rehabilitation, Anger, and Reliance on Professional Help, consistent with those reported by Chervinsky and colleagues (1998). Linear regression analysis showed that the MMPI-2 clinical scale Depression and the content scale Anxiety contributed to the MOT-Q factor Denial (greater depression and anxiety was associated with less motivation). The MMPI-2 Personality Psychopathology 5 (PSY-5) scale Disclosure contributed to the MOT-Q factor Interest in Rehabilitation. Finally, the PSY-5 scale Aggression and the supplementary scale Repression contributed to the MOT-Q factor Anger.

Conclusions: Our findings suggest that motivation for rehabilitation in individuals who sustained a TBI may be influenced by psychopathology as assessed by the MMPI-2. Thus, evaluation of potential psychopathology and personality features in TBI patients may reveal motivational and emotional issues relevant to the rehabilitation process as well as treatment outcome.

Correspondence: *Aikaterini Giazkoulidou, School of Psychology, Aristotle University of Thessaloniki, University Campus, Thessaloniki 54124, Greece. E-mail: giazkoulidou@yahoo.com*

R.T. LANGE, S. PANCHOLI, V.C. ANDERSON-BARNES, A. BHAGWAT & L.M. FRENCH. Neuropsychological Outcome from Blast versus Non-Blast Mild Traumatic Brain Injury.

Objective: Traumatic brain injury (TBI) is one of the most common injuries sustained by US military service members during the conflicts in Iraq and Afghanistan. The majority of TBIs occur as a result of blast injuries, typically caused by an explosive device. The purpose of this study is to compare the neuropsychological outcome from blast versus non-blast TBI.

Participants and Methods: Participants were 91 US military service members (Age: M= 29.9 years, SD=8.6) who sustained a mild TBI, divided into two groups: Blast (n=49) and Non-Blast (n=42). Patients had been seen for neuropsychological evaluation at Walter Reed Army Medical Center and were evaluated on average 6.4 months (SD=5.7) post injury. The majority of the sample was Caucasian (86%), had 12 or more years of education (98%), and was male (100%). Measures included the Personality Assessment Inventory (PAI) and five common neurocognitive tests.

Results: There were no significant differences on all neurocognitive measures (all p>.05) and all PAI clinical scales (all p>.05). There was however a non-significant trend and medium effect size for WAIS-III Block Design (p=.057, d=.41, Non-blast>Blast) and the Somatic Complaints scale on the PAI (p=.053, d=.41, Blast>Non-blast). When all PAI clinical scales were considered simultaneously, there were some significant differences in the overall number of scales elevated for some comparisons (e.g., four or more elevated scales: 51% Blast, 31% Non-Blast), though these differences were infrequent.

Conclusions: These results do not provide evidence to suggest that the neuropsychological outcome from blast-related mild TBI is disparate to that of non-blast-related mild TBI.

Correspondence: *Rael T. Lange, Ph.D., Defense & Veterans Brain Injury Center, Walter Reed Army Medical Center, 6900 Georgia Ave NW, Building 1, Room B207, Washington, DC 20910. E-mail: rael.lange@gmail.com*

R.T. LANGE, S. PANCHOLI, A. BHAGWAT, V.C. ANDERSON-BARNES & L.M. FRENCH. Influence of Poor Effort on Neuropsychological Test Performance in Military Personnel following Mild Traumatic Brain Injury.

Objective: The purpose of this study is to examine the influence of poor cognitive effort on neuropsychological test performance in military personnel following mild traumatic brain injury (MTBI).

Participants and Methods: Participants were 240 US military service members (Age: M= 29.4 years, SD=8.6) who sustained a TBI, divided into three groups based on injury severity and Word Memory Test performance: (a) MTBI-Pass (n=124), (b) MTBI-Fail (n=55), and (c) Mod-Severe TBI-Pass (n=61). Patients were evaluated at Walter Reed Army Medical Center on average 6.1 months (SD=5.7) post injury. The majority of the sample was Caucasian (84%), male (100%), and had 12+ years education (98%). Measures included the Personality Assessment Inventory (PAI) and five common neurocognitive tests.

Results: Patients in the MTBI-Fail group performed worse on most cognitive tests compared to the Mod-Severe TBI-Pass (p<.05; d=.41 to d=1.00) and MTBI-Pass group (p<.05; d=.34 to d=1.03). Using a criterion of three or more low scores, the MTBI-Fail group had the greatest rate of impairment (80%), followed by the Mod-Severe TBI-Pass (36.1%) and MTBI-Pass group (29%). On the PAI, the MTBI-Fail group had higher scores on more than half of the clinical scales (p<.05). There was a greater number of elevated scales (e.g., 5 or more) in the MTBI-Fail group (63.6%) compared to the MTBI-Pass (37.1%) and Mod-Severe TBI-Pass group (19.7%).

Conclusions: Effort testing is an important component of post-acute neuropsychological evaluations following combat-related MTBI. Those who fail effort testing are likely to be misdiagnosed as having severe cognitive impairment, and their symptom reporting is likely to be inaccurate.

Correspondence: *Rael T. Lange, Ph.D., Defense & Veterans Brain Injury Center, Walter Reed Army Medical Center, 6900 Georgia Ave NW, Building 1, Room B207, Washington, DC 20910. E-mail: rael.lange@gmail.com*

E. LARSON, F. ZOLLMAN, L. WASEK & L. GLASS. Memory Problems and Objective Assessment of Sleep in TBI Survivors.

Objective: The suggestion that sleep problems exacerbate cognitive impairment in patients with traumatic brain injury (TBI) has been difficult to study due to unreliable measures of sleep (e.g., self-report sleep diaries or observational sleep logs). In the present study actigraphy was used to estimate sleep duration. Exploratory analyses were performed to test the hypothesis that insomnia as measured by this technology would be associated with reduced memory as assessed by the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS).

Participants and Methods: A sample of twenty-three subjects was extracted from an archive of data compiled in studies of the effects of acupuncture in TBI survivors. This sample was heterogeneous, including inpatients and outpatients and representing a wide range of injury severity. Actigraphic data were collected for each subject over a period of three days and average number of hours of sleep per night was calculated using procedures adapted from studies of sleep in normals. At the end of actigraph data collection, cognitive function was assessed with the five RBANS indexes.

Results: Bivariate correlations showed longer sleep duration was associated with poorer delayed memory. Subtest analyses showed this effect was strongest for delayed trials of story recall and list recall.

Conclusions: The present findings are consistent with a previous report that in normals, those subjects with both the shortest and the longest sleep duration had poor performance on memory testing, suggesting a curvilinear relationship between quantity of sleep and cognitive performance. Confirmatory clinical studies are recommended.

Supported by the US Department of Education, National Institute on Disability and Rehabilitation Research, (Grant # H133A080045A) through the Midwest Regional Traumatic Brain Injury Model System: Innovative Approaches to Improve Cognition, Function, and Community Living. This study was also funded by the U.S. Army Medical Research and Materiel Command (W81XWH-08-1-0752).

Correspondence: *Eric Larson, Rehabilitation Institute of Chicago, 345 E. Superior St., Chicago, IL 60611. E-mail: elarson@ric.org*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

A. LEQUERICA, E. ELOVIC, A. NAQVI & M. SHEFFIELD-MOORE. Sleep Disturbance, Fatigue, and Endocrine Function After Traumatic Brain Injury.

Objective: Fatigue, cognitive dysfunction, depression, and sleep abnormalities are symptoms commonly reported after traumatic brain injury (TBI). These concerns are also reported among individuals with endocrine dysfunction. There is also evidence that TBI can result in endocrine abnormalities. This study was conducted to examine the relationship between endocrine function and sleep/wake disturbances.

Participants and Methods: Twenty (n=22) participants who suffered a moderate to severe TBI participated in a study in which they underwent a hormonal evaluation,(Estradiol, FSH, Testosterone, LH, IGF-1, Prolactin, Rapid TSH, FreeT4, and Cortisol) and completed questionnaires to measure subjective fatigue, depression, sleep quality, and daytime functioning. Finally, they were also asked to perform a hand grip exercise and complete a paper and pencil test to measure vigilance and performance decrement over time (objective physical and mental fatigue). Interrelationships among and prevalence of sleep dysfunction, fatigue, depression, quality of life, community integration, and endocrine functioning were explored.

Results: Over 50% of the sample reported sleep/wake disturbances and showed at least one endocrine abnormality. Subjective measures of fatigue were correlated with IGF-1 and testosterone. Decrement in grip strength showed a significant relationship with testosterone and AM cortisol. The level of testosterone correlated with a measure of sleep/wake disturbance.

Conclusions: The prevalence of endocrine abnormality and sleep dysfunction reported here are higher than has been reported in the TBI literature and may be specific to this sample of participants. Replication of the current findings in a more general population of individuals with TBI should be explored to further our understanding of the relationship between endocrine function and sleep/wake difficulties.

Correspondence: *Anthony Lequerica, Kessler Foundation Research Center, 1199 Pleasant Valley Way, West Orange, NJ 07052. E-mail: alequerica@kesslerfoundation.org*

S.M. LIPPA, K. MAESTAS, J. ROMESSER & N. PASTOREK. Demographic, Clinical, and Behavioral Correlates of Employment in OEF/OIF Veterans with Histories of Mild Traumatic Brain Injury.

Objective: Determine the demographic, clinical, and behavioral correlates of employment in OEF/OIF veterans with history of mild traumatic brain injury (mTBI).

Participants and Methods: Employment status was collected from returning veteran outpatients (n = 354) with histories of mTBI. Multivariable logistic regression was performed to examine the impact of demographic characteristics (age, race, and marital status), injury characteristics (loss of consciousness and time since injury), postconcussive symptoms, posttraumatic stress symptoms (re-experiencing, avoidance/numbing, and hypervigilance), and pain interference on employment status.

Results: Marital status, re-experiencing symptoms, hypervigilance symptoms, and pain interference made significant, unique contributions to predicting employment status. Married veterans were 1.86 times more likely to be employed than unmarried veterans (OR=1.80; 95% CI: 1.12–2.99). Veterans at the 25th percentile on hypervigilance symptoms (i.e., those reporting less severe symptoms) were 2.00 times more likely to return to work than those scoring at the 75th percentile (OR=.50; 95% CI: .23–.88). In contrast, veterans scoring at the 75th percentile on re-experiencing symptoms (i.e., those reporting more severe symptoms) were 2.01 times more likely to return to work than those scoring at the 25th percentile (OR=2.01; 95% CI: 1.1–2.13). Veterans reporting pain interference scores at the 25th percentile were 1.80 times more likely to be employed than those scoring at the 75th percentile (OR=.56; 95% CI: .33–.93).

Conclusions: Being married and reporting low amounts of pain interference are associated with being employed in OEF/OIF veterans. Lower levels of hypervigilance symptoms and higher levels of re-experiencing symptoms were also associated with employment at the time of assessment.

Correspondence: *Sara M. Lippa, M.A., University of Houston, 2616 Stanford St, Apt B, Houston, TX 77006. E-mail: smlippa@uh.edu*

S.M. LIPPA, K. MYSZKA, K. O'DELL, L. WIGGS & T. VERAMONTI. Cognitive Versus Physical Independence: What is Most Related to Supervision Levels Following Brain Injury?

Objective: Rehabilitation programs aim to decrease the supervision needs of individuals recovering from brain injury. The current study examines the extent to which cognitive independence, physical independence, or both are related to supervision needs at admission and discharge from a post-acute brain injury program.

Participants and Methods: Individuals with histories of brain injury underwent evaluation at admission and discharge from a post-acute brain injury program. Physical and cognitive independence were measured by scores on the Craig Handicap and Reporting Technique-Short Form (CHART-SF). Supervision level was measured by scores on the Supervision Rating Scale (SRS). For inpatients (n = 81) and outpatient (n = 54) separately, supervision level at admission was regressed on covariates and cognitive and physical independence at admission. For inpatients and outpatient separately, supervision level at discharge was regressed on covariates, supervision level at admission, and cognitive and physical independence at admission and discharge.

Results: At admission and discharge for both inpatients and outpatients, age, education, and time since injury were not significantly related to supervision level, while cognitive independence was statistically significantly related to supervision levels (Betas ranged from -.644 to -.892, p-values < .001). Physical independence was significantly related to supervision needs for inpatients at admission (Beta = -.237, p = .003), but not for inpatients at discharge or outpatients at admission or discharge.

Conclusions: Cognitive independence significantly predicted supervision needs of individuals with histories of brain injury participating in a post-acute brain injury program at admission and discharge. Physical independence was only related to supervision needs for inpatients at admission. Implications of these findings are discussed.

Correspondence: *Sara M. Lippa, M.A., University of Houston, 2616 Stanford St, Apt B, Houston, TX 77006. E-mail: smlippa@uh.edu*

Z. MELIKYAN, Y. MIKADZE & A. POTAPOV. Cognitive recovery 1-6 months after mild and moderate TBI. A neuropsychological report.

Objective: TBI is one of the leading causes of disability (including cognitive dysfunction) especially in young adults all over the world. Present study is aimed at studying cognitive recovery 3 and 6 months after mild and moderate TBI.

Participants and Methods: 28 adults (16 male, 12 female), 19-62 years old with mild (16 patients) and moderate (12 patients) TBI were tested within 1, 3 and 6 months after trauma. Testing included scored A.R. Lurian neuropsychological assessment and Trails A&B, COWA, Digit Symbol Coding, Letter-Number Sequencing, Digit and Spatial Span. ANOVA was performed. Only statistically significant results ($p<=0.05$) are reported.

Results: Within the first month of trauma most pronounced were executive dysfunction (difficulties in programming and serial organization), memory deficits (low productivity and errors), slowing and some visual-spatial difficulties. These deficits were most pronounced in patients with CT-verified local brain pathology. Recovery was most pronounced during first three months especially in executive functions (increasing in speed of information processing was combined with high error rates especially in switching tasks) and visual memory (productivity and error rates). At 3-6 months post-TBI speed of information processing, accuracy in switching tasks, and visual working memory have improved. Number of errors in visual and verbal memory has decreased.

Conclusions: Cognitive recovery after mild and moderate TBI is most pronounced within first three months after trauma and slows down within the next three months. At 1-3 months improve programming, serial organization, and memory productivity whereas at 3-6 months accuracy in switching tasks and memory improve.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *Zara Melikyan, PhD, MSU, 11-5 Mokhovaya str., Moscow 125009, Russian Federation. E-mail: zmelikyan@yahoo.com*

R. NAKASE-RICHARDSON, S.A. YABLON, M. SHERER, C.C. EVANS & S. BARNETT. Prospective evaluation of the nature and impact of acute sleep abnormality at one-month post TBI.

Objective: Although sleep disturbance is common following traumatic brain injury (TBI), it is poorly characterized. This paper reports an investigation of the nature of sleep abnormality in a neurorehabilitation sample at 1 month post-TBI.

Participants and Methods: Of TBI Model Systems admissions to a free-standing rehabilitation hospital between 01/1999 and 06/2004, 205 met study criteria. The sample was primarily male (67%), with a median of 12 years of education, and MVC as primary mode of injury (80%).

Results: Seventy-eight percent were rated as having a sleep disturbance on the Delirium Rating Scale Revised-98 at approximately one-month post-injury. Of those with sleep disturbance, 27% were rated as having a mild continuity disturbance at night, 33% with moderate disorganization of sleep-wake cycle, and 6% with severe disruption of sleep-wake cycle (i.e., day-night reversal). Spearman correlations between severity of sleep disturbance with TBI severity indices revealed significant associations with duration of post-traumatic amnesia, acute length of stay, and several cognitive/behavioral variables ($p<.001$; fluctuating mental presentation, thought-process abnormalities, disorientation, inattention, motor restlessness, and short-term memory recall). Associations with emergency room Glasgow Coma Scale score and age were non-significant. Individuals with moderate to severe sleep disorganization had worse outcomes at rehabilitation discharge on the Disability Rating Scale ($X2$ (3, N=205)=23.310, $p<.001$), Functional Independence Measure (FIM) Motor Subscale ($X2$ (3, N=205)=13.525, $p=.004$), and FIM Cognitive Subscale ($X2$ (3, N=205)=10.190, $p<.017$).

Conclusions: Although sleep-disturbance is common after acute TBI, its impact on behavior and cognition is under-explored. Further investigation into the inter-relationship of sleep with early neurobehavioral symptoms and rehabilitation outcome is warranted.

Correspondence: *Risa Nakase-Richardson, Ph.D., James A. Haley Veterans Hospital, 13000 Bruce B. Downs Blvd., Tampa, FL 33549. E-mail: Risa.Richardson@va.gov*

R. NAKASE-RICHARDSON, M. SHERER, S. YABLON, C.C. EVANS & S. BARNETT. The impact of daytime hypersomnolence on cognition and rehabilitation in an acute TBI sample.

Objective: Disturbed sleep-wake cycles are a target of early neurorehabilitation treatment. The morbidity associated with daytime hypersomnolence has not been demonstrated in an acute TBI sample. This paper examines the relationship of daytime hypersomnolence to cognition and participation in a neurorehabilitation setting.

Participants and Methods: The sample (68% male; M Age 32 years; M GCS 5; M Education 12 years) consisted of persons enrolled (N=79) in a RCT of amantadine hydrochloride at a rehabilitation hospital between 04/2003 and 09/2004. Prospective ratings of the Confusion Assessment Protocol by neuropsychologists including sleep-wake disturbance ratings and administration of the Rehabilitation Process Instrument to therapists (Visual Analogue Scale ratings of daily cooperation, productivity, and stress) were collected. First observations were used for analyses to minimize the effect of drug treatment on outcomes.

Results: Sixty-one percent were rated as having daytime hypersomnolence resulting in falling asleep during therapy sessions or persistent hypoarousal. A significant but modest relationship was observed between daytime alertness and night-time sleep ($r=.349, p=.002$). Individuals with daytime hypersomnolence had worse performance on measures of orientation (GOAT; $U=385, p<.001$), simple attention ($X2=3.8, p=.04$), sustained attention ($U=337, p<.001$), and comprehension ($U=481, p=.006$). No difference was found for GCS or time elapsed since injury. Individuals with greater impairment in daytime alertness were rated as having worse cooperation and productivity in rehabilitation therapies ($U=231, p=.04$; $U=215.5, p=.02$; respectively) and higher therapist ratings of stress ($U=194$, $p=.007$).

Conclusions: Daytime hypersomnolence has significant morbidity in the acute rehabilitation setting. Data support the importance of targeting daytime alertness for intervention early after TBI.

Correspondence: *Risa Nakase-Richardson, Ph.D., James A. Haley Veterans Hospital, 13000 Bruce B. Downs Blvd., Tampa, FL 33549. E-mail: Risa.Richardson@va.gov*

Z. MIKLOS, L. HENRY, J. PARDINI, V. FAZIO & M. LOVELL. The Effect of Cognitive Exertion on Post-Concussion Symptoms.

Objective: The aim of this study was to assess whether concussed individuals experience increased symptoms after completing computerized neurocognitive testing. It was hypothesized that patients' concussive symptoms would increase in response to the cognitive demands of testing.

Participants and Methods: Participants were 110 individuals (61% female) seen at a university concussion program for evaluation and management of concussion. Mean age of participants was 18.47 (SD = 8.71; range 11 - 61), and they had completed an average of 9.77 years of education (SD = 2.97; range 6 – 14). All participants were symptomatic at the time of evaluation. Participants were asked to complete the ImPACT computerized test battery and the post-concussion symptom scale (PCSS) as a routine part of concussion evaluation. To reflect changes in relevant symptoms, participants were asked to complete an abbreviated PCSS immediately before and immediately after completing the ImPACT test.

Results: Paired-samples t-test revealed a significant difference ($t = -4.302$, $p < .05$) between pre-test and post-test symptom totals assessed on the abbreviated PCSS, with post-test scores reflecting increased symptoms. Changes in cranial ($t = -4.158$, $p < .01$), somatic ($t = -3.804$, $p < .01$) and cognitive ($t = -3.602$, $p < .01$) clusters indicate a significant worsening of these specific symptom clusters following testing. The affective symptom cluster showed no significant change.

Conclusions: This study demonstrated that cognitively demanding tasks cause acute changes in post-concussive symptoms. Although it is common to educate patients with concussions about the ramifications of physical exertion, it is also important to increase awareness about effects of cognitive exertion.

Correspondence: *Jamie Pardini, Ph.D., UPMC Sports Med, 600 Oxford Dr., Ste 200, Monroeville, PA 15146. E-mail: pardinij@upmc.edu*

L. HENRY, M. LUGARICH, D. PARDINI & J. PARDINI. The Relation Between Test Performance and Changes in Post-Concussion Symptoms following Cognitive Exertion.

Objective: This study examined the association between neurocognitive test performance and acute symptom changes following completion of cognitive testing in a sample of concussed individuals.

Participants and Methods: 110 participants (39% male; mean age = 18.5) diagnosed with mTBI were evaluated at the University of Pittsburgh Medical Center Sports Concussion Program. All participants reported persistent concussion symptoms at the time of evaluation. Participants completed the ImPACT computerized test battery and the post-concussion symptom scale (PCSS) as a routine part of concussion evaluation. To reflect acute changes in symptoms, participants completed an abbreviated PCSS immediately before and after completing computerized testing.

Results: After controlling for pre-test symptoms, regression analysis indicated significant associations between post-test symptoms and composite scores on ImPACT. Lower verbal memory scores were associated with higher total symptoms and with higher symptom scores in three of four symptom clusters (cognitive, somatic, affective clusters; all ps <

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

.05). Slower visuomotor speed was associated with higher somatic symptoms. Lower visual memory scores were related to higher affective symptoms. Reaction time scores were not associated with post-test symptom scores. The findings were not accounted for by gender or time since sustaining the injury.
Conclusions: Results reveal an association between post-test symptom severity and performance on neurocognitive testing in individuals with concussion, suggesting acute changes in symptoms following cognitive exertion may be an indicator of injury severity.
Correspondence: *Jamie Pardini, Ph.D., UPMC Sports Med, 600 Oxford Dr., Ste 200, Monroeville, PA 15146. E-mail: pardinij@upmc.edu*

A.C. LYNN, A.R. RABINOWITZ & P.A. ARNETT. Correlates of the ImPACT Impulse Control Composite in a Non-Injured College Athlete Sample.
Objective: Research has shown that the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) battery is useful in diagnosis and management of sports-related concussion. However, the validity of the ImPACT's Impulse Control Composite (ICC) has received little attention in the extant literature. The present study sought to validate the ICC, and explore its correlates.
Participants and Methods: Five-hundred and fifty-five non-injured college athletes were administered a neuropsychological test battery, including the ImPACT, at baseline. Athletes were divided into three groups according to whether their ICC score was 1. Normal (less than sixteen; N=487), 2. High (between sixteen and thirty-nine; N=50), or 3. Extreme (greater than thirty; N=18).
Results: One-way ANOVA revealed that ICC was related to measures of impulsivity—Stroop 1 Errors ($F=3.7$, $p<.05$) and Vigil Commissions ($F=16.2$, $p<.001$), and measures of speeded-attention—the Symbol Digit Modalities Test ($F=6.4$, $p<.005$), Stroop 1 Time ($F=3.2$, $p<.05$), and Vigil Omissions and Average Delay ($F=6.2$, $p<.01$; $F=4.2$, $p<.05$). ICC predicted performance on delayed memory tasks—Brief Visual Memory Test ($F=5.1$, $p<.01$) and Rivermead Behavioral Memory Test—Story Memory ($F=4.7$, $p<.05$). ICC group was also related to the Computerized Assessment of Response Bias ($F=4.3$, $p<.05$), and a measure of current distress ($F=4.20$, $p<.05$). Those in the high ICC group were most likely to report a diagnosis of ADHD ($\alpha 2=16.5$, $p<.005$).
Conclusions: Findings suggest that the ICC is a valid measure of impulsivity. Impulsive responding at baseline was related to ADHD diagnosis, current distress, sub-optimal motivation, and poorer performance on other tasks of impulsivity, as well as memory tasks. Clinical implications will be discussed.
Correspondence: *Amanda R. Rabinowitz, M.S., Psychology, Pennsylvania State University, 1651 Highlandon Court, State College, PA 16801. E-mail: arr200@psu.edu*

A.R. RABINOWITZ & P.A. ARNETT. Factor Analysis of the ImPACT Subtests: An Examination of ImPACT Composite Scores.
Objective: The Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) battery is a popular tool for the diagnosis and management of sports-related concussion. The ImPACT clinical report provides five composite scores, to aid in test interpretation: Verbal Memory, Visual Memory, Visual Motor Speed, Reaction Time, and Impulse Control. The present study sought to validate this purported factor structure in an independent sample.
Participants and Methods: Five-hundred and fifty-five non-injured college athletes were administered the ImPACT at baseline. A structural equation modeling (SEM) approach to exploratory factor analysis (EFA) was conducted to determine the underlying factor structure of the ImPACT tests. Then, using the results from the EFA, a confirmatory SEM model was created in order to obtain factor loadings and interpret the factors. All analyses were done using LISREL 8.8 (Joreskog and Sorbom, 2006).
Results: A four factor EFA model yielded excellent fit to the data ($\alpha 226=37.2$, $p=.07$; SRM=.02; CFI=.99). The four factors were then subject to an oblique rotation. The resulting pattern matrix was fit to a confirmatory model, which yielded an acceptable fit to the data ($\alpha 247=113.65$, $p<.01$; SRM=.06; CFI=.96). Examination of the final solution suggested that the four retained factors measure: Memory, Attention, Impulsivity, and Speeded Processing.
Conclusions: These findings suggest that the ImPACT tests have a four factor structure. The factors purported by the authors of the ImPACT were not supported by the present analyses. Importantly, verbal and visual memory tasks loaded on the same factor, and reaction time measures loaded on different factors (Attention, Impulsivity, or Speeded Processing). Clinical implications will be discussed.
Correspondence: *Amanda R. Rabinowitz, M.S., Psychology, Pennsylvania State University, 1651 Highlandon Court, State College, PA 16801. E-mail: arr200@psu.edu*

P. RAMANATHAN, M.R. KENNEDY & C.J. MARSOLEK. Effects of Priming and Antipriming on Speed of Cognitive Processing in Traumatic Brain Injury Survivors.
Objective: Traumatic Brain Injury (TBI) frequently impairs explicit memory, metamemory, and cognitive processing speed (Sohlberg & Mateer, 2001), while leaving implicit memory (e.g., priming) generally unimpaired (Schmitter-Edgcombe, 2006). Here we examine whether priming, and the recently discovered phenomenon of antipriming (Marsolek et al., 2006), can affect the processing speed of TBI survivors when attempting to recall newly learned information, and make metamemory judgments.
Participants and Methods: Seventeen traumatic brain injury (TBI) survivors and 14 matched controls have participated to date, with recruitment continuing. The procedure follows Kennedy and Yorkston's (2000) paired associate learning task with metamemory Judgments of Learning (JOLs), crucially modified to include masked priming of target tokens. Priming tokens were either a row of x-s (baseline), the ensuing target word (prime), or an unrelated word (antiprime). This was immediately followed by study of the cue-target word pair for 5s (controls) or 9s (TBI). Response times (RTs) were measured for immediate and delayed JOLs, and recall responses two minutes after the delayed JOLs. An old/new judgment task was used to validate that subliminally presented stimuli were not consciously perceived.
Results: Repeated measures ANOVA shows no within-subjects effects of priming on RTs for JOLs or recall of target words. However, during the old/new validation task both experimental and control participants demonstrated significantly faster RTs for both primed and antiprimed items, relative to new items.
Conclusions: The present study provides evidence that although masked priming affects processing speed for some memory judgments (e.g., and old/new judgment task), it does not appear to affect processing speed for recall or Judgments of Learning.
Correspondence: *Pradeep Ramanathan, Ph.D., CCC-SLP, Communication Sciences, University of Connecticut, 850 Bolton Road, Unit 1085, Storrs, CT 06269. E-mail: pradeep.ramanathan@uconn.edu*

J. ROMESSER, S. SHEN, J. KIRCHER, T. ROBERTS, S. ALLEN & W. MARCHAND. A Preliminary Study of the Effect of Deployment Related Concussion on PTSD Symptoms and Other Psychiatric Variables at the Time of Treatment Seeking Among Veterans.
Objective: The aim of this study was to assess whether a diagnosis of concussion given at a Veterans Healthcare Administration secondary Traumatic Brain Injury assessment impacted either PTSD symptomatology or other variables at the time veterans seek treatment for PTSD.
Participants and Methods: This retrospective study compared 61 male veterans with a diagnosis of military-related concussion history and PTSD to 83 male veterans with PTSD but without a diagnosis of military-related concussion.
Results: There were no significant between-group differences in PTSD symptomatology. Further, there were no differences between the individual symptom clusters (re-experiencing, avoidance, numbing and hyperarousal) or on individual PCL items between the two groups. The

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

cohort diagnosed with concussion reported significantly decreased ability to cope with PTSD symptoms, increased risk taking when using alcohol and problems with physical health and pain. In contrast, this group exhibited less evidence of suicide risk and increased satisfaction with quality of free time, family relationships, financial situation and friendships.
Conclusions: If replicated, these results may guide the design of more effective assessments and interventions for veterans who receive diagnoses of PTSD and concussion. Specifically, individuals with PTSD and a concussion history may benefit from a treatment regimen with a specific focus on the prevention of alcohol abuse/dependence as well as on the development of effective coping strategies. Similarly, pain management and health maintenance strategies might be useful adjunctive treatment approaches for these individuals. These findings highlight the importance of an interdisciplinary assessment and treatment approach.
Correspondence: *Jennifer Romesser, PsyD, Salt Lake City VA Health Care System, 500 Foothill Drive, Salt Lake City, UT 84148. E-mail: Jennifer.Romesser@va.gov*

J. ROMESSER, J. BOOTH, J. BENGE, D. HELMER & N. PASTORICK. Mild Traumatic Brain Injury, Pain, and Headaches in OEF/OIF Veterans.
Objective: The purpose of this study was to evaluate the pain experience in OEF/OIF veterans with and without a history of mild traumatic brain injury (mTBI).
Participants and Methods: This study involved a retrospective chart review of 529 OEF/OIF veterans who underwent TBI evaluations by the polytrauma team at large southern and western VA medical centers. Questions assessing TBI injury information, pain (location, severity and degree of interference) and post traumatic stress symptoms were analyzed.
Results: PSAW Statistics 18 software was used for data analysis. Nonparametric tests and ANOVAs were used to compare TBI groups (no TBI, TBI with period of disorientation only, TBI with period of brief loss of consciousness) on the dependent variables including post traumatic stress symptoms and pain variables. Logistic regression was performed to assess the impact of post-traumatic stress and TBI in predicting membership to three different pain conditions: axial pain, headache, and pain interference.
Conclusions: Reports of pain were high, with over 80% of the sample reporting pain and 20-30% reporting severe or extreme pain interference in daily life which is higher than other OEF/OIF patient populations. Headaches were the most commonly reported problem at 71%. Those with a history of mTBI and loss of consciousness were nearly two times as likely to report headache pain and endorse more areas of pain compared to the rest of the sample. These findings suggest that a history of mild TBI with loss of consciousness may be a risk factor for more pain interference, more sites of pain and increased risk for headaches. Greater PTSD symptomology was also associated with greater pain interference and more reports of axial pain and headache pain.
Correspondence: *Jennifer Romesser, PsyD, Salt Lake City VA Health Care System, 500 Foothill Drive, Salt Lake City, UT 84148. E-mail: Jennifer.Romesser@va.gov*

D. SCHIEHSER, D.C. DELIS, L. DELANO-WOOD, J. FILOTEO, A.J. JAK & M.W. BONDI. Neuropsychological Predictors of Fatigue in Mild to Moderate TBI.
Objective: Fatigue is one of the most frequently reported symptoms after mild to moderate Traumatic Brain Injury (TBI). In addition, TBI survivors often report sleep problems, apathy, depression, and cognitive difficulties; yet, the relationship between fatigue and these co-morbid post-traumatic symptoms is poorly understood. The purpose of this study was to elucidate the symptom predictors of fatigue in mild to moderate TBI.
Participants and Methods: : Sixty-six non-combat active-duty military personnel in the acute recovery stage (mean = 37.5 days) of mild to moderate TBI participated in the study. Pearson correlations were used to examine the relationship between fatigue (SF-36 Vitality subscale) and sleep, apathy, mood, and cognition. In order to determine the unique predictor(s) of fatigue, sleep, apathy, mood and cognitive scores with significant bivariate correlations were entered as predictors into a multiple regression analysis with fatigue serving as the criterion.
Results: Correlational analyses revealed significant associations between higher levels of fatigue and sleep disturbance, apathy, depression, slower processing speed, and inattention. The regression model was significant ($R2 = .50$, $p < .001$), indicating that apathy was the best predictor of fatigue ($\geq = -.34$; $t = -2.8$, $p < .01$). Mood was also a significant predictor ($\geq = -.28$; $t = -2.1$, $p < .05$), while TBI severity, sleep, and cognitive performance did not add any significant unique variance to the model.
Conclusions: Apathy was the best predictor of fatigue in this acute mild to moderate TBI sample, suggesting an important relationship between apathy and fatigue not better accounted for by sleep disturbance, mood, cognition, or TBI severity.
Correspondence: *Dawn Schiehser, Ph.D., VASDHS/UCSD, 3350 La Jolla Village Dr, San Diego, CA 92161. E-mail: dschiehser@ucsd.edu*

A.L. SHANDERA-OCHSNER, J.P. HARP, A. ROACH & W.M. HIGH. Relationship of Executive Functioning to Outcome after Brain Injury.
Objective: Many persons who sustain a traumatic brain injury (TBI) experience lasting cognitive deficits post-injury. The area of executive functioning is particularly sensitive to TBI. The purpose of this study is to understand how problems on these tests are related to limitations people with TBI have in the real world like problems driving, working, or returning to school. It was hypothesized that performance on measures of executive functioning would relate to post-acute rehabilitation scores on a measure of functional outcome - the Mayo Portland Adaptability Inventory (MPAI-4).
Participants and Methods: Twenty-six individuals with recent TBI were referred for neuropsychological evaluation following discharge from acute (inpatient) rehabilitation program. Of these 26 participants, (26 Caucasian, 19 male), all had injuries consistent with complicated mild to severe TBI. All participants completed an extensive clinical interview, a neuropsychological test battery, emotional/behavioral measures, and outcome questionnaires.
Results: As expected based on the extant TBI literature, preliminary regression analyses revealed that a marker of injury severity - duration of loss of consciousness (LOC) - accounted for a significant (17%) proportion of the variance in outcome (MPAI-4 scores). Surprisingly, two other severity indicators - Glasgow Coma Scale score and duration of post-traumatic amnesia were not significant predictors of MPAI scores. Two sets of analyses (one controlling for LOC) were conducted to examine the relationship between performance on measures of executive functioning and MPAI-4 outcome scores.
Conclusions: The results of each analysis will be discussed, with particular attention to the possible relationship between injury severity markers (e.g. duration of LOC), executive functioning, and community outcome.
Correspondence: *Anne L. Shandera-Ochsner, M.S., University of Kentucky, 4030 Tates Creek Road, #1147, Lexington, KY 40517. E-mail: ashandera@gmail.com*

C. SOZDA, M.J. LARSON, D. KAUFMAN & W.M. PERLSTEIN. Differential Impairments of Cognitive Control Component Processes after Severe TBI: An fMRI study.
Objective: Patterns of cognitive impairment following severe traumatic brain injury (sTBI) are heterogeneous; however, deficits in "cognitive control" are common. These impairments likely reflect disruption of two essential component processes implemented in a closely interactive, yet dissociable frontal neural network: a dorsolateral prefrontal cortex (dlPFC)-mediated regulative component supporting maintenance of task goals and implementation of control, and an anterior cingulate cortex (ACC)-mediated evaluative component that supports conflict processing and performance monitoring.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Participants and Methods: Event-related functional magnetic resonance imaging (fMRI) and behavioral data were acquired while 10 survivors of sTBI and 12 neurologically-healthy controls performed a task-switching cued-Stroop task. Behavioral data were analyzed using restricted maximum likelihood analyses of variance; fMRI data were analyzed using a general linear model and planned linear contrasts.
Results: Behaviorally, both groups demonstrated similar levels of Stroop RT interference; that is, significant slowing in the incongruent compared to congruent conditions. TBI survivors committed significantly more errors than controls under the incongruent color-naming but not congruent condition. fMRI data revealed that, compared to controls, TBI survivors exhibited reduced dlPFC-mediated regulative activity, but intact ACC-mediated conflict-related activity.
Conclusions: Findings suggest that neural networks mediating regulative component processes are altered after sTBI. However, in contrast to our previous scalp-recorded event-related potential studies, evaluative conflict processing-related activity was not reduced in our sample of TBI survivors. These results suggest differential impairment of cognitive control component processes in our sample of sTBI survivors.
Correspondence: *Christopher Sozda, M.S., University of Florida, PO BOX 100165, Gainesville, FL 32610. E-mail: csozda@ufl.edu*

U.S. SPRINGER, M.A. COLE, J.J. MUIR, D. PARTOVI & N. RICHARDSON. Barriers to Medical Care in OEF/OIF Veterans: Unique Roles of Mood and Cognition.
Objective: Patient-cancelled appointments and no-shows are widely considered to be substantial barriers to the provision of health care for OEF/OIF veterans. This study sought to identify cognitive and mood variables that are associated with patient-initiated cancellations and no-shows in military veterans with mTBI within VA settings.
Participants and Methods: 178 veterans using health-care services at VA Northern California Health Care System completed a battery of neuropsychological tests and brief self-report psychodiagnostic measures. Spearman correlations identified potential predictors of appointment no-show and patient-initiated cancellation rates among available demographic, neurocognitive, psychiatric, and other clinical variables.
Results: Patient-cancelled appointments were significantly associated with higher depression scores (BDI-2), slower Grooved Pegboard Test performance, and reported problems with independent activities of daily living. In contrast, no-shows were significantly related to shorter forward digit span, worse semantic fluency, worse delayed memory on the Hopkins Verbal Learning Test, and employment/school-related problems. Cancellations and no-shows did not significantly correlate with each other or with other cognitive measures, effort scores, years of formal education, estimated premorbid verbal IQ, or age.
Conclusions: Patient cancellations and no-shows are related to daily functioning difficulties but not estimated premorbid intellectual ability. The identification of a unique role of mood in patient cancellations and cognition in no-shows provides specific intervention targets to address in efforts to help remove barriers to receiving medical care in OEF/OIF veterans.
Correspondence: *Utaka S. Springer, M.S., Mental Health, VA Northern California HCS, 150 Muir Road, Martinez, FL 94597. E-mail: uspringer@gmail.com*

J.F. SUMOWSKI, N. CHIARAVALLOTI & J. DELUCA. Cognitive reserve protects against learning and memory problems in traumatic brain injury.
Objective: Learning and memory impairment is prevalent among persons with traumatic brain injury (TBI). The cognitive reserve hypothesis posits that persons with greater lifetime intellectual enrichment better cope with neurologic insult without suffering cognitive impairment. Although there is ample evidence of cognitive reserve among elders with Alzheimer's disease or persons with multiple sclerosis, research is lacking on cognitive reserve in adults with TBI.
Participants and Methods: The California Verbal Learning Test, Second Edition was administered to 14 persons with TBI and 14 healthy controls to assess learning (Total Learning) and memory (Long Delay Free Recall). Lifetime intellectual enrichment was estimated with the Wechsler Test of Adult Reading. Regression analyses were used to investigate whether lifetime intellectual enrichment moderates / reduces the negative impact of TBI on learning and memory.
Results: Significant group (TBI, healthy control) x intellectual enrichment (low, high) interactions were observed for both learning and memory, whereby the negative effect of TBI on learning and memory was reduced among patients with higher intellectual enrichment.
Conclusions: These results extend the cognitive reserve hypothesis to persons with TBI, thereby helping to explain the vast variability in cognitive outcome among persons with TBI. Future research is needed to determine whether intellectual enrichment programs (e.g., reading, etc.) can improve cognitive reserve after a TBI.
Correspondence: *James F. Sumowski, Ph.D., Neuropsychology & Neuroscience Laboratory, Kessler Foundation Research Center, 300 Executive Drive, Suite 10, West Orange, NJ 07042. E-mail: jsumowski@kesslerfoundation.org*

C.E. TYNER, S.C. HEATON, S. SADRAMELI, J. SIRINEK, M.M. MARKANT & S.A. ROBICSEK. Demographic Factors Predictive of Attrition in Adult Severe Traumatic Brain Injury (TBI) Research.
Objective: Validity of research results depends, in part, on sample representativeness. A systematic bias in participant attrition threatens the ability to generalize findings. Longitudinal studies of severe TBI are often challenged by high attrition rates. Evidence of systematic attrition bias has been documented in mental health research, showing higher attrition rates in younger participants of low-SES (Graaf et al., 2000). Attrition biases are not commonly explored in neuropsychological outcome research. The current study sought to examine factors related to attrition (age, education, distance from the research center) in a longitudinal study examining severe TBI outcomes 6-months post-injury. We predicted that attrition risk would be associated with younger age, lower education, and increased distance, while mortality would be associated with older age.
Participants and Methods: Six-month follow-up was examined for 78 severe TBI adults (age range=18-81; M= 40.2). Stepwise logistical regression analyses calculated odds ratios (OR) of associations between demographic characteristics and follow-up status [complete (n=26), lost-to-attrition (n=21), deceased (n=31)].
Results: As hypothesized, older age was associated with a higher risk of mortality (OR=1.033, p=.038) and lower education was associated with a greater risk of attrition (OR=0.710, p=.022). Contrary to our hypothesis, older age decreased the odds of completing 6-month assessment (OR=.946, p=.026), beyond the risk of mortality, and distance was not significantly related to the risk of attrition.
Conclusions: Results show that demographic factors, such as education, may predict attrition in severe TBI research, a fact for consideration when interpreting study results. These findings also highlight which participants may be most vulnerable to attrition, potentially providing guidance for refining study retention efforts.
Correspondence: *Callie E. Tyner, M.S., Clinical and Health Psychology, University of Florida, P.O. Box 100165, Gainesville, FL 32610. E-mail: callietyner@phhp.ufl.edu*

E. VAKIL, E. SHALEV & E. AGRANOV. Direct and indirect memory measures of contextual information: High versus low functioning patients with Traumatic Brain Injury (TBI).
Objective: The facilitation of memory for target stimuli due to similarity of context in learning and in test is known as the "Context Effect" (CE). The paradigm used enabled measuring memory for target, direct memory for context and indirect memory for context as expressed in CE. The present study attempts to characterize the contributions of different levels of severity of Traumatic Brain Injury (TBI) to CEs.
Participants and Methods: Thirty three moderate to severe patients with TBI (mean age 28.58) and 25 matched controls (mean age 27.84)

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

participated in this study. Based on tests sensitive to frontal and temporal lobes functioning, the TBI group was divided into high and low functioning subgroups. We employed a local-context stimulus array, presenting participants with photographs of trial-unique male faces portrayed as wearing distinctive, trial-unique hats yielding specificity).
Results: Two mixed ANOVAs were conducted to analyze the effects of Group and Context (the former as a between subjects and the latter a within subjects factor). First, CE (hits-false alarms) on corrected hits (i.e., an indirect measure of memory for context) was examined and then the CE on direct memory of context. The analyses revealed that the low, but not the high, functioning TBI patients were impaired on direct measures of target and context. However, the groups did not differ on the indirect measure of memory for context (i.e., CE).
Conclusions: The conclusions of the present study are twofold. First, even patients who have sustained moderate to severe TBI should not be treated as a homogeneous group. Second, the present results reinforce the importance of the dissociation between direct and indirect measures of memory. Even in moderate to severe TBI, contextual information is preserved when measured indirectly.
Correspondence: *Eli Vakil, PhD, Psychology, Bar Ilan University, Bar Ilan University Ramat Gan, Ramat Gan 52900, Israel. E-mail: vakile@mail.biu.ac.il*

E. VAKIL, C. LEV-RAN GALON & E. AGRANOV. Conceptual and Perceptual Skill Learning: High versus low functioning patients with Traumatic Brain Injury (TBI).
Objective: A distinction was made between perceptual and conceptual skill learning tasks. The Tower of Hanoi (TOH), but not the Mirror Reading (MR) task, was affected by divided attention. This finding led us to view the former as a conceptual and the latter as a perceptual skill-learning task. TBI is known to affect primarily frontal and temporal lobes. Thus, it was predicted that the TOH would be more sensitive to TBI than the MR task. Furthermore, the present study attempts to characterize the contributions of different levels of severity of TBI to the two types of skill learning tasks.
Participants and Methods: Twenty nine moderate to severe patients with TBI (mean age 29.13) and 29 matched controls (mean age 27.17) participated. Based on tests sensitive to frontal and temporal lobes functioning, the TBI group was divided into high and low functioning subgroups. They were administered the TOH and the MR. The TOH was administered 10 times. For the MR task it was presented with 12 blocks of 24 words that appeared in mirror writing.
Results: Mixed ANOVA was conducted to analyze the effects of Group and Learning (the former is a between and the latter is a within subjects factor).
TOHP- The results indicate that baseline performance, but not learning rate, was impaired following TBI. Both TBI groups differed from the control group, but did not differ from each other.
MR- As above, baseline performance but not learning rate was impaired following TBI. Both TBI groups differed from the control group, and the high functioning TBI group outperformed the low functioning group.
Conclusions: The conclusions of the present study are two- fold. First, even patients who have sustained moderate to severe TBI should not be treated as a homogeneous group. The MR task was more sensitive than the TOH to the severity of impairment following TBI. Second, these results reinforce the importance of the dissociation between baseline performance and learning rate in skill learning.
Correspondence: *Eli Vakil, PhD, Psychology, Bar Ilan University, Bar Ilan University Ramat Gan, Ramat Gan 52900, Israel. E-mail: vakile@mail.biu.ac.il*

R. VILLAR, J. YALOF, N. JENNY & T. LEWIS. Comorbid Traumatic Brain Injury and Posttraumatic Stress Disorder: Conceptualization and Treatment Through a Psychodynamic Framework.
Objective: This research integrates the literature on comorbid Traumatic Brain Injury (TBI) and Posttraumatic Stress Disorder (PTSD), and includes a study on treatment through a psychodynamic framework. Research on the use of psychodynamic therapy for those with either PTSD or TBI suggest it can be an effective treatment for these populations. This is the first known study on insight-oriented treatment for this population.
Participants and Methods: A vignette describing a client with PTSD alone, PTSD with mild TBI, or PTSD and moderate TBI was randomly sent to 48 psychodynamic therapists with an accompanying survey on concept applicability. It was hypothesized that the inclusion of brain injury would cause participants to both decrease use of psychodynamic techniques and increase use of CBT interventions due to the greater direction and structure needed when working with neurological deficit. Three primary tests were completed using one-way analysis of variance (ANOVA). Averages for each diagnostic condition were compared for (a) psychodynamic concepts, (b) cognitive-behavioral concepts, and (c) likelihood of referral to another form of psychotherapy. A two-tailed t-test was used to compare those with and without experience treating comorbid TBI and PTSD in estimated likelihood of referral to another form of psychotherapy. Lastly, three two-tailed t-tests compared average psychodynamic and CBT concept endorsement for each of the three vignettes.
Results: Endorsement of psychodynamic and non-psychodynamic concepts did not significantly differ with the addition of TBI, nor did likelihood of referral to a different form of therapy. Further, psychodynamic concepts were endorsed to a greater degree than were CBT concepts in all conditions.
Conclusions: Results indicate that psychodynamic therapists integrate interventions from other theoretical orientations, but maintain their framework when working with clients who have both neurological and emotional trauma.
Correspondence: *Rebecca Villar, Immaculata University, 152 Devereaux Circle, South Portland, ME 04106. E-mail: rvillar@immaculata.edu*

W. WATSON, S.C. HEATON, H.J. HANNAY, J. SIRINEK, I. SCHMALFUSS, A. GABRIELLI & S. ROBICSEK. Replication and Extension of a Prognostic Model in Severe Traumatic Brain Injury.
Objective: Outcomes for patients who survive a severe TBI can range from permanently disabled to remarkably favorable. Researchers continue to strive to predict not only mortality but long term outcome. A recent model has proven to be useful in crude predictions of outcome after severe TBI (Steyerberg et al., 2008). The present study sought to replicate the main findings of this model and extend these findings by using a measure that provides more detailed characterization of outcome at 6 months post-injury.
Participants and Methods: Participants consisted of 546 adults ages 18-89 with severe TBI. Acute physiological data was gathered for use in the extended IMPACT model and included: patient's age, pupil response, GCS motor score, CT characteristics, as well as events of hypoxia and hypotension. Sum scores derived from the IMPACT model were calculated from each participant's acute data. Outcome measures obtained at 6-month post injury included mortality, favorable/unfavorable outcome on the Glasgow Outcome Scale (GOS), and the Disability Rating Scale (DRS).
Results: The IMPACT model predicted mortality at 6-months post-injury with area under curve (AUC) of .792. When predicting favorable outcome, the AUC improved to .800. Logistic regression showed the IMPACT model significantly predicted both mortality (odds ratio = 1.30; B = -.26, S.E. = .06, $p < .001$) and favorable outcome (odds ratio = 1.32; B = -.28, S.E. = .06, $p < .001$). Linear regression analyses revealed that the IMPACT model moderately predicted outcome on the DRS 6-months post-injury ($F(1,544) = 256.02$, $p < .001$, $R2 = .32$).
Conclusions: This study replicated the IMPACT study findings and showed that the model is sensitive and specific for predicting mortality and favorable outcome in this sample. The model shows promise for creating a more precise way of classifying severity to help explain the heterogeneity among severe TBI patient outcomes.

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

Correspondence: *William Watson, M.S., Kennedy Krieger Institute, 117 S Linwood Ave, Baltimore, MD 21224. E-mail: watsonw@kennedykrieger.org*

E.A. WILDE, T.C. WU, T.L. MERKLEY, S.R. MCCAULEY, E.D. BIGLER, S. HASLEY, Z. CHU, J.V. HUNTER, H.S. LEVIN & P. MORETTI. The Relation between Diffusion Tensor Imaging and Volumetrics in the Midbrain and Brainstem and Neurological Functioning in Severe Traumatic Brain Injury.

Objective: Neurological deficits are often overlooked in traumatic brain injury research (TBI) at a chronic post-injury interval, particularly for deficits that may involve the midbrain and brainstem. This study sought to 1) examine changes in the brainstem on advanced neuroimaging techniques such as volumetrics and diffusion tensor imaging (DTI) and 2) correlate these with Neurological Outcome Scale for Traumatic Brain Injury (NOS-TBI; a measure of neurologic functioning specifically validated for use in TBI) scores in participants with severe TBI.

Participants and Methods: Participants included 13 participants with severe TBI (mean age 22.2 ± 4.7) underwent MRI at 3T (including 30-direction DTI and high resolution T1-weighted imaging for volumetrics) and were administered the NOS-TBI at approximately 6 months post-injury. Sixteen neurologically intact participants (mean age 22.9 ± 5.9) served as a comparison group for imaging.

Results: No significant group differences were noted on age, gender, years of education, or race/ethnicity. The TBI group had significantly lower FA on the right and left (p=0.005 for both) and higher ADC on the right (p=0.0003) and left (p=0.0009) cerebral peduncles in comparison to the control group. Neurological deficits as quantified by the NOS-TBI correlated significantly with right (r=0.75) and left (r=.67) cerebral peduncle ADC in the TBI group, with greater neurological deficit relating to higher ADC. While groups did not differ on brainstem volume, NOS-TBI score was related to brainstem volume in the TBI group (r=-.63).

Conclusions: Neurological deficits in severe TBI are related to changes in the cerebral peduncles and brainstem as detected by advanced neuroimaging techniques such as DTI and volumetrics.

Correspondence: *Elisabeth A. Wilde, PhD, Physical Medicine adn Rehabilitation, Neurology and Radiology; Baylor College of Medicine, 1709 Dryden Rd., Ste. 1200, Houston, TX 77030. E-mail: ewilde@bcm.edu*

Paper Session 8: Syndromes and Systems

Moderator: Dorene Rentz

12:45–2:15 p.m.

P. CHEN & A.M. BARRETT. Spatial Neglect and Global Spatial Representations: Clock Drawing.

Objective: Representational spatial neglect is commonly assessed with object drawings. Local representational deficits may result in details omitted in neglected spatial regions. However, reduced global spatial representational resources may result in reduced area available to represent either the whole object, or its background workspace. We wished to assess representational neglect in clock drawing by examining clock size (area), and background workspace (2-D drawing placement).

Participants and Methods: Sixty-seven right stroke survivors drew clocks while taking the Behavioral Inattention Test (BIT), with thirty-eight scoring below cutoff for neglect. We compared dimensions and area of clock drawings, and drawing placement by horizontal (left/right) and radial (upper/lower half of page) displacement on the page, in survivors with (N+) versus those without (N-) spatial neglect.

Results: Consistent with reduced global spatial resources available for drawing, N+ patients drew clocks with about half the area of those produced by N- patients (independent-sample t=2.94, p=0.005), and area decreased with neglect severity (r=0.361, p=0.003). Also consistent with reduced asymmetric global spatial resources for a background workspace, N+ patients displaced their drawings rightward compared with N- patients (t=3.60, p=0.001), and rightward displacement increased with neglect severity (r=-0.634, $p < 0.001$). However, rightward displacement and clock area were not inter-correlated.

Conclusions: Spatial neglect may be associated with reduced spatial representational resources, reflected in either left-sided drawing omissions, reduced size of objects drawn, or rightward drawing displacement. This may be explained by dissociable spatial deficits affecting the local content, global object configuration, and global background workspace available for internal representations.

Correspondence: *Peii Chen, Ph.D., Kessler Foundation Research Center, 1199 Pleasant Valley Way, West Orange, NJ 07052. E-mail: pchen@kesslerfoundation.org*

H.M. GIRARD, N. KEMMOTSU, D.J. HAGLER, JR., E.S. TECOMA, V.J. IRAGUI, E. HALGREN, A.M. DALE & C.R. MCDONALD. Effects of Age of Seizure Onset and Disease Duration on Cortical Thinning and White Matter Compromise in Mesial Temporal Lobe Epilepsy.

Objective: Previous studies have demonstrated that patients with left and right mesial temporal lobe epilepsy (L/RMTLE) show differential patterns of cortical thinning and white matter compromise, but the disease-related correlates of these differences are unknown. This study investigated the relationships among seizure-related variables, cortical thinning, and white matter compromise in LMTLE vs. RMTLE.

Participants and Methods: Diffusion tensor imaging and cortical thickness measurements were obtained in 34 patients (17 LMTLE, 17 RMTLE) and 34 age- and gender-matched controls. Spearman correlations were used to examine the associations among clinical variables, fiber tract integrity, and regional cortical thinning.

Results: Patients with LMTLE showed extensive, bilateral cortical thinning and reduced fractional anisotropy (FA) in frontotemporal fiber tracts compared to controls. Cortical thinning and reduced FA in RMTLE was modest and primarily ipsilateral to the seizure focus. In LMTLE, longer disease duration was associated with cortical thinning in left parietal cortex, lower FA of the left unicinate fasciculus (UNC) and lower hippocampal volume, whereas a younger age of seizure onset was associated with lower FA in the left UNC, left parahippocampal cingulum (PHC), and left inferior longitudinal fasciculus (ILF). In RMTLE, longer disease duration was associated with cortical thinning in temporoparietal cortex. There were no significant correlations with age of seizure onset in RMTLE. All effects remained after controlling for age.

Conclusions: LMTLE and RMTLE may represent two very different subgroups of patients with greater neuropathology observed in those with LMTLE. Early seizures in LMTLE may differentially affect white matter development in temporal lobe fibers, whereas chronic seizure propogation may result in more widespread cortical thinning. Differential brain-related vulnerability in LMTLE may explain the greater cognitive and functional impairments often observed in LMTLE relative to RMTLE.

Correspondence: *Carrie R. McDonald, Ph.D., Psychiatry, University of California, San Diego, 8950 Villa La Jolla Drive, Suite C101, La Jolla, CA 92037. E-mail: camcdonald@ucsd.edu*

J. PAYNE & E. KENSINGER. Sleep Preferentially Benefits Emotional Components of Scenes: Behavioral and Neural Evidence.

Objective: After information is encoded into memory, it undergoes an offline period of consolidation that may occur optimally during sleep. The consolidation process not only solidifies memories, but also transforms them in adaptive ways. Here we demonstrate that a daytime nap preferentially enhances memory for emotional objects at the expense of

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press

neutral background scenes, and that this selective enhancement correlates with time spent in deep, slow-wave sleep. Neural evidence for this qualitative shift reveals distinct memory networks associated with the retrieval of emotional object memories following periods of sleep vs. wakefulness.

Participants and Methods: Subjects encoded negative and neutral objects embedded in neutral backgrounds at noon, then subsequently attempted to retrieve these objects from memory following a nap or one of two wake conditions designed to strictly control for circadian and interference confounds. In a second (fMRI) study, subjects encoded the same images in the morning or evening and then retrieved them 12hr later while undergoing an fMRI scan (following wakefulness or sleep).

Results: Relative to wakefulness, sleep preferentially enhanced memory for emotional, compared to neutral, components of scenes in both studies. While wakefulness engaged a diffuse memory retrieval network – including widespread activity in the lateral prefrontal and parietal cortices, sleep activated a more refined network of limbic regions – including the amygdala and ventromedial prefrontal cortex. Effective connectivity analyses revealed stronger connections among limbic regions following sleep than wakefulness.

Conclusions: Sleep evokes qualitative changes in the emotional memory network, and profoundly influences the consolidation of emotional memories by modifying the neural architecture used for later retrieval.

Correspondence: *Jessica Payne, Ph.D., Psychology, University of Notre Dame, 122-B Haggar Hall, Notre Dame, IN 46556. E-mail: jpayne7@nd.edu*

Y. TANAKA, D. CAHANA-AMITAY, M.L. ALBERT, K. FUJITA, C. NONAKA, M. MIYAZAKI & M. TANAKA. Aphasia, Anxiety, and Beta-Adrenergic Antagonists.

Objective: The role of anxiety has not been sufficiently explored in aphasia. In previous studies the centrally acting beta blocker, propanolol, was found to provide short term improvement of naming in both Broca's and Wernicke's aphasia. The current study extends the results of prior research.

Participants and Methods: This was a proof of principle study. Patients with Broca's (4), Wernicke's (4), and amnestic aphasia (3) were tested with the Boston Naming Test (BNT), Action Naming Test (ANT), subtests of auditory comprehension from the SLTA, FAS (word and vegetable), Cookie Theft Description, and Beck Anxiety Inventory. Measures of autonomic function consisted of heart rate, blood pressure, coefficient of variation of R-R intervals in the electrocardiogram (CV-RR100), and sympathetic skin response. Participants received baseline testing, and then were given 10 mg of propanolol daily for four weeks. A second test session was carried out after four weeks, and a third, one month after propanolol was discontinued.

Results: On the second test session, scores on the BNT, ANT, FAS, and auditory comprehension tests were significantly improved for all subjects. CV-RR100 was significantly reduced. There were no significant changes on the Beck Anxiety Inventory. At the third test session, all scores returned toward baseline.

Conclusions: Treatment of aphasia with the putative anti-anxiety agent propanolol produces significant improvement on a range of language tests, regardless of aphasia diagnostic category, coupled with significant changes in physiologic measures. In contrast, however, no changes were produced on a scale designed to measure anxiety.

Correspondence: *Yutaka Tanaka, Tanaka Clinic, 124, Shimogaito, Heguri,, Ikoma-Gun, 636-0933, Japan. E-mail: EZZ05540@nifty.com*

J.D. MEDAGLIA, K. GATES, A. PEECHATKA, M. HASSE, J. SLOCOMB & F.G. HILLARY. Examining Network Change with Extended Unified Structural Equation Modeling: Implications for the Latent Support Hypothesis in Brain Trauma.

Objective: Recent investigations have explored a latent support hypothesis as a potential explanation for right prefrontal cortex (PFC) recruitment observed after brain injury. This position maintains that right PFC resource allotment represents a natural expression of attentional control, exhibiting a functional influence on other working memory regions during tasks. To examine this position, a recent advancement in connectivity modeling (extended unified structural equation modeling, euSEM) is used to estimate functional MRI data in individuals who have sustained traumatic brain injury (TBI).

Participants and Methods: Participants were twelve individuals with moderate or severe TBI and twelve age and education matched healthy controls. Participants performed the n-back during fMRI data acquisition. Functional timeseries were extracted with the MarsBar toolbox in SPM5 from the bilateral PFC, anterior cingulate cortex (ACC) and parietal lobes for each subject. Connectivity models were estimated for each run of data using euSEM to examine network change. Connections were submitted to second-level t-tests to detect network change within and between groups.

Results: More connections from the right PFC to right ACC were observed in TBI than in controls. The influence of the right PFC on right ACC decreased while left intrahemispheric connections increased in TBI. Also, the total number of connections in TBI decreased during the 2-back. A load effect on left intrahemispheric connections was observed in TBI.

Conclusions: Left intrahemispheric connectivity is representative of acclimation to task and remains consistent when task demands are increased. The right PFC's influence diminishes during task proceduralization, supporting a latent resource interpretation of the PFC's role in TBI.

Correspondence: *John D. Medaglia, B.S., Psychology, Pennsylvania State University, 610 Moore Building, University Park, State College, PA 16802. E-mail: jdm454@psu.edu*

D.O. CLAASSEN, W.P. VAN DEN WILDENBERG, R. RIDDERINKHOF & S.A. WYLIE. The effect of dopamine agonists on risk behavior in Parkinson's disease patients with and without impulse control disorder.

Objective: Dopamine agonist treatment is associated with the emergence of impulse control disorder (ICD) in Parkinson's disease (PD). Agonists preferentially alter mesocorticolimbic dopamine pathways, which modulate risk-taking behavior. We hypothesized that dopamine agonists would increase risk-taking behavior in PD, especially among a vulnerable subset of patients who developed ICD concomitant with dopamine agonist use.

Participants and Methods: PD patients with agonist-induced ICD (PD-ICD; n=22) and PD controls without ICD (PD-C; n=19) performed a variant of the Balloon Analogue Risk Task (BART) in which participants allowed balloons to inflate to earn higher rewards while risking the chance that the balloon would pop. The probability that balloons would pop was manipulated to assess sensitivity to negative consequences. Patients were tested separately in "on" and in "off" dopamine agonist states.

Results: In the off dopamine agonist state, PD-ICD and PD-C groups risked a similar number of balloon inflations to earn rewards. In the on agonist state, PD-ICD risked significantly more balloon inflations than PD-C to obtain rewards. Both groups risked fewer balloon inflations when the risk of balloon popping was higher and on trials immediately following a popped balloon.

Conclusions: PD patients with ICD show a propensity toward risky decisions when on their dopamine agonist medication. The increase in risk-taking appears driven by efforts to obtain higher rewards rather than by a reduced sensitivity to the effects of negative consequences. These findings suggest that changes in risk processing as a result of dopamine agonist use may underlie clinical symptoms of ICD. Our results also add behavioral support to the emerging view that the clinical expression of ICD reflects converging genetic, environmental, and pharmacological influences on dopamine and mesocorticolimbic function.

Correspondence: *Scott A. Wylie, Ph.D., Neurology, University of Virginia, 500 Ray C. Hunt Drive, Charlottesville, VA 22908. E-mail: saw6n@virginia.edu*

https://doi.org/10.1017/S1355617711000415 Published online by Cambridge University Press