an anatomically accurate globe and orbit is of interest to improve surgical education for trainees. The purpose of this study was to create a high-fidelity globe and orbit model using synthetic materials and utilizing 3D-printing techniques. METHODS/STUDY POPULATION: A deidentified computed tomography scan of the head and neck was digitally rendered and segmented using Mimics and 3-Matic (Materialise NV, Belgium) to create a digital model of the bony orbit. The model was 3D printed using a stereolithographic 3D-printer (Formlabs, Somerville, MA). The globe was created by soaking a large water bead made from a water absorbing polymer (YIQUDUO, China) for 24 hours. The water bead was then coated consecutively with three layers of silicone (Smooth-On, Macungie, PA). A standard sausage casing was hydrated and encased around the water bead, representing the conjunctiva. The globe was placed into the 3D-printed orbit. An incision was made in the sausage casing and the defect was sutured by one ophthalmologist. RESULTS/ANTICIPATED RESULTS: The bony orbital anatomy was accurately represented by stereolithographic printing. The size and feel of the artificial globe was similar to that of an in vivo human globe. The incised sausage casing covering the globe was able to be manipulated and sutured using a 8-0 suture in a microsurgical environment. The sausage casing had high-fidelity characteristics of an in vivo human eye conjunctiva. DISCUSSION/SIGNIFICANCE: This model can be used for teaching of conjunctival suturing for ophthalmologic trainees. By use of easily obtained materials for the globe, this model has the potential to standardize teaching methods of challenging techniques, and can reduce the need for animal and human tissue procurement, which is the current standard for ophthalmologic teaching.

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Evaluating the long-term impact of a practice-oriented research training program for clinical and translational research staff

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OBJECTIVES/GOALS: The objective of this evaluation is to evaluate the long-term impact of the PORT program on the clinical and translational research careers of the participating research staff. The impact of the program is best demonstrated through measures of the scientific contributions of the participants as well as their professional advancement over time. METHODS/STUDY POPULATION: The PORT program participants were tracked through the collection of instructional and public records, including the collection of their subsequent grant and publications. The clinical and translational research careers of the participants was also assessed, using a measure adapted from the operational guidelines for NCATS' Research Careers Common Metric. A survey was administered to part participants and interviews conducted with participants from the past cohorts. RESULTS/ANTICIPATED RESULTS: The evaluation results demonstrate the PORT program participants made substantial contributions to the advancement of clinical and translational research, particularly through their publication of hundreds of scientific works. In addition, the evaluation results reveal that the program had short-, intermediate- and long-term impact on their research careers, thereby contributing to the advancement of the health research workforce at the University of Michigan for well over a decade. Specific participant cases highlight how individuals utilized their experience and training to advance research agendas and their long-term careers at the institution. These findings can inform the development, implementation and evaluation of similar programs throughout the CTSA consortium and beyond. DISCUSSION/SIGNIFICANCE: Most evaluations of research training and award programs for clinical and translational research staff do not evaluate the long-term impact of CTSA support on the research careers of the participants. The findings of this evaluation can help inform the development of new and more effective workforce development initiatives with long-term impact.

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The use of visual arts to teach complex ideas on non-binary sex/gender traits and identities.

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OBJECTIVES/GOALS: Recent scientific discoveries show that human sex determination and differentiation is a spectrum of developmental processes and that sex/gender traits and identities not always fit binarity. This study aims to determine whether the visual arts can effectively transmit these complex scientific ideas on sex and gender variance. METHODS/STUDY POPULATION: A one-hour lecture for undergraduate students enrolled in a behavioral neuroendocrinology course included 17th century Spanish paintings and representative work from contemporary LGBTQIA+ artists in photography. Pre and post self-evaluation was conducted through five multiple choice questions. Chi Square test was employed for statistical analysis, which required elimination of no responses from item analysis. Statistical significance was defined as p value < 0.05. Three artistic images and two scientific images were included in the questions. Acquisition of content-specific knowledge on diverse body configurations, differences of sex development (DSD), transsexuality, histopathology of the gonad and neuroanatomy of the hypothalamus was evaluated. RESULTS/ANTICIPATED RESULTS: Twenty students completed the online pre- and post-test. We found that a 17th century Spanish painting was effective at making the distinction between transsexuality and intersexuality ($p < 0.0005$). Similarly, an artistic image that reinterprets the Vitruvius Man was effective for presenting the argument that diverse body configurations does not imply clinical pathology ($p < 0.0001$). Last, a scientific image showing the histopathology of an ovotestis was effective for introducing undergraduate students to diagnostic criteria for DSD ($p < 0.02$). No significant differences were found in the use of an artistic photograph depicting a young female to male transsexual individual nor in the use of a scientific image showing the neuroanatomical localization of the hypothalamus. DISCUSSION/SIGNIFICANCE: The learning of complex scientific concepts on human sex determination and differentiation can be affected by preconceived ideas, values, and attitudes towards

https://doi.org/10.1017/cts.2022.289 Published online by Cambridge University Press

sex and gender variance. The visual arts can provide a familiar ground of understanding between teachers and learners to transform such preconceptions.

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A Flexible and Transformational Approach for Learning Research and Communication Skills: The Center for Research Education and Science Communications Opportunities (CRESCO) of the Title V Cooperative Project between the University of Puerto Rico Medical Sciences Campus and the Universidad Central del Caribe (Title V Coop)

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OBJECTIVES/GOALS: The Title V Coop developed CRESCO, a physical and virtual space in the libraries of the two cooperating institutions. Adopting a flexible and transformational approach, it offers services to support the development of research and information skills of undergraduate students and faculty who receive clinical-translational research (CTR) training. METHODS/STUDY POPULATION: Since 2016, CRESCO has been staffed by a multidisciplinary team composed of three librarians, a statistician, an instructional designer, and an IT specialist. The physical facilities of the two libraries were remodeled and equipped, and a central portal was created to provide services and access to resources on a 7/24 basis. Online tutorials, workshops, and mentoring services have been offered that address topics in statistics, literature search, plagiarism, and the use of several research software. Services statistics are collected, and a questionnaire is administered to evaluate the workshops. RESULTS/ANTICIPATED RESULTS: The main results include 12 online tutorials created in CTR areas and available in the CRESCO hub portal; 14,660 mentoring/consultations offered in statistics, the use of research-related software, and the search for scientific literature search; and 6 online workshops created in CTR areas, with 463 attendees. When evaluating online workshops, participants considered that their acquired learning was high or extremely high on the following topics: use of Intellectus Statistics (88%, n = 96); selection of statistical tests (81%, n = 92); use of Turnitin (85%, n = 76); literature search (91%, n = 58); and citations and references in Mendeley (90%, n = 67). DISCUSSION/SIGNIFICANCE: These results suggest that the flexible, multidisciplinary, and transformational approach of CRESCO has been successful in helping undergraduate students and faculty develop the skills necessary to conduct CTR projects.

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Mothers Leading Science: A program to diversify and develop the research workforce

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OBJECTIVES/GOALS: The purpose of this group is to foster professional and personal growth as leaders, provide peer mentoring, integrate the roles of scientist, woman, and mother, and build a self-sustaining network of peers for ongoing support throughout their careers in an academic setting. METHODS/STUDY POPULATION: - Study population: 12 Health sciences research faculty (50% protected research time); identify as female; mother of school-age and/or younger children Methods: Year-long program; including a 2-day retreat based on Brene Brown's Dare to Lead RESULTS/ANTICIPATED RESULTS: - Despite the pandemic, 100% of participants continued in the program over the one-year duration and met the attendance requirement of 75% - Screening for burnout was effective - facilitator was able to intervene when severe burnout was noted.

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Transforming the pipeline towards independence in Clinical and Translational Research (CTR) through opportunities in research environments for underrepresented health professions faculty and students: The Title V Cooperative Project between University Puerto Rico Medical Sciences Campus and Universidad Central del Caribe (Title V Coop)

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OBJECTIVES/GOALS: Diversity and interdisciplinarity are required for successful and transformational CTR. The Title V Coop developed a training curriculum for underrepresented in CTR health professions faculty and students, successfully integrating them in CTR teams. The curriculum exposed students to theory and then a practicum. METHODS/STUDY POPULATION: The curriculum and practicum included basic aspects of training in research including responsible conduct of research and the design of a proposal. The practicum focused on the organizing of a research team identified as a Clinical and Translational Mentoring Team (CTMT) and the implementation of the proposed project. Emphasis was placed on the importance of the mentor-mentee relationship, including peer mentoring. Participants were recruited from across all post-secondary institutions in Puerto Rico emphasizing the participation of faculty(UgF) and students (UgS) from undergraduate programs in health professions and the participation of graduate students GS) as peer mentors. Research mentors for each of the CTMTs were selected from faculty members that are established researchers. RESULTS/ANTICIPATED RESULTS: Twenty-seven (27) proposals from the CTMTs were approved. A total of one hundred and eight (108) participants were or are still engaged in the proposed research. Thirty-four faculty (34) members participated as mentors and three (3) peer reviewed publications have been done. Health professions and science fields represented by the participants include: Nursing, radiology technician, audiologist, medical students, basic science in biology or chemistry, public health and industrial

https://doi.org/10.1017/cts.2022.289 Published online by Cambridge University Press