

Correspondence

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The Editor, British Journal of Psychiatry, 17 Belgrave Square, London SW1X 8PG

CHILDHOOD INDICATORS OF ADULT SCHIZOPHRENIA

DEAR SIR,

In their article, 'Some possible childhood indicators of adult schizophrenia', Hanson, Gottesman and Heston (*Journal*, August 1976, 129, pp 142-54) suggest that children of schizophrenics who 'hit' on three variables possibly related to schizophrenia may 'have a higher risk for schizophrenia than all the other children studied' (p 150). We submit that this speculation is based upon results obtained by the application of inappropriate statistical methods, and that a more appropriate method yields results that do not fit their implied model.

Their procedure was as follows: First, they manipulated the cut-off points for 'hits' and 'misses' on each of three variables they thought might be precursors of schizophrenia, in order to maximize chances of finding significant differences between children of schizophrenics (risk children) and children of non-schizophrenics (comparison or control children). Significant χ^2 s were obtained for each of the three indicators, with risk children getting a significantly greater proportion of hits on each. We agree that this method can be useful in pulling out weak associations, and was appropriate to their purposes.

Their next step was to compute the 'percentage of children expected to hit on any two and on all three indicators by chance alone' (p 148). They found that by chance alone 13 children would be expected to hit on two variables and between zero and one of the 116 children would be expected to hit on all three variables. Finally, the authors compared these expected frequencies to the actual frequencies of two or three hits by individuals in the two groups, and made much of the fact that five risk children and no control children hit on all three indicators.

We contend that this comparison is inappropriate because it does not take into account the prior manipulation of the cut-off points in the χ^2 tables. This manipulation had the effect of increasing probabilities of chance hits for risk children and decreasing the probabilities for controls, so that a given child's chances of hitting on any variable depended upon whether he was a risk or a control child. For example, while all children together had a 20/116 or .17 chance

of hitting on the first variable, this figure cannot be considered as the chance level for either group. It would seem more appropriate to consider separately the probabilities of hits for risk and control children. Thus, the probability of a risk child hitting on the first variable, poor motor skills, is 9/30, or .33; for controls the corresponding probability is 11/86, or .13. For the second variable, large within-person test score variance, probabilities for hits are .53 for risk children and .26 for control children. For the third variable, schizoid behaviour at ages 4 and 7, probabilities for hits are .27 and .05 for the two groups.

If children of schizophrenics have a high risk for schizophrenia, and if the presence of any of the three variables chosen by the authors indicates increased risk for schizophrenia, as the authors suggest, then children with two or three indicators should be even more concentrated in the risk group than those with a single indicator. In considering the probability of two hits, we applied the above base rates and got probabilities of .38 for risk children and .05 for control children, with corresponding expected frequencies of 11.40 for risk children and 4.58 for controls. How do these expected frequencies for two hits compare to the actual frequencies (3 risk children and 8 control children)? The difference between expected and observed is significant ($\chi^2 = 12.68$, $P < .001$), but children of schizophrenics hit *less* frequently than would be expected by chance.

Applying the same procedure to the computation of probabilities of three hits gives values of .043 for risk children and .13 for controls. Thus, between 1 and 2 (1.28) risk children would be expected to hit on all three indicators and almost no (.13) control children should hit on all three. Actually five risk children and no control child hit on all three. While this difference was in the hypothesized direction, it is less dramatic than that presented by the authors, and not different enough from chance to be measured.

C. L. JANES
V. HESSELBROCK

*Division of Child Psychiatry,
Department of Psychiatry,
Washington University School of Medicine,
St Louis, Missouri 63108, USA*