THE FAULT IN OUR STARS: THE LACK OF DISCRIMINANT VALIDITY BETWEEN STATISTICS AND MATHEMATICS ANXIETIES

Jenny Terry and Andy P. Field
University of Sussex, UK
jlt26@sussex.ac.uk

PURPOSE

To promote statistical literacy, we must identify and address emotional and attitudinal barriers to learning statistics with robust methods and measurement. Statistics anxiety is often cited as such a barrier, but we know little about its construct validity. Of particular concern, statistics anxiety is defined as distinct from mathematics anxiety, yet few empirical studies have tested this assumption. Although findings suggest distinctiveness, reported differences are based primarily on correlations and could be due to various methodological limitations. To address these issues, we re-evaluated the constructs' independence in three novel ways.

METHODOLOGY

We conducted an online study with 465 undergraduate psychology students in the UK. Participants completed self-report questionnaires (2 x statistics anxiety, 2 x mathematics anxiety, pre-manipulation state anxiety), followed by a between-participants experimental manipulation (multiple-choice test: statistics or mathematics), and a post-manipulation state anxiety questionnaire.

RESULTS

Exploratory factor analysis of the four statistics anxiety and mathematics anxiety scales produced factors driven by a shared underlying construct. For example, items from the test anxiety subscales of all measures loaded onto a single test anxiety factor.

Latent profile analysis indicated 96.6% of participants reported similar ratings across the mathematics anxiety and statistics anxiety scales. This pattern suggests it is very unusual for an individual to have statistics anxiety independently of mathematics anxiety and vice-versa, again supporting the likelihood of a shared underlying construct.

Multi-level modelling of our experimental manipulation showed state anxiety changes did not vary by multiple-choice test type for either statistics-anxious or mathematics-anxious individuals. Therefore, the constructs showed no specificity in their predictive validity.

CONCLUSION

Our results indicate statistics and mathematics anxieties are not separate constructs, meaning they have fallen prey to the 'jangle fallacy'. If further research corroborates this finding, the constructs' associated literatures will be mutually informative, expediting our understanding of statistics anxiety.