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TITLE:
Pathfinder: A brief, reliable measure to overcome the challenges of investigating *g* in the genomic era.

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KEYWORDS:

ABSTRACT:
Background:
Research on the genetics of general cognitive ability (*g*) has shown increasing heritability from childhood to adulthood. Recent genome-wide association analyses of studies using diverse measures of *g* have produced polygenic scores that can significantly predict *g*, although their predictive power ($R^2 = \sim .10$) is far from capturing the heritability estimates of twin studies. One strategy to bridge this missing heritability gap is to incorporate the same high-quality measure of *g* in large biobanks.

Methods
In a series of three studies, we created a 15-minute online measure of *g* derived from six verbal and nonverbal tests that is reliable and psychometrically valid. The final *g* measure included 20 items measuring verbal ability and 20 items measuring nonverbal ability, embedded in a gamified storyline: *Pathfinder*. We administered this measure to 4,200 twins 23-25 years old from the Twins Early Development Study.

Results

Our final measure of g correlated strongly ($r = .83$) with a large battery of well-established verbal and nonverbal tests and modestly with educational attainment ($r = .38$). One-week test-retest reliability was excellent for total g ($r = .81$) and for the verbal and nonverbal composites ($r = .84$ and $r = .75$). Ongoing twin and DNA-based analyses will assess the heritability and polygenic prediction of our newly created g measure and its longitudinal associations with measures of g, education and socioeconomic status.

Discussion

It is our hope that this freely available measure of g will be used widely to advance research in genomics and the social and behavioural sciences.

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