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Harmonized phenotypes for anxiety, depression, and attention-deficit hyperactivity disorder (ADHD)

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ABSTRACT

In multi-cohort consortia, the problem often arises that a phenotype is measured using different questionnaires in different cohorts. This study aimed to harmonize scores based on the Child Behaviour Check List (CBCL) and the Strength and Difficulties Questionnaire (SDQ) for anxiety/depression and ADHD using test linking. To link the scales, we used parent reports on 1330 children aged 10-11.5 years from the Raine study on both SDQ and CBCL. Test linking was done based on Item Response Theory. We started from existing CBCL and SDQ scales related to anxiety/depression and ADHD (theoretical approach). For confirmation, we conducted a data-driven approach using factor analysis to validate the theoretical approach. Both approaches yielded similar scales, supporting the combination of existing scales. In addition, we studied the impact of harmonizing scores on the statistical power of meta-analytic gene-finding studies. The results showed that IRT-based harmonization increased the statistical power of the results compared to sum scores, even with equal sample size. These findings can guide future researchers to harmonize data from different samples and/or different questionnaires that measure anxiety, depression, and ADHD, in order to obtain larger sample sizes, to compare research results across subpopulations, or to increase generalizability of research results. We recommend using our item parameters to estimate harmonized scores that represent commensurate phenotypes across cohorts, and we explained in detail how other researchers can use our results to harmonize data in their studies.

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