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Estimating twin heritability and environmental sources of variation in the ABCD Study.

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Twin studies continue to yield insights into the sources of variation, covariation and causation in human traits. The ABCD Study[®] (abcdstudy.org) includes four twin-sites, each collecting data on about 200 pairs of twins using population-based sampling. We published initial estimates of heritability for the wide range of phenotypes assessed at baseline in the ABCD Study using a consistent direct variance estimation approach. We built an online resource (<https://abcdtwinhub.shinyapps.io/baselineTwinResults>) for researchers that serves as a reference point for future behavior genetic studies of this publicly available dataset. This tool provides twin correlations as well as estimates of genetic and environmental variance for thousands of continuously distributed phenotypic features, including: structural and functional neuroimaging, neurocognition, personality, psychopathology, substance use propensity, physical, and environmental trait variables. The estimates were obtained using an unconstrained variance approach, to allow them to be incorporated directly into meta-analyses without upwardly biasing aggregate estimates. We built on this tool by analyzing ordinal phenotypes using a threshold model, and estimating model parameters for all variables across follow-up waves. Effects of site, self-identified race/ethnicity, age and sex were statistically controlled. Results from genetic modeling will be accessible via the user-friendly open-access web interface we have established, and will continue to be update as new data are released from the ABCD Study.