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Multivariate analysis reveals shared genetic architecture of brain morphology and human behavior

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ABSTRACT:

Human variation in brain morphology and behavior are related and highly heritable. Yet, it is largely unknown to what extent specific features of brain morphology and behavior are genetically related. Here, we introduce multivariate genomic-relatedness restricted maximum likelihood (MGREML) and provide estimates of the heritability of grey-matter volume in 74 regions of interest (ROIs) in the brain. We map genetic correlations between these ROIs and health-relevant behavioral outcomes including intelligence. We find four genetically distinct clusters in the brain that are aligned with standard anatomical subdivision in neuroscience. Behavioral traits have distinct genetic correlations with brain morphology which suggests trait-specific relevance of ROIs.

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