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Magnitude of Gene–Environment Correlation for Cognitive Ability

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ABSTRACT:

Cognitive ability is a complex phenotype with numerous impacts on positive outcomes across the lifespan, from better health to higher income. Both quantitative genetic methods (e.g., the classical twin design) and molecular genetic methods (genome-wide association studies) indicate substantial heritability of cognitive ability. However, these methods typically assume the absence of gene-environment correlation (*r*GE), despite essentially all theoretical models of educational attainment posing some role of *r*GE across development. Further, empirical evidence on genetic nurture demonstrated the importance of *r*GE for cognitive phenotypes. Yet, we do not have a general estimate of the magnitude of *r*GE for cognitive ability. Here, we use data from the Adolescent Brain Cognitive Development study (ABCD; N=1681 pairs) to estimate the correlation between additive genetic effects and the shared environment. These estimates are possible by integrating the classical twin design with a polygenic score for educational attainment (Dolan et al., 2021). We also include height as a negative control. Our study provides empirical evidence as to the magnitude of gene-environment interplay on a consequential life outcome and highlights a developmental cascade whereby people select or evoke environments that match their genetically influenced characteristics dynamically across early life.

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