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Triangulating genetic methods to uncover the contribution of cognitive and noncognitive skills to academic achievement throughout the school years

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ABSTRACT:

Characteristics such as personality, motivation, and socioemotional competencies have been found to account for academic achievement, and its heritability, beyond cognitive skills. These characteristics have been broadly described as *noncognitive skills*. Several questions regarding the role of noncognitive skills in academic development remain unanswered, including to what extent noncognitive characteristics are associated with academic achievement throughout compulsory education, and the extent to which genetic and environmental factors are implicated in the development of these associations. By triangulating multiple methods, the current study provides a detailed account of how cognitive and noncognitive characteristics are linked to academic performance from age 7 to 16 in the Twins Development Study. Phenotypic and twin analyses showed that noncognitive skills are a fundamental driver of academic achievement, as they predicted variation in achievement at every developmental stage beyond cognitive abilities. Genetic factors accounted for a substantial portion of this prediction. A new polygenic score (PGS) of noncognitive skills, created extending existing approaches to quantify the genetics of noncognitive skills from DNA, significantly predicted variation in noncognitive traits and academic achievement at every developmental stage. While the contribution of cognitive genetics to academic achievement remained relatively stable, the contribution of noncognitive genetics increased substantially over development, providing a glimpse into the mechanisms underlying active gene-environment correlation processes. By placing recent advances in the genetic investigations of noncognitive skills into an educationally relevant, developmental context, the current study provides new crucial insights into the role of cognitive and noncognitive characteristics in academic achievement throughout the school years.

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