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Heritability of infant traits: Meta-analysis of twin studies of psychological traits and developmental milestones in infancy

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ABSTRACT: Despite the importance of infancy as a period of rapid postnatal growth and development, the causes of variation in infant traits remain ambiguous as no one has synthesized findings on genetic and environmental influences on infant phenotypes. We systematically retrieved and extracted findings from 139 papers from 52 twin studies using the classical twin design in infants aged between 0 and 24 months (PROSPERO protocol registration CRD42019151532). Findings included 377 psychological and developmental phenotypes from 78,421 pairs (30,732 MZ; 47,689 DZ), in 21 different countries. We manually classified findings using the WHO International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY) and conducted three-level multilevel random-effects meta-analyses of twin correlations for phenotypes from 10 ICF-CY categories. These models incorporated sampling variance, within-cohort variance in outcome measurement and between-cohort variance, allowing multiple findings to be included from each twin study and multiple different measures of a phenotype. Heritability and shared and nonshared environmental estimates were calculated in meta-analytic SEM models using the correlations and variances from the multilevel meta-analyses. Results provided consistent evidence that psychological traits and developmental milestones are heritable from as early as 0–2 years and are influenced by the shared and non-shared environment. Phenotypic domains with the highest heritabilities were psychomotor functions and attention and those with the highest shared environmental estimates were language, basic cognitive functions and sleep functions. This first meta-analysis of infant traits confirms significant modest twin heritability across a range of infant traits and milestones.

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