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TITLE: Exploring genetic relationships between early motor, personal-social and language development.

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ABSTRACT:

During the first years of life, children learn to master many developmental milestones. Specifically, the transition from crawling to walking during motor development is thought to initiate a cascade of developmental events across domains, including personal-social skills and language development, due to largely unknown aetiological mechanisms. Here, we study whether infant fine motor, gross motor and personal-social skills (6-18 months) genetically predict processes of language acquisition (15-38 months) in unrelated children (genetic-relatedness<0.05) from the Avon Longitudinal Study of Parents and Children (N<7923, 50.6% males, 15 Communicative Development Inventories (CDI) and Denver Development Screening Test (DDST) measures and

genome-wide data). Univariate and multivariate genetic architectures were analyzed using Genome-wide Complex Trait Analysis and Genetic-Relationship-Matrix Structural Equation modelling (GSEM; Cholesky decomposition). Identified SNP-heritability estimates ranged from 4%(SE=0.06) to 20%(SE=0.05). Both, gross motor skills at 6 months and personal-social skills at 15 months of age were genetically correlated with later language abilities (e.g. expressive vocabulary 24 months: $r_g=0.65$ (SE=0.23, $p=0.007$) and $r_g=0.61$ (SE=0.19, $p=0.001$), respectively). GSEM analyses showed that expressive vocabulary (24 months) and word combination use (38 months) load on the latent genetic factor for gross motor skills (6 months), with standardised factor loadings of 0.25(SE=0.09, $p=0.006$) and 0.25(SE=0.09, $p=0.006$) respectively. Similarly, expressive vocabulary (24 months) and grammar (24 months) loaded on the latent genetic factor for personal-social skills (15 months) with standardised factor loadings of 0.29(SE=0.09, $p=0.001$) and 0.26(SE=0.09, $p=0.004$), respectively. Thus, both infant gross motor skills and personal-social skills are predictive of subsequent language performance, consistent with developmental priming of language abilities.

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