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Genetic mechanisms of intergenerational transmission of hyperactivity and inattention

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ABSTRACT:

The symptoms of ADHD, commonly classified into hyperactive and inattentive dimensions, are highly heritable and polygenic. The children of parents with ADHD tend to present more severe ADHD symptoms, and it is assumed that the intergenerational transmission of hyperactivity and inattention is genetically mediated. Recent research showed that parental genotype can predict a child's trait both directly through alleles passed on at conception, but also indirectly through parental behaviors (nature of nurture), independently of the genes transmitted to the children. The present study aims to document genetic mechanisms of intergenerational transmission of hyperactivity and inattention in a sample of twin families from Quebec, Canada. We used the data of 317 families from the Quebec Newborn Twin Study, 317 children and 394 parents in total. Hyperactivity and inattention of twins were repeatedly reported by parents in early childhood and by teachers in primary school. We derived polygenic risk scores (PRS) for ADHD and educational attainment to capture genetic variability associated with the ADHD symptoms. In preliminary analyses, twins' polygenic scores explained up to 6% of individual differences of inattention and up to 3% of hyperactivity. The parents' polygenic scores enhanced this prediction, with total explained variance up to 8% for inattention and 5% for hyperactivity. Overall, the PRS for ADHD was less predictive than the PRS for educational attainment: it explained at most 3.5% of the variance (early childhood hyperactivity). The results suggest that parental genotype can shape child's hyperactivity and inattention bypassing the child's own genotype, supposedly through environmental pathways.

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