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Direct and indirect genetic influences involved in the intergenerational transmission of risk for ADHD in the Norwegian Mother, Father and Child Cohort

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ABSTRACT:

Direct genetic transmission of risk may partly account for epidemiological associations between parental risk factors and children's attention-deficit/hyperactivity disorder (ADHD) symptoms. Indirect genetic influences may also contribute to children's ADHD symptoms via mechanisms such as genetically influenced parenting environments which in turn contributes to ADHD liability in children (also called "genetic nurture"), population stratification or assortative mating. Our study sample consisted of 5,405 family trios from the Norwegian Mother, Father and Child Cohort Study (MoBa). Mothers reported on their 8-year-old children's ADHD symptoms using the Parent/Teacher Rating Scale for Disruptive Behavior Disorders. We computed polygenic scores for parental traits previously associated with ADHD, including psychopathology, substance use, neuroticism, educational attainment and intellectual ability. Jointly modelling polygenic scores for fathers, mothers and children to statistically control for genetic transmission, children's polygenic scores for ADHD ($\beta = 0.10$; 95% CI 0.07 to 0.14), smoking ($\beta = 0.07$; 95% CI 0.03 to 0.10) and educational attainment ($\beta = -0.09$; 95% CI -0.13 to -0.05) predicted ADHD symptoms, suggesting direct genetic effects. Mothers' polygenic scores for autism spectrum disorder ($\beta = 0.05$; 95% CI 0.02 to 0.08) and neuroticism ($\beta = 0.05$; 95% CI 0.01 to 0.08) predicted children's ADHD symptoms, implicating indirect genetic effects. Both direct genetic transmission and genetic nurture likely contribute to associations

between some parental traits and children's ADHD symptoms. These findings highlight the importance of considering the role of genetic influences when investigating intergenerational transmission of risk of ADHD.

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