

Novel genetic variants for ADHD linked to educational attainment

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A study published in the February 2018 issue of the *Journal of the American Academy of Child and Adolescent Psychiatry (JAACAP)* reports that five novel genetic variants associated with attention-deficit/hyperactivity disorder (ADHD) have been identified by exploiting genetic overlap between ADHD and educational attainment.

"In this study, we aimed to explore the genetic architectures of ADHD and educational attainment and to what degree they have a shared [genetic basis](#)," says Alexey A. Shadrin, lead author of the study and postdoctoral research fellow at the Norwegian Centre for Mental Disorders Research (NORMENT). "Our findings may increase the understanding of the genetic risk underlying ADHD and its connection to educational attainment, which has important socioeconomic and health-related life implications," Dr. Shadrin explains.

The researchers used advanced statistical tools to analyze large genetic datasets from genome-wide association studies (GWAS) on ADHD in 3,000 patients and educational attainment in more than 300,000 individuals. The data originated from the Psychiatric Genomics Consortium and the Social Science Genetic Association Consortium, respectively. "Interestingly, we found evidence for a shared genetic basis between ADHD and educational attainment, in which the majority of ADHD genetic risk variants were associated with lower educational attainment," says Professor Ole A. Andreassen, senior author of the study and director of NORMENT. "This finding suggests that part of the reason for why individuals with ADHD tend to have academic

underachievement may be driven by genetic risk. However, we do not know in what way these genetic variants exert their influence on ADHD risk and educational attainment, which must be investigated in subsequent studies."

The authors report five novel genetic loci (locations on the chromosome) associated with ADHD, of which three were also shared with educational attainment. Four of the five ADHD-associated loci implicate protein coding genes: KDM4A, MEF2C, PINK1, RUNX1T1. The researchers also found a pronounced negative genetic correlation (as one factor increases, the other decreases) between ADHD and educational attainment supporting a shared genetic basis between these phenotypes.

"It is important to treat identified genetic associations with caution, bearing in mind that their effect sizes are tiny. This makes them uninformative for clinical diagnostics or treatment guidance, yet they may provide important clues into disease biology that may be interrogated in experimental studies", says Olav B. Smeland, who is currently working as a psychiatric resident and postdoctoral research fellow at Oslo University Hospital. "Although we have some idea how the genes work, we could learn more about them by blocking the function of each gene in mice and study the impact on brain function."

The study's evidence for a shared genetic basis between ADHD and [educational attainment](#) adds to the conceptual framework for why children with ADHD tend to have academic underachievement and emphasizes the need for ongoing therapeutic interventions for children with ADHD in the school setting.

More information: Alexey A. Shadrin et al, Novel Loci Associated With Attention-Deficit/Hyperactivity Disorder Are Revealed by Leveraging Polygenic Overlap With Educational Attainment, *Journal of the American Academy of Child & Adolescent Psychiatry* (2017). [DOI:](#)

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