Twin Studies: Genetics May Explain Adult ADHD, Alcohol Abuse, Binge Eating

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Among other findings: Shared genetic factors may account for 91% of the association between adult ADHD and binge eating.

Symptoms of attention deficit hyperactivity disorder (ADHD) in adulthood are strongly associated with alcohol use problems and binge eating disorder, and genes may explain much of the overlap, according to results from twin studies presented in a doctoral thesis at Linköping University, Sweden.1 The findings are the first to support a genetic basis for a link between adult ADHD and binge eating disorder.

Results also suggested that the genetic overlap between ADHD and these disorders were similar in women and men, and applied across a range of alcohol use problems, from mild to more severe. However, environment is probably also important. The findings showed that maltreatment in childhood may contribute to ADHD symptoms in adulthood.

“Clinically, the results of this thesis support that ADHD in adults be considered and addressed in adults with substance use disorder or binge-eating behaviour. Given the common genetic risk factors and the role of the early childhood environment, family interventions should be considered for these populations,” wrote author Andrea Johansson Capusan, PhD, of Linköping University, Sweden.

Past studies have reported higher prevalence of ADHD in adults with substance use disorder, compared to the general population. Likewise, research has suggested that binge eating disorder and ADHD are comorbid.
Twin studies have strongly suggested a genetic role in ADHD etiology. However, the nature of the relationship between ADHD, genes and other psychiatric conditions like substance use disorder and binge eating remains less clear. While self-medication may provide one explanation, some studies have pointed to shared genetic and neurologic factors, such as changes in mesolimbic reward processing, as well as in frontal, executive and inhibitory systems.

Studies also suggest a wide range of environmental risk factors for ADHD, including low income, family adversity, hostile parenting, and childhood maltreatment, according to background information in the thesis.

To tease out the role of genes and environment in adult ADHD, substance abuse disorders, and binge eating, Dr. Johansson Capusan and colleagues conducted four related studies. Each study used self-reported data on ADHD symptoms from 18,167 twins aged 20-46 years in the Swedish Twins Registry (60% female, mean age 33.6 years).

**Study I** focused on ADHD symptoms and alcohol use disorder, polysubstance abuse, illicit drug use (cannabis, stimulants, opioids), and regular nicotine use. Results showed strong associations between ADHD symptoms and substance use problems. There were no significant differences by ADHD subtype, and no particular substance was preferred over another. ADHD symptoms were associated with:

- 88% increased odds of alcohol abuse (OR 1.88, 1.89-5.29)
- 358% increased odds of alcohol dependence (OR 3.58, 4.01-9.87)
- 227% increased odds of illicit drug use (OR 2.27 2.30-5.57)
- 33% increased odds of regular nicotine use (OR 1.33, 0.94-2.12)

**Study II** evaluated alcohol dependence specifically, with a focus on sex differences. Results suggested that shared genetic factors may explain 64% (95% CI: 47, 80) of the association between adult ADHD and alcohol dependence, while non-shared environmental factors also contribute significantly to the overlap (rE = 0.18; 95% CI: 0.10, 0.26). No significant differences were found based on sex.

**Study III** looked at childhood maltreatment (maltreatment, neglect, and abuse). The study compared data within each twin pair, in order to evaluate the role of genes and environment. Results showed that part of the association between adult ADHD and childhood maltreatment may be explained by environmental confounding within the family. However, results were significant statistically significant for physical and sexual abuse, suggesting that genes may also play a causal role.

**Finally, study IV focused on** the links between adult ADHD and binge eating. Results suggested that 91% of the association between adult ADHD and binge eating may be accounted for by shared genetic factors. Compared to those without ADHD symptoms, adult ADHD symptoms were associated with:

- 365% increased odds of binge eating behavior (OR 3.65 [95%CI: 2.72, 4.91], p<.001)
- 255% increased odds of binge eating disorder (OR= 2.55 [95%CI: 1.11, 5.86], p<.05)
- 209% increased odds of bulimia nervosa (OR= 3.09 [95%CI: 2.09, 4.56], p<.001)

“Given increasing evidence that ADHD and its comorbidities with other conditions have a significant degree of shared heritability, it is important that health providers are educated in interpreting and communicating genetic and environmental risks to their patients,” Dr. Johansson Capusano concluded.

Further studies are needed to evaluate the role of neurobiology in childhood maltreatment, and how the two may contribute to adult ADHD symptoms.

**Take Home Points**

- Swedish twins studies suggest adult ADHD symptoms are strongly associated with alcohol use problems and binge eating disorder, and genes may explain much of the overlap.
- Shared genetic factors may explain 64% of the association between adult ADHD and alcohol dependence, while non-shared environmental factors also contribute significantly.
- Shared genetic factors may account for 91% of the association between adult ADHD and binge eating.
- Part of the association between adult ADHD and childhood maltreatment may be explained by environmental confounding within the family. However, results do not rule out a causal role for genes and more studies are needed.

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