Study Finds Inherited Genetic Signature Linked to Increased Risk for Addiction

A new study suggests that a common genetic signature may increase a person's risk of developing substance use disorders (SUD), regardless of the type of SUD. Researchers analyzed genomic data of over 1 million people with SUD in one of the largest studies of its kind.

Study results were published in Nature Mental Health by researchers at the Washington University in St. Louis. More than 150 coauthors from around the world contributed to the research that was supported by the National Institute on Drug Abuse (NIDA), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), the National Institute of Mental Health (NIMH), the Eunice Kennedy Shriver National Institute of Child Health and Human Development, and the National Institute on Aging.

Researchers identified areas in the genome connected to general addiction risk as well as specific SUD types, including alcohol, nicotine, cannabis, and opioid use disorders. The genetic sample included over 1 million individuals with genes indicating European ancestry and over 92,000 individuals with genes indicating African ancestry.

The study highlights molecular patterns underlying addiction.

The human genome is made up of a set of 23 chromosomes and over 3 billion base pairs of DNA. In that DNA there are more than 10 million SNPs (pronounced snip), which account for our genetic differences. The researchers in this study identified 19 independent SNPs associated with general SUD risk and 47 SNPs for specific SUDs among the European ancestry group. In the African ancestry sample, the study showed one SNP associated with general addiction and one SNP connected to risk for alcohol use disorder. Authors noted that fewer findings for the African ancestry may be due to smaller samples and highlighted the need to address the data disparities in building a globally representative population in genetics research.

The genetic pattern identified was also connected to polysubstance use disorder and a higher risk of mental and physical illness, including psychiatric disorders, suicidal behavior, respiratory disease, heart disease, and chronic pain conditions.

"There is a tremendous need for treatments that target addiction generally, given patterns of the use of multiple substances, lifetime substance use, and severity seen in the clinic," explained lead author Alexander Hatoum, PhD, a research assistant professor of psychological & brain sciences in Arts & Sciences at Washington University. "Our study opens the door to identifying medications that may be leveraged to treat addiction broadly, which may be especially useful for treating more severe forms, including addiction to multiple substances."

"This study represents a major advance in understanding how genetic factors predispose people to substance use disorders," shared co-author Arpana Agrawal, PhD, a professor of psychiatry at Washington University School of Medicine. "While we have known for a while that many genetic factors are shared between different substance use disorders, our study identified some of the contributing genes, providing avenues for future biological and therapeutic discoveries for individuals with multiple addictions."

NIDA director Dr. Nora Volkow also shared: "Genetics play a key role in determining health throughout our lives, but they are not destiny. Our hope with genomic studies is to further illuminate factors that may protect or predispose a person to substance use disorders – knowledge that can be used to expand preventative services and empower individuals to make informed decisions about drug use."

More info:
https://www.nature.com/articles/s44220-023-00034-y
https://nida.nih.gov/news-events/news-releases/2023/03/new-nih-study-reveals-shared-genetic-markers-underlying-substance-use-disorders
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