

Press Release

January 13, 2025

FOR IMMEDIATE RELEASE

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SAFE Glen Cove Coalition: Study Suggests Brain Structure Differences are Associated with Early Adolescent Substance Use

A study of nearly 10,000 adolescents funded by the National Institutes of Health (NIH) has identified distinct differences in the brain structures of those who used substances before age 15 compared to those who did not. Many of these structural brain differences appeared to exist in childhood before any substance use, suggesting they may play a role in the risk of substance use initiation later in life, in conjunction with genetic, environmental, and other neurological factors.

This data adds to some emerging evidence that an individual's brain structure, alongside their unique genetics, environmental exposures, and interactions among these factors, may impact their level of risk and resilience for substance use and addiction. Researchers seek to understand the complex interplay between the factors that contribute and that protect against drug use as this information is crucial for making effective and informed prevention interventions and providing support for those who may be most vulnerable.

Among the 3,460 adolescents who initiated substances before age 15, most (90.2%) reported trying alcohol, with considerable overlap with nicotine and/or cannabis use; 61.5% and 52.4% of kids initiating nicotine and cannabis, respectively, also reported initiating alcohol. Substance initiation was associated with a variety of brain-wide (global) as well as more regional structural differences primarily involving the cortex, some of which were substance-specific. While these data could someday help inform clinical prevention strategies, the researchers emphasize that brain structure alone cannot predict substance use during adolescence, and researchers warn that these data should not be used as a diagnostic tool.

Using data from the National Institute on Drug Abuse (NIDA) ABCD study, the largest longitudinal study of brain development and health in children and adolescents in the United States, researchers assessed MRI scans taken of 9,804 children across the U.S. when they were ages 9 to 11 – at “baseline” – and followed the participants over three years to determine whether certain aspects of brain structure captured in the baseline MRIs were associated with early substance initiation.

Researchers monitored for alcohol, nicotine, and/or cannabis use, the most common substances used in early adolescence, as well as use of other illicit substance and compared MRIs of 3,460 participants who reported substance initiation before age 15 from 2016 to 2021 to those who did not (6,344).

The researchers identified five brain structural differences between those who reported substance initiation before the age of 15 and those who did not. These included greater total brain volume and greater subcortical volume in those who indicated substance initiation. Some brain structural differences also appeared unique to the type of substance used.

In a post-hoc analysis, the researchers found that many of these brain differences still held even after removing those participants who reported substance initiation prior to collection of their baseline MRIs. The resulting comparison was between those who did not report any substance use initiation and a subgroup of 1,203 participants in the substance use initiation group who did not have any substance use experience when their MRIs were first captured. The results of this secondary analysis suggest that some of these brain structural differences may exist prior to any substance use, challenging the interpretation that such differences are only driven by substance exposure and pointing to an area for further investigation.

While some of the brain regions where differences were identified have been linked to sensation-seeking and impulsivity, the researchers note that more work is needed to delineate how these structural differences may translate to differences in brain function or behaviors. They also emphasize that the interplay between genetics, environment, brain structure, the prenatal environment, and behavior influence affect behaviors.

The ABCD study provides a large database of longitudinal data to go beyond previous neuroimaging research to understand the bidirectional relationship between brain structure and substance use. The hope is that these types of studies, in conjunction with other data on environmental exposures and genetic risk, could help change how we think about the development of substance use disorders and inform more accurate models of addiction moving forward.

The National Institute on Drug Abuse (NIDA) is a component of the National Institutes of Health, U.S. Department of Health and Human Services. NIDA supports most of the world's research on the health aspects of drug use and addiction. The Institute carries out a large variety of programs to inform policy, improve practice, and advance addiction science. For more information about NIDA and its programs, visit www.nida.nih.gov.

SAFE is the only alcohol and substance use prevention agency in Glen Cove whose mission is to eliminate alcohol and substance use in Glen Cove. Its Coalition is concerned about alcohol, tobacco and other drug use in youth and is conducting a prevention awareness campaigns entitled "Keeping Glen Cove SAFE" to educate and update the community regarding its negative consequences. To learn more about the SAFE Glen Cove Coalition please follow us on www.facebook.com/safeglencovecoalition or visit SAFE's web page at www.safeglencove.org.

