

Best friends' drinking can negate the protective effects of an alcohol dehydrogenase 1B gene variant

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Patterns of alcohol use that begin during adolescence are important factors in the development of alcohol use disorders (AUDs) during adulthood. While researchers know that adolescent drinking is influenced by both genetic and environmental factors, much less is known about interactions between the two. A study of the interplay between peer drinking and the functional polymorphism rs1229984 in the alcohol dehydrogenase 1B gene (ADH1B) in the development of adolescent drinking milestones has found that peer drinking reduces the protective effects of an ADH1B variant.

Results will be published in the October 2014 online-only issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"By late adolescence, most U.S. youth have consumed [alcohol](#), and unfortunately approximately 15 percent meet the criteria for alcohol abuse," said Laura J. Bierut, Alumni Endowed Professor of Psychiatry at Washington University School of Medicine as well as corresponding author for this study. "Adolescents who begin [drinking](#) at a younger age are at greater risk for later alcohol problems. For example, one study surveyed over 40,000 adults and found that individuals who began drinking before age 14 developed [alcohol dependence](#) during their lifetime at nearly twice the rate as those who began drinking at age 21 or older. These data demonstrate that alcohol use during adolescence plays

an important role in the subsequent [development](#) of AUDs in [adulthood](#)."

Henry R. Kranzler, director of the Center for Studies of Addiction at the University of Pennsylvania Perelman School of Medicine, agreed.

"Adolescent drinking has gotten a lot of attention because it contributes to problems in school and in the family and increases the likelihood of using other drugs, including tobacco, and of problematic sexual behavior," he said. "Although drinking during adolescence is normative in some countries, it's controversial whether later exposure to alcohol can protect against adult AUDs."

"Only a limited number of studies have investigated the interplay between specific robust genes associated with the development of alcohol dependence and environments during the critical developmental period of adolescence," said Bierut. "Recently, large-scale genetic studies have shown that certain genes contribute to adult substance use disorders. For example, some people have a particular variant of the ADH1B gene that causes an amino acid change in this enzyme, which leads to faster enzyme activity so individuals with this variant metabolize alcohol more rapidly which means that acetaldehyde levels are temporarily increased. Given the toxicity of acetaldehyde, negative effects are experienced by people with this ADH1B variant when they drink alcohol, which discourages heavy drinking and serves as a [protective effect](#). Because peer drinking is known to have a strong effect on youth alcohol use, we hypothesized that this important environmental influence would alter the effect of the ADH1B variant on early drinking milestones, such as becoming intoxicated or experiencing a symptom of an AUD."

"There is some evidence that adolescent drinking is particularly affected by gene by environment interactions," added Kranzler. "Genetic risk factors may be more fully expressed in environments with low parental

monitoring and high alcohol availability, and the presence of friends, particularly close friends, who drink."

Bierut and her colleagues analyzed data gathered through the Collaborative Study on the Genetics of Alcoholism (COGA), a large, multi-center, family study designed to identify genes that contribute to AUDs. Study authors selected 1,550 European and African-American individuals (766 females, 784 males) who had a full drink of alcohol before age 18, since the ADH1B variant is expected to exhibit a protective effect only in response to alcohol consumption. Sophisticated statistical methods were used to examine two primary outcomes during adolescence: age of first intoxication and age of first DSM-5 AUD symptom.

"This study demonstrates that a high-risk social environment can overwhelm the protective effect of a genetic variant associated with alcohol-related behaviors," said Emily Olfson, an MD-PhD student at Washington University School of Medicine as well as first author of this study. "The modifiable risk factor of 'best friends drinking' eliminates the protective effect of a well-established ADH1B variant for the development of adolescent drinking behaviors. Among individuals who reported that none or few of their best friends drank alcohol between ages of 12 to 17 – considered a low-risk social environment – this ADH1B variant was associated with a protective effect, reducing the likelihood that an adolescent would experience a first intoxication and first symptom of an AUD. In contrast, in individuals who reported that most or all of their best friends drank alcohol, and thus were already at elevated risk for drinking behaviors, this genetic protection was lost."

"While there's little to be done to measure genetic risk at this point – as the benefit of routinely screening for variation in ADH1B cannot be justified – peer drinking practices are amenable to assessment and intervention by clinicians and appealing, non-drinking activities can be

encouraged by school administrators," said Kranzler. "Furthermore, monitoring adolescent activities and promoting engagement in social activities that don't include alcohol are things that parents can do to help their adolescents avoid alcohol involvement."

Bierut concurred. "Peer drinking is a modifiable environmental risk factor that overrides the genetic protective effect of an ADH1B variant," she said. "Clinicians need to be aware of the risk of peer drinking so that efforts can be made to change the peer environment. Associating with and becoming friends with peers who drink is a strong risk factor for the development of problem drinking. Parents, teachers, counselors, and others who interact with adolescents should encourage [adolescents](#) to not drink and help them to select friends who do not drink heavily. In the past 30 years, we have changed the social acceptance of smoking and reduced smoking in our youth. Hopefully we can reduce the social acceptance of adolescent drinking and limit the future development of AUDs."

Provided by Alcoholism: Clinical & Experimental Research

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