

## A family history of alcoholism may make adolescent brains respond differently

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Researchers know that adolescents with a family history of alcoholism (FHP) are at risk for developing alcohol use disorders. Some studies have shown that, compared to their peers, FHP adolescents have deficits in behavioral inhibition. A study of the neural substrates of risk-taking in both FHP adolescents and their peers with a negative family history of alcoholism (FHN) has shown that FHP youth demonstrated atypical brain activity while completing the same task as the FHN youth.

Results will be published in the April 2012 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"We know that a familial history of alcoholism is a significant risk factor for future alcohol abuse," said Bonnie J. Nagel, assistant professor of psychiatry and behavioral neuroscience at Oregon Health & Science University as well as corresponding author for the study. "We were interested in determining whether adolescents at heightened risk for alcohol use made more risky decisions during a laboratory task compared to their lower-risk peers. Additionally, we wanted to examine whether differences in brain responses when making risky decisions were present in these two groups. We wanted to investigate pre-morbid neural risk factors during decision making in FHP youth, as opposed to differences in brain response due to heavy alcohol use itself."

"This is the first study to examine the neural substrates of risk-taking in FHP adolescents who are substance naïve," added Megan Herting, a PhD candidate in behavioral neuroscience at Oregon Health & Science

University. "A previous study looked at young adults who were drinkers, therefore, it is hard to say if the differences found were purely a pre-existing neural risk factor for alcohol use. Alcohol use may also differentially impact the brains of those with and without a [family history](#) of alcoholism. Thus, the current study is a very novel and important piece of work showing that the brain is doing something different during risky decision making in substance-naïve FHP adolescents."

Study authors recruited 31 youth – 18 FHP (12 males, 6 females) and 13 FHN (8 males, 5 females) – between 13 and 15 years of age from the local community. All of the youth had little to no alcohol involvement prior to their participation in the study. Functional magnetic resonance imaging (fMRI) was used to examine brain responses of the youth during a Wheel of Fortune (WOF) decision-making task, which presented risky versus safe probabilities of winning different amounts of money.

"While our study found that FHP adolescents did not perform significantly differently on the WOF task compared to the FHN adolescents," said Nagel, "we found two areas of the brain that responded differently. These areas were in the prefrontal cortex and cerebellum, both of which are important for higher-order day-to-day functioning, such as decision-making. In these brain regions, FHP adolescents showed weaker brain responses during risky decision-making compared to their FHN peers. We believe that weaker activation of these brain areas, known to be important for optimal decision-making, may confer vulnerability towards risky decisions with regards to future alcohol use in adolescents already at risk for alcoholism."

Herting noted that higher-order or executive functioning is also important for things like attention, working memory, and [inhibition](#). "Therefore, differences in brain activity may impact the ability of FHP individuals to make good decisions in many contexts, and in particular

may facilitate poor decision-making in regards to alcohol use," she said. "Taken together with other studies on FHP youth, these results suggest that atypical [brain](#) structure and function exist prior to any substance use, and may contribute to an increased vulnerability for alcoholism in these individuals."

Both Nagel and Herting believe these findings can help to develop better prevention programs based on familial risk factors. "These findings may suggest a neurobiological marker that helps to explain how family history of alcoholism confers risk," said Nagel. "Furthermore, our research may aid clinicians who work with high-risk youth to develop effective prevention strategies for these [adolescents](#) to promote healthy decision-making."

However, they both added, having a familial history of alcoholism is just one of many different factors involved in future alcohol abuse. "While having a family history of alcoholism may put one at greater risk for [alcohol](#) abuse, personality and behavioral risk factors are also important to consider," said Nagel. "The combination of genetic and environmental factors is very different for everyone, so some individuals may be at higher risk than others, and certainly there are genetic and environmental factors that can also protect against [alcohol abuse](#). Future research will need to determine the relative influence of these traits on [alcohol](#) abuse risk to be able to design specific prevention strategies for different high-risk populations."

Provided by Alcoholism: Clinical & Experimental Research

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