

Some people may be more susceptible to alcohol-induced fragmentary blackouts

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Alcohol's effects on memory range from mild deficits to alcohol-induced blackouts. That said, very little research has been carried out on memory impairments among individuals who have experienced alcohol-induced blackouts. A new study of neural activation during a contextual-memory task among individuals with and without a history of alcohol-induced fragmentary blackouts demonstrates individual differences in how alcohol impacts memory.

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

"Prior research had shown that individuals who experienced alcohol-induced blackouts were more likely than those who had not experienced blackouts to exhibit [memory impairments](#) when intoxicated," said Reagan R. Wetherill, a postdoctoral fellow at the University of California, San Diego and corresponding author for the study. "Our study is the first examination of neural activity during a contextual-memory task among individuals with a history of alcohol-induced blackouts."

"Blackouts have been widely regarded as an important warning signal of problem drinking for many decades now," observed Bryan Hartzler, a research scientist at the University of Washington's [Alcohol](#) & Drug Abuse Institute. "But some people may mistakenly equate the term 'alcohol blackout' with only a more extreme experience of [memory](#) loss where one 'loses time' for a period during which the brain essentially just

stops making memories. Fragmentary blackouts are less severe than that, in that just portions of one's experience are forgotten and can be recalled via use of retrieval cues. However, fragmentary blackouts have also been shown to be much more prevalent, at least among young adults. The current study's inclusion of functional magnetic resonance imaging technology provides a direct, powerful means to examine underlying biological correlates of this more common type of alcohol-induced blackout."

Wetherill and her colleagues used data from a larger, longitudinal study of alcohol use and behavioral risks to examine 24 individuals (12 males, 12 females) with (n=12) and without (n=12) a history of fragmentary blackouts. All participants completed a block design contextual memory task across 48 functional magnetic resonance imaging sessions, with and without alcohol, during which task performance and brain hemodynamic activity were measured.

Wetherill explained that the block design contextual [memory task](#) involves a study phase and a test phase. During the study phase, images are shown with a cue question such as "living or nonliving?," followed by a brief rest, then different images are shown with a different cue question such as "pleasant or unpleasant?" After several "blocks" of images are shown, the test phase has participants recall the images and cue questions, adding an additional image that was never shown. Wetherill said this task is designed to assess a person's ability to remember contextual information like the cue question when presented with a previous experience like a specific image.

"Our study's findings suggest that some people are more likely to experience alcohol-induced blackouts than others due to the way alcohol affects brain activity in areas involved in self-monitoring, attention, and working memory," said Wetherill.

"Through use of imaging technology, this study has made the really intriguing finding that the unique patterns of blood flow and neural activity seen in persons prone to experience those amnesic phenomena emerged only after they became intoxicated," said Hartzler. "That finding, taken together with results from prior research on fragmentary blackouts, suggests there are salient individual differences in how alcohol impacts memory, and that those differences can be identified by both behavioral and neurophysiological markers."

"Alcohol intoxication attenuated recollection-related brain activity in the right frontopolar cortex, which is a brain region involved in 'multitasking,'" said Wetherill. "Later, when sober, individuals with a history of blackouts showed slightly impaired recollection and attenuated brain activity in prefrontal and posterior parietal brain regions typically involved in attention, inhibitory processing, decision-making, and working memory. Thus, alcohol appears to affect a person's ability to multitask, and also affects some people's ability to engage brain areas required for encoding and remembering previous experiences."

"Irrespective of the specific type of alcohol-related memory loss involved, if one is experiencing blackouts it is an important signal that negative personal and health consequences are more likely to occur," said Hartzler. "Not fully recalling one's life experiences, particularly those that occur while one is intoxicated, creates a state of vulnerability where the chances increase for the individual to incur all kinds of problems."

Wetherill agreed. "Given that approximately 40 percent of college students experience alcohol-induced blackouts and, in some cases, later discover they engaged in unwanted/risky sex, drove, or other complex behaviors, our findings highlight the fact that alcohol impairs brain functioning and some people may be more vulnerable to alcohol's effects than others," she said. "In other words, just because your friend may be

able to drink a certain number of drinks and appear to be functioning fine, it does not mean that you or everyone else can."

Provided by Alcoholism: Clinical & Experimental Research

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