

# Teen pot use could hurt brain and memory, new research suggests

Brian Alexander | NBC News  
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Teenage pot smokers could be damaging brain structures critical to memory and reasoning, according to new research that found changes in the brains of heavy users.

Research released Monday in the journal *Schizophrenia Bulletin* showed the brains of young heavy marijuana users were altered in so-called sub-cortical regions — primitive structures that are part of the memory and reasoning circuits. And young people with such alterations performed worse on memory tests than non-using controls, despite the fact that the heavy users had not indulged for more than two years, on average, before the testing.

“We see that adolescents are at a very vulnerable stage neurodevelopmentally,” said Matthew Smith, who led the research team at Northwestern University Feinberg School of Medicine in Chicago. “And if you throw stuff into the brain that’s not supposed to be there, there are long-term implications for their development.”

The portion of people ages 12 to 17 who used marijuana during the past month fell to 9.5 percent last year from almost 12 percent in 2002, according to the latest figures from the government’s Substance Abuse and Mental Health Services Administration. But that still represents millions of adolescents and teenagers — and the legalization of marijuana has raised the specter that underage people will have easier access.

Adults who smoked pot regularly as teens were shown to have “neuropsychological decline” and “more cognitive problems” than non-users in a study last year in the *Proceedings of the National Academy of Sciences (PNAS)*. This was true even if users stopped using long before the study.

The new research may help explain why.

Smith’s team recruited 44 non-using healthy controls and compared them with 10 people with a history of cannabis use disorder, 15 with a history of cannabis use disorder and a diagnosis of schizophrenia, and 28 with schizophrenia but no past regular use of marijuana. The average age of the people was mid-20s at the time of the testing, but they had been heavy users as teens.

When the team made MRI scans of the three brain regions — the striatum (a collection of bodies key to reward and motivation), the thalamus (the brain’s Grand Central Station for cognition input), and the globus pallidus (involved with both movement and memory) — heavy users showed abnormalities, whether or not they had schizophrenia. (Heavy users displayed a significantly reduced volume of the thalamus, for example.)

When the groups were given four tests of working memory, like remembering sequences of numbers they'd seen, heavy users, with or without schizophrenia, performed worse than healthy controls and non-using schizophrenics.

“We saw poor performance in the marijuana groups...” Smith explained. “And the younger somebody started using, the more abnormal they looked.”

But the study leaves important unanswered questions.

Smith stressed that it does not prove cause-and-effect, and neither did the PNAS study. The differences in brain geography in Smith's study could have existed before the young people used weed — it's possible that their brain differences made them more likely to smoke pot in the first place.

“It's chicken-and-egg,” explained Donald Dougherty, vice-chair for research and the Wurzbach Distinguished Professor of Psychiatry at the University of Texas Health Science Center in San Antonio.

“We can identify certain differences, mainly in impulse control, related to the onset of substance use,” Dougherty said. “But the key thing is that we do not know what impact drug use has on normal development. It may be that differences at the beginning leads to drug use, then drug use also impacts normal development. We can't tease these things out.”

Dougherty found the study “very interesting” but agreed with Smith that “there are lots of unanswered questions.” Ideally, researchers would follow children from a time before they ever started using, through a period of use, and into adult years to track brain and cognition changes.

“It's important to look at development at young ages,” Dougherty said. “People don't recognize there is such a huge potential to affect the long-term brain, but we still don't know to what extent drug use may impact normal development.”

*Brian Alexander is a frequent contributor to NBC News and a co-author of “The Chemistry Between Us: Love, Sex, and the Science of Attraction.”*