

# Study: Long-term marijuana use changes brain's reward circuit

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Dr. Francesca Filbey, director of cognitive neuroscience of addictive behaviors at the Center for BrainHealth, and her research team examined the effects of long-term marijuana use on the reward system in the brain. Credit: University of Texas at Dallas

Chronic marijuana use disrupts the brain's natural reward processes, according to researchers at the Center for BrainHealth at The University of Texas at Dallas.

In a paper published in *Human Brain Mapping*, researchers demonstrated for the first time with functional magnetic resonance imaging that long-term [marijuana](#) users had more [brain](#) activity in the mesocorticolimbic-reward system when presented with cannabis cues than with natural reward cues.

"This study shows that marijuana disrupts the natural reward circuitry of the brain, making marijuana highly salient to those who use it heavily. In essence, these brain alterations could be a marker of transition from recreational marijuana use to problematic use," said Dr. Francesca Filbey, director of Cognitive Neuroscience Research in Addictive Disorders at the Center for BrainHealth and associate professor in the School of Behavioral and Brain Sciences.

Researchers studied 59 adult marijuana users and 70 nonusers, accounting for potential biases such as traumatic brain injury and other drug use. Study participants rated their urge to use marijuana after looking at various visual cannabis cues, such as a pipe, bong, joint or blunt, and self-selected images of preferred fruit, such as a banana, an apple, grapes or an orange.

Researchers also collected self-reports from study participants to measure problems associated with marijuana use. On average, marijuana participants had used the drug for 12 years.

When presented with marijuana cues compared to fruit, marijuana users showed enhanced response in the brain regions associated with reward, such as the orbitofrontal cortex, striatum, anterior cingulate gyrus, precuneus and the ventral tegmental area.

"We found that this disruption of the reward system correlates with the number of problems, such as family issues, individuals have because of their marijuana use," Filbey said. "Continued marijuana use despite these problems is an indicator of [marijuana dependence](#)."

**More information:** Francesca M. Filbey et al. fMRI study of neural sensitization to hedonic stimuli in long-term, daily cannabis users, *Human Brain Mapping* (2016). [DOI: 10.1002/hbm.23250](https://doi.org/10.1002/hbm.23250)

Provided by University of Texas at Dallas

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