

Dependence alters the brain's response to pot paraphernalia

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Dr. Francesca Filbey, professor at the University of Texas at Dallas, found that drug paraphernalia triggers the reward areas of the brain differently in dependent and non-dependent marijuana users. Credit: The University of Texas at Dallas



New research from The University of Texas at Dallas demonstrates that drug paraphernalia triggers the reward areas of the brain differently in dependent and non-dependent marijuana users.

The study, published July 1 in *Drug and Alcohol Dependence*, demonstrated that different areas of the brain activated when dependent and non-dependent users were exposed to drug-related cues.

The 2012 National Survey on Drug Use and Health shows marijuana is the most widely used illicit drug in the United States. According to a 2013 survey from the Pew Research Center, 48 percent of Americans ages 18 and older have tried marijuana. The National Institute on Drug Abuse states that 9 percent of daily users will become dependent on marijuana.

"We know that people have a hard time staying abstinent because seeing cues for the <u>drug</u> use triggers this intense desire to seek out the drugs," said Dr. Francesca Filbey, lead author of the study and professor at the Center for BrainHealth in the School of Behavioral and Brain Sciences. "That's a clinically validated phenomenon and behavioral studies have also shown this to be the case. What we didn't know was what was driving those effects in the brain."

To find this effect, Filbey and colleagues conducted brain-imaging scans, called functional magnetic resonance imaging (fMRI), on 71 participants who regularly used marijuana. Just more than half of those were classified as dependent users. While being scanned, the participants were given either a used marijuana pipe or a pencil of approximately the same size that they could see and feel.

A comparison of the images revealed that the nucleus accumbens, the reward region in the brain, was activated in all users in response to the pipe. However, the strengths of the connections with other areas differed



between dependent and non-dependent users.

"We found that the reward network is actually being driven by other areas unrelated to reward, like the areas in memory and attention or emotion," Filbey said.

Non-dependent users showed greater activations in the <u>orbital frontal</u> <u>cortex</u> and hippocampus, suggesting that memory and attention were connected to the activation of the reward network. Dependent users had greater activations in the amygdala and anterior cingulate gyrus, suggesting a more emotional connection.

Additionally, the areas of the brain activated resemble <u>areas</u> activated for other addictions, such as nicotine or cocaine, lending greater support to the addictiveness of marijuana.

These findings suggest that marijuana abuse intervention needs to cater more specifically to a user's level of addiction.

"Clinicians treating people with problems with <u>marijuana</u> dependence should consider the different processes that trigger the reward response when determining possible pharmacological or behavioral interventions," Filbey said.

Provided by University of Texas at Dallas

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