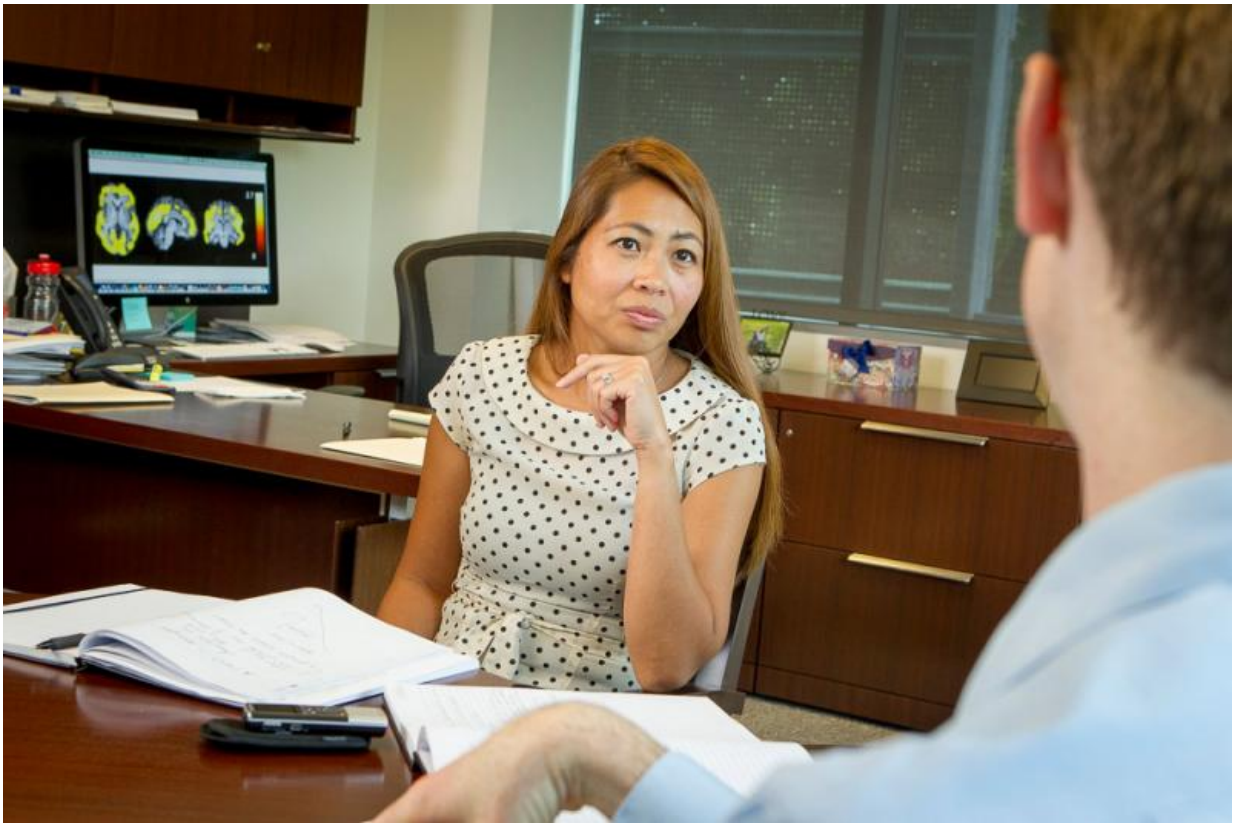
Marijuana brain study offers new substance by including nicotine use

October 2 2015, by Emily Bywaters



Dr. Francesca Filbey, director of cognitive neuroscience of addictive behaviors at the Center for BrainHealth, and her research team accounted for nicotine use in their latest marijuana study.

Until recently, marijuana research largely excluded tobacco users from

its participant pool. But scientists at the Center for BrainHealth at UT Dallas have found reason to include them, uncovering significant differences in the brains of those who use both substances and marijuana-only users.

In a study that appears online in *Behavioural Brain Research*, scientists found that the hippocampus, which is associated with memory and learning, is significantly smaller in users of both substances than in nonusers and nicotine-only users. Also, the number of cigarettes smoked daily by users of both substances was connected to the severity of their hippocampal shrinkage, and, unexpectedly, the smaller their hippocampus, the greater their memory function.

"Approximately 70 percent of individuals who use marijuana also use tobacco," said Dr. Francesca Filbey, the study's principal investigator and director of cognitive neuroscience of addictive behaviors at the Center for BrainHealth.

"Our findings exemplify why the effects of marijuana on the brain may not generalize to the vast majority of the marijuana-using population, because most studies do not account for tobacco use. This study is one of the first to tease apart the unique effects of each substance on the brain as well as their combined effects."

Filbey's research team used magnetic resonance imaging (MRI) to examine the study participants' hippocampus, whose size and shape are known to have been altered in connection with chronic marijuana use.

Participants, who were divided into four groups, completed a substance use history assessment and neuropsychological tests three days before an MRI head scan. The four groups were:

- Nonusers: Individuals who have not had any marijuana or

tobacco in the past three months
- Chronic marijuana users: Individuals who use marijuana at least four times per week
- Frequent nicotine users: Individuals who use nicotine 10 or more times daily
- Chronic marijuana plus frequent nicotine users: Individuals who use marijuana at least four times per week and nicotine 10 or more times daily.

Researchers also found that there are no significant connections between hippocampal size and memory performance in the groups who only use tobacco or marijuana.

Other findings included: In the marijuana-only group, the hippocampus is significantly smaller than in nonusers and individuals who use only nicotine. For nonusers, the smaller the hippocampus, the poorer the memory function.

"We have always known that each substance is associated with effects on the brain and hypothesized that their interaction may not simply be a linear relationship. Our findings confirm that the interaction between marijuana and nicotine is indeed much more complicated due to the different mechanisms at play," Filbey said. "Future studies need to address these compounding effects of substances.

"The combined use of marijuana and tobacco is highly prevalent. We really need to understand how the combined use changes the brain to really understand its effects on memory function and behavior."

More information: "Combined effects of marijuana and nicotine on memory performance and hippocampal volume," *Behavioural Brain Research*, Volume 293, 15 October 2015, Pages 46-53, ISSN 0166-4328, dx.doi.org/10.1016/j.bbr.2015.07.029

Provided by University of Texas at Dallas