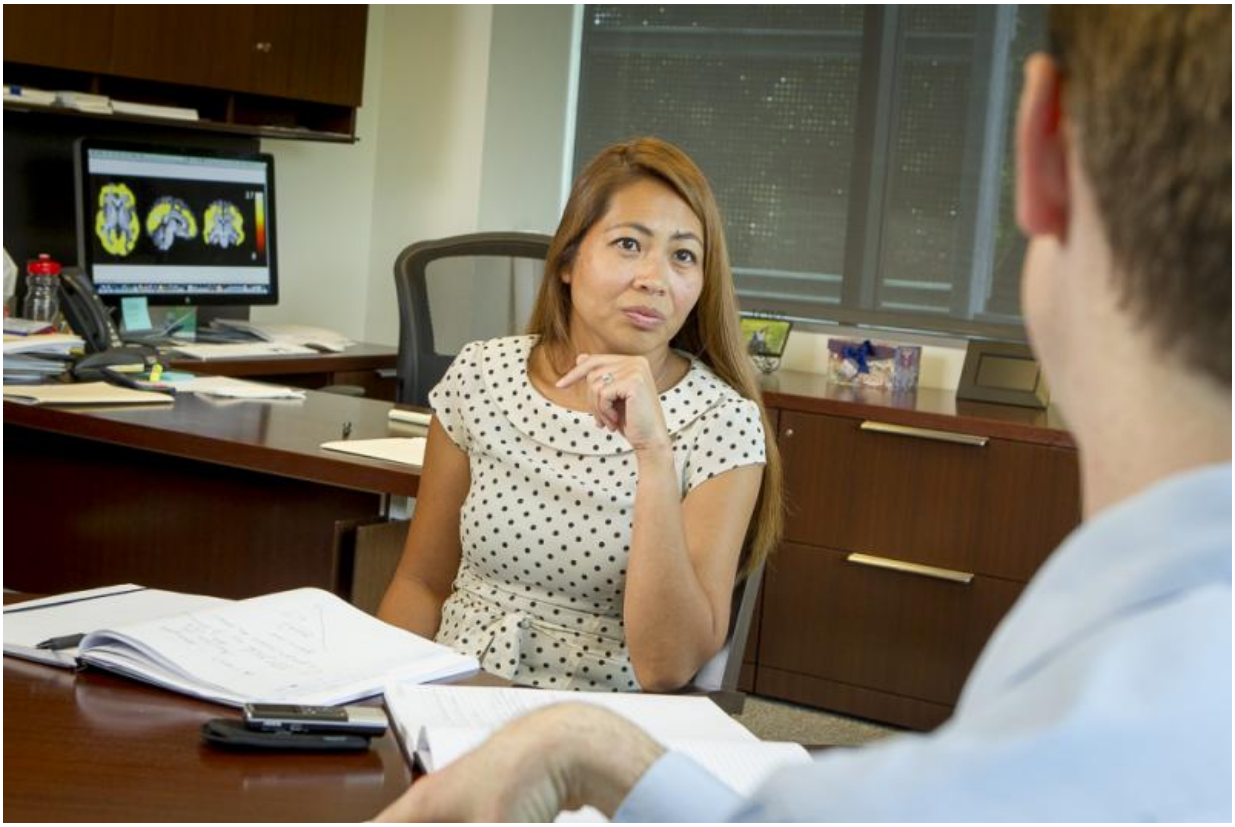
Study finds nicotine changes marijuana's effect on the brain

August 18 2015



Dr. Francesca Filbey, study principal investigator and Director of Cognitive Neuroscience of Addictive Behaviors at the Center for BrainHealth at The University of Texas at Dallas Credit: Randy Anderson

How scientists study the effects of marijuana on the brain is changing.

Until recently marijuana research largely excluded tobacco users from its participant pool, but scientists at the Center for BrainHealth at The University of Texas at Dallas have found reason to abandon this practice, uncovering significant differences in the brains of individuals who use both tobacco and marijuana and the brains of those who only use marijuana.

In a study that appears online in the journal *Behavioural Brain Research*, scientists report an association between smaller hippocampal brain volume and marijuana use. Although the size of the hippocampus, an area of the brain associated with memory and learning, is significantly smaller in both the marijuana group and marijuana plus tobacco group compared to non-using controls and individuals who use tobacco exclusively, the relationship to memory performance is unique.

Hippocampal size of nonusers reflects a direct relationship to memory function; the smaller the hippocampus, the poorer the memory function. Individuals who use marijuana and tobacco show an inverse relationship, i.e., the smaller the hippocampus size, the greater memory the function. Furthermore the number of nicotine cigarettes smoked per day in the marijuana and nicotine using group appears to be related to the severity of hippocampal shrinkage. The greater the number of cigarettes smoked per day, the smaller the hippocampal volume and the greater the memory performance. There were no significant associations between hippocampal size and memory performance in individuals who only use tobacco or only use marijuana.

"Approximately 70% of individuals who use marijuana also use tobacco," explained Francesca Filbey, Ph.D., 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."

Dr. Filbey's research team used magnetic resonance imaging (MRI) to examine the hippocampus; an area of the brain that is know to have altered size and shape in association with chronic marijuana use. Participants completed a substance use history assessment and neuropsychological tests three days prior to an MRI head scan. The team compared four groups: 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 (10 or more times daily) and chronic marijuana plus frequent nicotine users (at least four marijuana uses per week and 10 or more nicotine uses per day).

"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," said Filbey. "Future studies need to address these compounding effects of substances."

She continued, "The combined use of marijuana and tobacco is highly prevalent. For instance, a 'blunt' is wrapped in tobacco leaf. A 'spliff' is a joint rolled with tobacco. We really need to understand how the combined use changes the brain to really understand its effects on memory function and behavior."

Provided by Center for BrainHealth

Citation: Study finds nicotine changes marijuana's effect on the brain (2015, August 18)