

## Casual Marijuana Use Creates Brain Changes - Health & wellness

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Young adults who occasionally smoke marijuana show abnormalities in two key areas of their brain related to emotion, motivation, and decision making, raising concerns that they could be damaging their developing minds at a critical time, according to a new study by Boston researchers.

Other studies have revealed brain changes among heavy marijuana users, but this research is believed to be the first to demonstrate such abnormalities in young, casual smokers.

The Boston scientists also found that the degree of brain changes appeared to be directly related to the amount participants smoked per week.

Researchers did not study whether those changes were linked to corresponding declines in brain function, but lead author Jodi Gilman, a psychology instructor at Harvard Medical School and a brain scientist at Massachusetts General Hospital, said such abnormalities in young brains are reason for concern.

“This is when you are making major decisions in your life, when you are choosing a major, starting a career, making long-lasting friendships and relationships,” Gilman said.

The findings, published Wednesday in the *Journal of Neuroscience*, come amid an increased debate about the long-term effects of marijuana, as a growing number of states legalize the drug for medicinal and recreational use.

Forty Boston-area young adults aged 18 to 25, many from Boston University, were selected for the study. Researchers used scans to measure the volume, shape, and density of two regions of the brain — the nucleus accumbens and the amygdala.

Half of the group said they used marijuana at least once a week, and the other 20 had not used the drug in the past year, and reported using it less than five times in their life.

Among the group that did smoke, the median use was about six joints per week.

Scans revealed that the nucleus accumbens was larger in marijuana users, compared with nonusers, and its alteration was directly related to how much the person smoked. The nucleus accumbens is a hub in the brain that is involved with decision making and motivation. Structural changes were also seen in the amygdala, which is involved with

emotional behavior.

These changes, Gilman said, may be evidence that the brain is forming new connections that encourage further drug use, “a sort of drug learning process.” The study did not address whether the brain changes are permanent.

The results are similar to animal studies that show when rats are given THC, the mind-altering ingredient in marijuana; their brains also form new connections, indicating an adaptation to the unnatural level of reward and stimulation from marijuana.

Other scientists not involved in the study say its small size makes it hard to extrapolate to the general population. But they also said the findings may help explain what happened to the brains of participants in other marijuana studies that demonstrated behavioral and functional changes, but did not use scans to identify potential brain abnormalities.

“Anything that underscores that there may be structural changes in the brain [from marijuana use] is important,” said Dr. Staci Gruber, an associate psychiatry professor at Harvard Medical School and a director of brain imaging at McLean Hospital.

Gruber’s studies of marijuana smokers have focused on those with longer, more chronic use and have found that those who started smoking at earlier ages, while still in their teens, are less able to perform certain reasoning and decision-making tasks, compared with those who started later in life.

Stuart Gitlow, president of the American Society of Addiction Medicine, said the Mass. General study provides much-needed “hard evidence” of brain changes that appear to match the changes in cognitive skills — thinking and reasoning — that other researchers have demonstrated in marijuana studies.

“We’ve known that people who use marijuana when they’re younger tend to have cognitive abnormalities, but this gives us direct evidence,” he said.

“It’s fairly reasonable to draw the conclusion now that marijuana does alter the structure of the brain, as demonstrated in this study,” Gitlow said, “and that structural alteration is responsible, at least to some degree, for the cognitive changes we have seen in other studies.”

Earlier research has shown different brain changes linked to alcohol or other drug use, such as cocaine.

Dr. Hans Breiter, a coauthor of the Mass. General study, said there are still many unanswered questions about the potential long-term effects of these various chemicals, especially if people use more than one drug. One of his earlier studies, for instance, showed that the amygdala region of the brain shrank with cocaine use, while the new marijuana study suggests an increase.

“Most drug users use more than one drug,” said Breiter, a professor of psychiatry and behavioral sciences at Northwestern University Feinberg School of Medicine.

“Cocaine users use opiates, and most marijuana users also drink,” he said.

Kay Lazar