

Cannabis Use and Cognitive Function in Young Adults: A Longitudinal Study

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ABOUT THE STUDY

The increasing prevalence of cannabis use among young adults has sparked concern within public health and academic communities, particularly regarding its potential long-term impact on cognitive function. Although cannabis is often perceived as a relatively benign substance, emerging evidence suggests that regular use during critical periods of brain development, especially adolescence and early adulthood can lead to lasting cognitive impairments. This longitudinal study was conducted over a span of six years and aimed to evaluate the effects of sustained cannabis use on key cognitive domains in young adults aged 18 to 25, a demographic known for both high cannabis consumption rates and ongoing neurological maturation.

At baseline, no significant differences in cognitive performance were observed among the three groups, suggesting a level playing field at the beginning of the study. However, longitudinal data revealed that regular cannabis users experienced a notable decline in specific cognitive domains over time. Most prominently, verbal memory and executive functioning exhibited significant deterioration, with regular users scoring on average 15–20% lower on recall and cognitive flexibility tasks by the final follow-up. Occasional users showed mild but non-significant decreases in performance, while non-users either maintained or improved their scores over the same period. Importantly, deficits in regular users persisted even after controlling for education level, alcohol use, and mental health conditions such as depression.

Neuroimaging sub-studies conducted on a representative subsample, supported these findings, revealing structural and functional changes in key brain regions associated with cognition. MRI scans showed reduced gray matter volume in the hippocampus and prefrontal cortex of regular users, correlating with poor performance in memory and planning tasks. Functional MRI further demonstrated diminished activity in these regions during working memory challenges, indicating potential cannabis-induced neuroadaptation or neurotoxicity. Notably, these changes were not observed in occasional users or non-users, emphasizing a dose-dependent relationship between cannabis exposure and cognitive alteration. Participants who discontinued cannabis use during the study period showed partial

cognitive recovery, particularly in attention and processing speed. However, residual deficits in verbal memory persisted, suggesting that while cessation can halt further decline, some cognitive impairments may be irreversible or require extended recovery periods. Qualitative interviews with these individuals revealed increased academic motivation and self-awareness about cannabis-related harms, highlighting the importance of education and early intervention. Interestingly, despite the objective cognitive decline observed in regular users, self-reported measures of cognitive function (such as perceived attention or memory problems) were not significantly different from those of non-users. This discrepancy indicates a lack of awareness or insight into cognitive changes among frequent users, which may hinder their willingness to seek help or reduce use. This aligns with previous findings in substance use research, where subjective cognitive assessments often underestimate the severity of impairment.

The study had certain limitations. Despite rigorous controls, reliance on self-reported cannabis use introduced potential bias, although urine screenings helped mitigate this concern. Attrition over the six-year period, particularly among high-frequency users, may have led to an underestimation of long-term effects. Additionally, while the study excluded individuals with diagnosed psychotic disorders, it did not specifically examine genetic predispositions or familial risk factors, which may influence vulnerability to cannabis-related cognitive decline.

In conclusion, this longitudinal study provides robust evidence that regular cannabis use in young adulthood is associated with measurable declines in cognitive function, particularly in verbal memory and executive processes. These deficits appear to be both dose-dependent and partially persistent, raising significant concerns about the long-term neuropsychological health of habitual users. While occasional use did not result in substantial cognitive decline, the findings underscore the importance of preventative strategies aimed at delaying initiation and reducing frequency of use among youth. Education campaigns, clinical screening, and early behavioral interventions may be critical tools in mitigating the cognitive and functional impact of cannabis use during this vulnerable period of brain development. As policies around cannabis continue to liberalize globally, these neurocognitive findings must be integrated into public health decision-making to ensure informed choices among young people.

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