NORML
Working to Reform Marijuana Laws

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Marijuana Exposure and Cognitive Performance

Cannabis exposure is not causally associated with either significant or residual detrimental effects on cognitive performance

"This pilot study assessed structural magnetic resonance imaging in older adults who were either current cannabis users (n = 28; mean age 69.8 years, 36% female) or nonusers (n = 28; mean age 66.8 years, 61% female). Recruitment targeted users who reported at least weekly use for at least the last year, although users had 23.55 years of regular cannabis use on average. ... No significant differences between groups were observed in performance on a brief computerized cognitive battery. These results suggest that cannabis use likely does not have a widespread impact on overall cortical volume while controlling for age."
Preliminary results from a pilot study examining brain structure in older adult cannabis users and nonusers, Psychiatric Research: Neuroimaging, 2019

This study "provides the first quantitative synthesis of the literature examining cannabis and cognitive functioning in adolescents and young adults (with a mean age of 26 years and younger). ... Sixty-nine studies of 2152 cannabis users and 6575 comparison participants with minimal cannabis exposure were included. ... Associations between cannabis use and cognitive functioning in crosssectional studies of adolescents and young adults are small and may be of questionable clinical importance for most individuals. Furthermore, abstinence of longer than 72 hours diminishes cognitive deficits associated with cannabis use. ... [R]esults indicate that previous studies of cannabis in youth may have overstated the magnitude and persistence of cognitive deficits associated with use. Reported deficits may reflect residual effects from acute use or withdrawal."
Association of cannabis with cognitive functioning in adolescents and young adults: A systematic review and metaanalysis, JAMA Psychiatry, 2018

Cannabis exposure, even among young people, is not associated with causal, longterm changes in brain morphology

"In this study, high-resolution T1-weighted MRIs were obtained from 781 youth aged 14-22 years who were studied as part of the Philadelphia Neurodevelopmental Cohort. This sample included 147 cannabis users (109 occasional [≤1-2 times per week] and 38 frequent [≥3 times per week] users) and 634 cannabis non-users. Several structural neuroimaging measures were examined in whole brain analyses, including gray and white matter volumes, cortical thickness, and gray matter density. Established procedures for stringent quality control were conducted, and two automated neuroimaging software processing packages were used to ensure robustness of results. There were no significant differences by cannabis group in global or regional brain volumes, cortical thickness, or gray matter density, and no significant group by age interactions were found. Follow-up analyses indicated that values of structural neuroimaging measures by cannabis group were similar across regions, and any differences among groups were likely of a small magnitude. In sum, structural brain metrics were largely similar among adolescent and young adult cannabis users and non-users."
Cannabis use in youth is associated with limited alterations in brain structure, Neurophyschopharmacology, 2019

"In a large, multisite dataset of 120 controls and 141 cannabis users, we examined whether differences in key characteristics of the cortical surface -- including cortical thickness, surface area, and gyrification index were related to cannabis use characteristics, including (i) cannabis use vs. non-use, (ii) cannabis dependence vs. non-dependence vs. non-use, and (iii) early adolescent vs. late adolescent onset of cannabis use vs. non-use. Our

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results revealed that cortical morphology was not associated with cannabis use, dependence, or onset age. ... We additionally found no association between cortical surface area and gyrification index in relation to cannabis use. ... Our lack of finding in a well-powered study suggests that cortical surface morphology may be less associated with cannabis use than previously assumed."
Cortical surface morphology in long-term cannabis users: A multi-site MRI study, European Neuropsychopharmacology, 2018

After adjusting for potential confounders, the cumulative use of cannabis -- even among young people -- is not associated with either a significant or long-term adverse impact on intelligence quotient

"In the largest longitudinal examination of marijuana use and IQ change, ... we find little evidence to suggest that adolescent marijuana use has a direct effect on intellectual decline. ... [T]he lack of a dose-response relationship, and an absence of meaningful differences between discordant siblings lead us to conclude that the deficits observed in marijuana users are attributable to confounding factors that influence both substance initiation and IQ rather than a neurotoxic effect of marijuana."
Impact of adolescent marijuana use on intelligence: Results from two longitudinal twin studies, Proceedings of the National Academies of Sciences, 2016

"We investigated associations between adolescent cannabis use and IQ and educational attainment in a sample of 2235 teenagers from the Avon Longitudinal Study of Parents and Children. ... After full adjustment, those who had used cannabis ≥50 times did not differ from never-users on either IQ or educational performance. ... These findings suggest that adolescent cannabis use is not associated with IQ or educational performance once adjustment is made for potential confounds, in particular adolescent cigarette use. Modest cannabis use in teenagers may have less cognitive impact than epidemiological surveys of older cohorts have previously suggested."
Are IQ and educational outcomes in teenagers related to their cannabis use? A prospective cohort study, Journal of Psychopharmacology, 2016