NORML

Working to Reform Marijuana Laws

Marijuana Exposure and Cognitive Performance

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

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 cross-sectional 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 meta-analysis, JAMA Psychiatry, 2018

"This study tested whether adolescents who used cannabis or met criteria for cannabis dependence showed neuropsychological impairment prior to cannabis initiation and neuropsychological decline from before to after cannabis initiation. ... Participants were 1989 twins from the Environmental Risk (E-Risk) Longitudinal Twin Study, a nationally representative birth cohort of twins born in England and Wales from 1994 to 1995. ... Compared with adolescents who did not use cannabis, adolescents who used cannabis had lower IQ in childhood prior to cannabis initiation and lower IQ at age 18, but there was little evidence that cannabis use was associated with IQ decline from ages 12-18. ... Moreover, adolescents who used cannabis had poorer executive functions at age 18 than adolescents who did not use cannabis, but these associations were generally not apparent within twin pairs. ... [In] conclusion: Short-term cannabis use in adolescence does not appear to cause IQ decline or impair executive functions, even when cannabis use reaches the level of dependence. Family background factors explain why adolescent cannabis users perform worse on IQ and executive function tests."
Associations between adolescent cannabis use and neuropsychological decline: A longitudinal co-twin control study, Addiction, 2018

"[W]e used a prospective cohort design to test whether neurocognitive differences preceded cannabis onset and if early cannabis use was associated with poorer neurocognitive development. Participants completed a visuospatial working memory task during fMRI acquisition and multiple cognitive assessments at 12- years-old, prior to any reported cannabis use (baseline), and at 15-years-old. ...The consistency of our results from baseline to follow-up and a lack of group differences in behavioral development do not support the idea that early cannabis initiation alone predicts cognitive dysfunction by age 15. Further, the amount of reported cannabis use was not associated with behavioral performance. ... Conclusions: Purported neurocognitive effects of early cannabis onset may not be due to cannabis initiation alone."
Early cannabis use and neurocognitive risk: A prospective functional neuroimaging study, Biological Psychiatry, 2018

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

"The aim of this report is to determine the size of associations between cannabis use and the volumes of seven subcortical regions of interest (ROIs) in two independent population-based

samples. ... Sample 1 comprised 622 young male and female adult twins from the ongoing population- based Brisbane Longitudinal Twin Study. ... Sample 2 comprised 474 middle-age male twins from the population-based Harvard Drug Study. ... Magnetic resonance imaging (MRI) and volumetric segmentation methods were used to estimate volume in seven subcortical ROIs: thalamus; caudate nucleus; putamen; pallidum; hippocampus; amygdala; and nucleus accumbens."

... This is the largest exploratory analysis integrating brain imaging with self-report cannabis and comorbid substance use data. After correcting for multiple testing, there was no effect of cannabis use on the volume at any subcortical region of interest in young adults or middle-aged males. ... In the context of expanding medicalization and decriminalization and the concerns surrounding the consequences of increased cannabis availability, our findings suggest that normal variation in cannabis use is statistically unrelated to brain morphology as measured by subcortical volumes in non-clinical samples."
Testing associations between cannabis use and subcortical volumes in two large population-based samples, Addiction, 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