Marijuana Exposure and Cognitive Performance

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

“Using data from the UK Biobank, which includes health information from over 500,000 adults, associations between cannabis use, regional brain volume, and cognition in participants aged 40-70 years (mean age = 54.5) were evaluated. … Lifetime cannabis use was positively associated with regional brain volume in CB1-rich regions, including the caudate, putamen, hippocampus, and amygdala. Greater lifetime use was also linked to better performance in learning, processing speed, and short-term memory. Individuals reporting use limited to adolescence also showed larger regional volumes and better cognitive performance than non-users. … Results highlight that cannabis may influence brain health differently across the lifespan, potentially offering protective effects in older age.”
Cannabis use is associated with brain volume and cognitive function in middle-aged and older adults, *Journal of Studies on Alcohol and Drugs*, 2025

“Cross-sectional and longitudinal data were drawn from the UK Biobank, including adults aged ≥60 years. Cannabis use patterns were self-reported, and cognitive function was assessed via computerized tests of attention, executive function, processing speed, visual memory and working memory. … Lifetime cannabis users (17%) performed better across all cognitive domains: attention, executive function, processing speed, visual and working memory.”
History of cannabis use and cognitive function in older adults: Findings from the UK Biobank, *Age and Ageing,* 2025

"A sample of 540 older adults from a well-characterized observational cohort was included for analysis. Participants completed ... a comprehensive neuropsychological assessment. Approximately 11% of participants reported using cannabis in the prior six months. … Participants with recent cannabis use performed similarly across all five domains of neuropsychological functioning compared to those with no cannabis use. … Overall, our results indicate that older adults who reported using cannabis in the prior six months did not differ on neuropsychological testing results when compared to older adults who reported no recent use of cannabis. … Our results are generally consistent with findings from systematic reviews concluding that low frequency cannabis use among older adults is generally well tolerated and is not clearly associated with adverse cognitive outcomes."
Cannabis use and cognition in older adults: Preliminary performance-based neuropsychological test results and directions for future research, *Journal of the International Neuropsychological Society*, 2025

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

"Our primary objective was to systematically review the evidence on brain volume differences between young cannabis users and nonusers aged 12–26 where profound neuromaturation occurs, accounting for the role of global brain volumes (GBVs). … A systematic search was run in three databases (PubMed, Scopus, and PsycINFO) and was reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. … Sixteen studies were included. The reviewed samples included 830 people with mean age 22.5 years (range 14–26 years). Of these, 386 were cannabis users (with cannabis use onset at 15–19 years) and 444 were controls. We found no detectable group differences in any of the GBVs (intracranium, total brain, total white matter, and total gray matter) and regional brain volumes (i.e., hippocampus, amygdala, orbitofrontal cortex, and total cerebellum). Age and

cannabis use level did not predict (standardized mean) volume group differences in metaregression. … [T]his early evidence suggests nonsignificant volume differences between young cannabis users and nonusers."
Brain anatomical alterations in young cannabis users: A meta-analysis of structural neuroimaging studies, *Cannabis and Cannabinoid Research*, 2022

"A systematic review following PRISMA guidelines and subsequent effect-size seed-based d mapping (SDM) meta-analyses were conducted to investigate relationships between age (across the 12-to-21-year-old developmental window), sex, and gray matter volume (GMV) differences between cannabis using (CU) and typically developing (TD) youth. … Meta-analysis of whole-brain VBM [voxel-based morphometry] studies identified no regions showing significant GMV difference between CU and TD youth. … These findings suggest that GMV [gray matter volume] differences between CU [cannabis using] and [typically developing] TD youth, if present, are subtle, and may vary as a function of age, cumulative cannabis exposure, and sex in young people. Whether age- and sex-related GMV differences are attributable to common predispositional factors, cannabis-induced neuroadaptive changes, or both warrant further investigation."
Age- and sex-related cortical gray matter volume differences in adolescent cannabis users: A systematic review and meta-analysis of voxel-based morphometry studies, *Frontiers in Psychiatry*, 2021

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 this study of 5162 Danish men, the mean cognitive decline was found to be 6.2 IQ points over an average of 44 years. Notably, cannabis users exhibited statistically significantly less cognitive decline compared to nonusers. In the fully adjusted model, cannabis use was associated with 1.3 IQ points less cognitive decline than the decline observed in the reference group. … Among cannabis users, no significant association was found with cognitive decline for either age of initiation of cannabis use or frequent cannabis use."
Cannabis use and age-related changes in cognitive function from early adulthood to late midlife in 5,162 Danish men, *Brain and Behavior*, 2024

"We … test[ed] for associations between marijuana use and changes in intelligence scores from adolescence (ages 12-21) to adulthood (ages 18-26) using data drawn from the National Longitudinal Study of Adolescent to Adult Health. … [O]ur findings did not reveal a significant association between cumulative marijuana use and changes in intelligence scores."
Examining the influence of adolescent marijuana use on adult intelligence: Further evidence in the causation versus spuriousness debate, *Drug and Alcohol Dependence*, 2017