Table 3. *Chronic Cognitive and Psychomotor Effects of Cannabinoids*

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| Author | Population (Groups) | Study Question | Study Design | Study Conclusion |
| Bolla et al 2005 (60) | 11 heavy cannabis users and 11 non-drug users | Are there long-term neurocognitive effects and alterations in brain activity associated with cannabis use? | Prospective study using 3 neuropsychological tests to compare groups after 25 days of abstinence from cannabis use | Heavy cannabis use results in persistent neurocognitive defects, which correlate with decreased activation of the right lateral orbitofrontal and right dorsolateral prefrontal cortex, along with increased activation of the left cerebellum and left parietal lobe |
| Solowij et al 2002 (82) | 51 long-term users, 51 short-term users and 33 non-users of cannabis | Does long-term cannabis use lead to cognitive impairment? | Multisite retrospective cross-sectional study using 9 neuropsychological tests | Long-term heavy cannabis use results in persistent neurocognitive deficits, which can worsen with continued use |
| Pope et al 2001 (83) | 63 heavy cannabis users, 45 former heavy users and 72 controls | Are there long-term neurocognitive effects of cannabis use? | Prospective study using 10 neuropsychological tests to compare groups during abstinence from cannabis at 0, 1, 7 and 28 days | Long-term heavy use is associated with persistent neurocognitive deficits within 7 days of abstinence, but not at 28 days of abstinence |
| Yücel et al 2008 (84) | 15 long-term and heavy cannabis-using men and 16 matched non-using control subjects | Does long-term heavy cannabis use cause anatomical changes in the brain? | Prospective cross-sectional study using MRI[[1]](#footnote-1) to evaluate the effect of cannabis on brain volume | Long-term heavy cannabis users had reduced hippocampal and amygdala volumes and decreased performance on the Rey Auditory Verbal Learning Test |
| Battistella et al 2014 (85) | 22 occasional and 25 regular cannabis users | Does cannabis use cause a dose-dependent toxicity in brain regions rich with CB1[[2]](#footnote-2) receptors? | Prospective study using MRI to evaluate the effect of cannabis on brain volume | Regular cannabis users had lower gray matter volume in the temporal, orbitofrontal and parahippocampal regions. These regions are responsible for motivational, emotional and affective processing. There was also increased gray matter in the cerebellar region. |
| Thames et al 2017 (86) | 24 HIV[[3]](#footnote-3)-positive cannabis users, 24 HIV-positive non-users, 13 HIV-negative cannabis users and 16 HIV-negative non-users | Do cannabis and HIV status possess neurocognitive and neuroanatomical effects, and is there an interaction? | Prospective study using 6 neuropsychological tests and MRI to compare groups | Cannabis use was associated with worse global cognition in the HIV-negative group, but there was no difference in the HIV-positive group. Cannabis use was associated with smaller volumes in the entorhinal cortex and fusiform gyrus. |
| Eldreth et al 2004 (87) | 11 heavy cannabis users and 11 non-users | Do heavy cannabis users experience persistent deficits in executive cognitive functioning and brain activity? | Prospective study using PET[[4]](#footnote-4) scans and a modified Stroop test to compare groups after 25 days of abstinence from cannabis use | Cannabis users had greater activation in the bilateral hippocampus and decreased activation in the left lateral prefrontal cortex and left perigenual anterior cingulate cortex  No differences were found for the modified Stroop test . |
| Matochik et al 2005 (88) | 11 heavy cannabis users and 8 non-users | Does heavy cannabis use cause anatomical changes in the gray and white matter regions of the brain? | Prospective study using T1-weighted MRI to compare gray and white matter tissue density in the two groups | Cannabis users had decreased gray matter density in the right parahippocampal gyrus and increased gray matter density in the right thalamus and bilateral precentral gyri.  Cannabis users had decreased white matter density in the left parietal lobe and increased white matter density in the left parahippocampal and fusiform gyri. |

1. MRI, Magnetic Resonance Imaging [↑](#footnote-ref-1)
2. CB1, Cannabinoid Receptor Type 1 [↑](#footnote-ref-2)
3. HIV, Human Immunodeficiency Virus [↑](#footnote-ref-3)
4. PET, Positron Emission Tomography [↑](#footnote-ref-4)