



# Personality may explain the association between cannabis use and neuropsychological impairment

In a recent issue of PNAS, Meier et al. (1) used a prospective cohort of 1,037 New Zealanders followed from birth to age 38 y to show that the relationship between cannabis use and cognitive impairment cannot be attributed to precannabis-use differences in intelligence. However, important omitted “third” variables, such as stable individual differences in personality traits, could potentially cause both drug use and changes in intelligence. For instance, a negative relationship between cannabis use and neuropsychological performance may be explained by low conscientiousness, which could lead to substance dependence (2) and poor performance on neuropsychological tests (2, 3). Personality traits could also explain positive noncausal associations between cannabis use and cognitive functioning. For example, high levels of openness to experience could lead people to seek out activities that promote cognitive functioning and could also condition the initiation of cannabis use (4). It is, therefore, critical to consider whether personality traits may confound the cannabis–intelligence link.

To do this, I used longitudinal data from 6,401 individuals who participated in the British 1958 National Child Development Study. Childhood cognitive ability was assessed at age 11 y using an 80-item general-ability test (5), and adult neuropsychological functioning was gauged at age 50 y using three cognitive tests assessing working memory (word-list recall, delayed recall) and executive

functioning (animal naming). Childhood cognitive ability closely predicted composite scores derived from the adulthood cognitive assessments [ $r(6,401) = 0.41$ ;  $P < 0.001$ ]. Participants’ cannabis use was assessed at age 42 y and coded as follows: 0, no history of cannabis use (69%); 1, history of cannabis use but not in the last year (25%); and 2, have used cannabis in the last year (6%).

In a hierarchical regression analysis that adjusted for sex and childhood cognitive ability, cannabis use was positively associated with high levels of neuropsychological functioning at age 50 y ( $B = 0.054$ ,  $SE = 0.015$ ;  $t = 3.64$ ,  $P < 0.001$ ). This relationship was attenuated to nonsignificance when the analysis was adjusted for the “Big-5” personality traits (openness, conscientiousness, extraversion, agreeableness, and emotional stability), as measured in adulthood using 50 items from the International Personality Item Pool (<http://ipip.ori.org>) [ $B = 0.018$ ,  $SE = 0.015$ ;  $t = 1.2$ ,  $P = 0.24$ ]. Post hoc analyses revealed that openness positively predicted cannabis use, an increase in neuropsychological functioning, and fully explained the cannabis–intelligence link. Thus, it appears that “open” individuals may tend to seek out illicit substances and to select into cognitively stimulating environments that improve neuropsychological functioning.

Crucially, these findings illustrate how by failing to include personality traits, which have been measured repeatedly in the Dunedin cohort (2), Meier et al. (1) may have

identified a noncausal association between cannabis use and changes in cognitive functioning. Given that the current test described here was restricted by the limitations of the data, particularly in the assessment of cannabis use, it is imperative that the role of personality traits be addressed by Meier et al. (1). This is especially important given that policy and prevention campaigns may invest substantial resources into alleviating the proposed neurotoxic effects of cannabis use.

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