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Impact of adolescent marijuana use on intelligence: Results from two longitudinal twin studies

Nicholas J. Jackson (/search?author1=Nicholas+J.+Jackson&sortspec=date&submit=Submit)^{a,b,1},
 Joshua D. Isen (/search?author1=Joshua+D.+Isen&sortspec=date&submit=Submit)^{c,1,2},
 Rubin Khoddam (/search?author1=Rubin+Khoddam&sortspec=date&submit=Submit)^a,
 Daniel Irons (/search?author1=Daniel+Irons&sortspec=date&submit=Submit)^c,
 Catherine Tuvblad (/search?author1=Catherine+Tuvblad&sortspec=date&submit=Submit)^{a,d},
 William G. Iacono (/search?author1=William+G.+Iacono&sortspec=date&submit=Submit)^c,
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 Adrian Raine (/search?author1=Adrian+Raine&sortspec=date&submit=Submit)^{e,f,g}, and
 Laura A. Baker (/search?author1=Laura+A.+Baker&sortspec=date&submit=Submit)^a

Author Affiliations

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Significance

Marijuana is the most commonly used recreational drug in the United States. Some studies suggest that marijuana use in adolescence is linked to declines in intellectual functioning. Because of the infeasibility of studying this phenomenon experimentally, it is unclear whether the association can be causally attributed to marijuana use itself or is instead the result of confounding factors. We approach this issue quasiexperimentally using longitudinal samples of adolescent twins. Among twin pairs discordant for marijuana use, we assessed intelligence quotient (IQ) score changes while adjusting for the effects of genetic influences and other factors shared by members of the same twin pair. Results suggest that familial confounds underlie the association between adolescent marijuana use and declining IQ scores.

Abstract

Marijuana is one of the most commonly used drugs in the United States, and use during adolescence—when the brain is still developing—has been proposed as a cause of poorer neurocognitive outcome. Nonetheless, research on this topic is scarce and often shows conflicting results, with some studies showing detrimental effects of marijuana use on cognitive functioning and others showing no significant long-term effects. The purpose of the present study was to examine the associations of marijuana use with changes in intellectual performance in two longitudinal studies of adolescent twins (*n* = 789 and *n* = 2,277). We used a quasiexperimental approach to adjust for participants' family background characteristics and genetic propensities, helping us to assess the causal nature of any potential associations. Standardized measures of intelligence were administered at ages 9–12 y, before marijuana involvement, and again at ages 17–20 y. Marijuana use was self-reported at the time of each cognitive assessment as well as during the intervening period. Marijuana users had lower test scores relative to nonusers and showed a significant decline in crystallized intelligence between preadolescence and late adolescence. However, there was no evidence of a dose–response relationship between frequency of use and intelligence quotient (IQ) change. Furthermore, marijuana-using twins failed to show significantly greater IQ decline relative to their abstinent siblings. Evidence from these two samples suggests that observed declines in measured IQ may not be a direct result of marijuana exposure but rather attributable to familial factors that underlie both marijuana initiation and low intellectual attainment.

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 toccsectionid=Psychological+and+Cognitive+Sciences&

Footnotes

¹N.J.J. and J.D.I. contributed equally to this work.

²To whom correspondence should be addressed. Email: jdisen@umn.edu (mailto:jdisen@umn.edu).

Author contributions: W.G.I., M.M., A.R., and L.A.B. designed research; N.J.J., J.D.I., R.K., D.I., and C.T. performed research; N.J.J. and J.D.I. analyzed data; and N.J.J. and J.D.I. wrote the paper.

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This article contains supporting information online at www.pnas.org/lookup/suppl/doi:10.1073/pnas.1516648113/-DCSupplemental (lookup/suppl/doi:10.1073/pnas.1516648113/-DCSupplemental).

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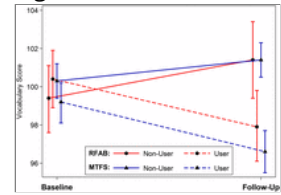
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Figures



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