

Marijuana Use by Adolescents and Potential Loss of Intelligence



*Heavy use by adolescents may
be a signal of other problems.*

ENVIRONMENTAL RESOURCE COUNCIL

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We recently learned that a substantial number of Internet searchers who download our marijuana material had specific questions regarding the relationship between marijuana use by adolescents and consequent impact on intelligence. We felt a responsibility to address this important issue in more depth.

Although medical marijuana research has been limited in the United States by Federal Law, recreational marijuana is likely the most studied intoxicant in scientific literature and there is substantial international research on this issue. Consequently, it is possible to select from thousands of scientific articles, and superficially support almost any position. However, marijuana use in adolescence and its eventual impact on intelligence has been a primary focus of much responsible research. A reliable profile of the impact following heavy use by adolescence on intelligence does emerge.

Some international research indicates a decrease in intelligence quotients (IQ) in conjunction with heavy use by adolescents (using five days a week or more). As these heavy users matured, their self-reported heavy use correlated with what appeared to be a reduced IQ of around 8 points. A reasonable interpretation of existing data is that heavy use by adolescents may be a signal of other problems in their lives. However, inferring from the data that heavy use in adolescence is a direct consequence or cause of intelligence loss simply is not warranted. Subsequent, more in-depth research, initially from Norway, indicated that marijuana use

in a semi-chronic pattern did not diminish IQ, but the two dynamics were concurrent, i.e. the same conditions creating or allowing heavy youthful use also likely contributed to a downward shift in intelligence scores.

Research on heavy adolescent marijuana use conducted in New Zealand in 2012 and animal studies (mice) by the University of Maryland Medical Center in 2013 had been identified as inferring that heavy and repeated marijuana dose exposure in youthful developing brains might be correlated to impaired mental functioning. The New Zealand research showed that heavy use in adolescents correlated with a lower IQ but, again, while the two dynamics were concurrent, there was no indication that one factor caused the other. Animal studies dealing with cognitive intelligence are important but there are significant limits in transferring complex intelligence relationships between humans and rodents.

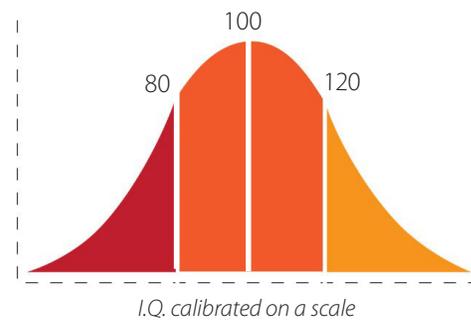
In the January 18, 2016 issue of *Science Immunology*, two important studies were described: one involved an analysis of 2,000 British youth, and the other studied identical twins, one who used marijuana and one who abstained. In both studies, it appeared that after taking environmental factors into account, there was, in the words of the article, “no measurable link between marijuana use and IQ.” In the February 2, 2016 issue of *Proceeding of the National Academy of Sciences*,¹ two twin studies supported the *Science Immunology* findings reporting that “there was no evidence of a dose-

response relationship between frequency of use and intelligence quotient (IQ) change." It appeared that after taking all factors into account, in the words of the Academy publication, "...marijuana-using twins failed to show significantly greater IQ decline relative to their abstinent siblings."

There are a few important caveats in interpreting any research in the area of illegal drug use and impact on intelligence. First, as with virtually all other marijuana survey based research, the responses from those questioned are primarily the result of subjects self-identifying themselves as heavy users, experimenters, occasional users, or nonusers. This would be expected to create a "Hawthorne effect," where subjects understate socially undesirable and especially illegal behavior. Much "drug use" research may be actually measuring distinctions between less trusting subjects, who tend not to self-identify as users and others whose world view supports answering such questions honestly.

Secondly, intelligence quotients measure several types of intelligence, including "fluid intelligence," such as complex problem solving, and "crystallized intelligence," which tends to measure specific knowledge. For example, fluid intelligence would support writing creatively; crystallized intelligence would support a stronger vocabulary and spelling competencies. Some intelligence benchmarks focused on crystallized intelligence alone, some did not.

Finally, the IQ indicator is based on a progressively fluctuating Bell Curve. Every 10 years, there has been about a 3% increase in the intelligence of



Western populations, as measured by IQ testing protocol. This tends to skew comparative measurements. For instance, we once assumed populations lost intelligence as they aged; now, we understand that IQ scores are simply getting higher over time. Age dynamics may be influencing results.

While use, especially heavy use in adolescence, should be a concern and quite possibly a signal of other social or developmental problems, the fact that around one-half of our under 50 Western population has tried marijuana while at the same time their composite IQs are rising, and in consideration of the most recent research, loss of intelligence should not be considered a probable risk. Heavy use in adolescence may well be a warning of other problems.

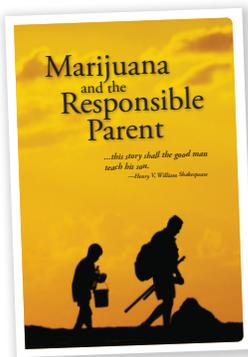
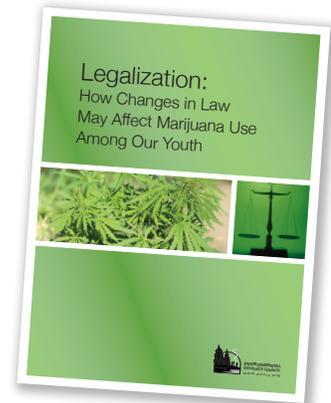
As with any intoxicant, compulsive heavy use that negatively influences a person's life represents a risk to individuals and communities. Understandably, this behavior-oriented threat is greater for adolescents who are naturally less mature. Use, especially heavy, compulsive use among adolescents, should be considered both problematic in itself and potentially a signal of other problems.

¹Impact of Adolescent Marijuana Use on Intelligence: Results from two longitudinal twin studies (February 2, 2016). Jackson, Nicholas J.; Isen, Joshua D.; Khoddam, Rubin; Irons, Daniel; Tuvblad, Catherine; Iacono, William G.; McGue, Matt; Raine, Adrian; Baker, Laura A. In: Proceedings of the National Academy of Sciences of the United States of America, Vol. 113, No. 5, 02.02.2016, p. E500-E508. 10.1073/pnas.1516648113/-/DCSupplemental.

Following are marijuana-related publications that may be of interest and can be downloaded at www.envrc.org.

Legalization: How changes in the law might affect marijuana use among our youth

Most Americans today are living under significantly relaxed marijuana possession laws. It is important to ask how these evolving changes might affect young people. This pamphlet suggests ways that young people might be impacted and offers guidelines for results-based drug prevention programming.



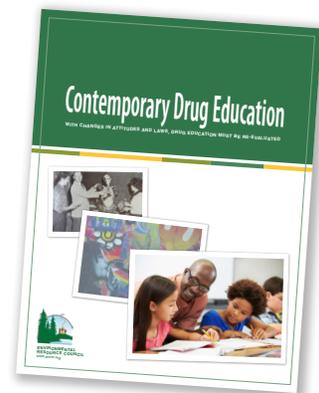
Marijuana and the Responsible Parent

The school district is not the best institution to prevent substance abuse, although it is sometimes held responsible by the community. It is parents who can absolutely make the most difference. This booklet addresses how parents can prevent harm with regard to their children's potential use of marijuana.

Contemporary Drug Education

With changes in attitudes and laws, drug education must be re-evaluated.

In addition to drug education approaches and exercises, this booklet includes the 2017 findings regarding marijuana and health from the National Academies of Science, Engineering and Medicine.



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