

Young Brains on Cannabis: It's Time to Clear the Smoke

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Cannabis is the most commonly used illicit substance among youth. Recent policy developments and ongoing debate related to this drug underscore the urgent need to “clear the smoke” and better understand what the scientific evidence says about the health and behavioral effects of cannabis use, particularly on youth whose brains are undergoing rapid and extensive development.

Clearing the smoke

Cannabis is a prominent political, health, and law enforcement issue in North America that is currently receiving a great deal of attention. As we watch the effects of the legalization of cannabis in Colorado, Washington, Alaska, Oregon, and the District of Columbia, other jurisdictions are debating the future of this illicit drug. Should it remain criminalized or should decriminalization be examined by lawmakers? How can we prevent commercialization promoting increased rates of use within a legalization model? Where does marijuana for medical purposes fit into the picture, if at all? A critical piece of information often missing from these debates or not addressed adequately is the scientific evidence about the effects of cannabis use on a person's overall health. This concern is even more pressing when it comes to the cognitive, physical, and mental health harms to adolescents who use cannabis.

It is critical we ask these questions because adolescence is a time of rapid development that helps lay the foundation for success later in life. Conversely, it can

also set the stage for experiencing challenges in adulthood, as youth are disproportionately more likely than adults to experience greater harms from drug use. More specifically, youth represent a high-risk group for experiencing cannabis-related harms. Their brains are undergoing rapid and extensive development that can be negatively affected by cannabis use.

There is certainly cause for concern about the amount and frequency of cannabis use among youth. According to the 2014 Monitoring the Future (MTF) Survey in the US, 35.1% of high school seniors reported past-year use of cannabis, with 5.8% reporting daily or near daily use. Comparable prevalence rates are reported in Canada, with 22% of 15–19-year-olds and 26% of 20–24-year-olds reporting past-year use of cannabis in 2013 according to the Canadian Tobacco, Alcohol and Drugs Survey. Moreover, a 2013 UNICEF report noted that Canada's youth are the highest users of cannabis when compared to students in other developed countries. The MTF Survey also indicates a growing perception among young people that can-

nabis is a relatively harmless drug, and there is strong evidence that perception of harm is inversely related to rates of use. Knowing that youth are disproportionately heavy users of cannabis, what specific concerns should this raise about short- and long-term consequences and how do we incorporate these concerns in the debate?

Recent evidence shows that early and frequent use of cannabis has been linked with deficits in short-term cognitive functioning, reduced IQ, impaired school performance, and increased risk of leaving school early—all of which can have significant consequences on a young person's life trajectory.¹ Of note, the impact of cannabis use on IQ has been the topic of recent debate among experts in the field and further research aimed at understanding this relationship will provide much needed clarity.

Heavy cannabis use in adolescence is also a risk factor for psychosis, a risk that is heightened if users have a preexisting vulnerability to that condition.¹ Cannabis use can also lead to dependence, with evidence from longitudinal studies in the US estimating the risk of developing cannabis dependence to be one in six among those users who initiated in adolescence,² a rate higher than that reported among adults. Recent data from the 2012 Canadian Community Health Survey reveal that more than one in 20 young Canadians aged 15–24 met the criteria for cannabis abuse or dependence during the past year.

There is also growing evidence from the human literature that early and frequent use of cannabis can alter structural aspects of the developing brain, including those that are responsible for memory, decision-making, and executive functioning.¹ However, we do not yet know the full extent of the impact of early cannabis

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use on changes in brain function and behavior of young people, which underscores the need for further investment in research in this area.

Beyond longer-term consequences, cannabis can also acutely impair cognitive and motor functions like perception, coordination, and balance for hours after use. This impairment presents a safety hazard for drivers getting behind the wheel, as well as for other motorists and pedestrians. In fact, the risk of car crashes doubles for drivers who get behind the wheel after using cannabis and this risk is further elevated if cannabis use is combined with other substances, most notably alcohol. Recent data from the National Fatality Database indicate that cannabis was the most common illicit drug present among fatally injured drivers aged 15–24 in Canada between 2000 and 2010. The Drug Abuse Warning Network, which monitors the health impact of drugs in the US, estimated that in 2011, there were nearly 456,000 drug-related emergency department visits in which cannabis use was mentioned in the medical record. Thirteen percent of patients were between the ages of 12 and 17. Data from the Canadian Institute for Health Information reveal that from 2006 to 2011, youth aged 15–24 spent the largest number of days in a hospital for a primary diagnosis of mental and behavioral disorders due to the use of cannabinoids. Furthermore, the number of days spent in a hospital increased by almost 40% during the same time period.³

These findings are particularly troubling because recent research from Canada has revealed that young people are confused about cannabis and do not have the knowledge they need about the risks associated with this drug to make more informed decisions.⁴ Some have expressed questionable beliefs about the effects of cannabis, indicating that it helps to improve their focus at school and can prevent—or even cure—cancer. Youth also expressed mixed beliefs as to whether cannabis improves or impairs driving performance, and felt that cannabis and driving was not as dangerous as drunk driving. Youth talked about how cannabis is natural and so they did not really think of it as a drug.

A call to action

The findings from this reviewed research highlight the complexity of the issues sur-

rounding youth consumption of cannabis. Youth are confused with the mixed messages they are receiving from discussions ranging from legalization to the use of cannabis for medical purposes, which points to the need for a coordinated, comprehensive, factual, and consistent approach to increasing awareness of this drug and its impact.

As primary care is an important intervention point for youth experiencing harms related to cannabis, there is an urgent need to develop practical, evidence-informed tools to assist healthcare providers in the early identification of cannabis use and cannabis dependence, as well as tools to deliver interventions to treat potential problems. Examples of such tools may include screening instruments to screen for cannabis use that warrants clinical intervention, as well as brief intervention strategies aimed at addressing the problematic substance use revealed during the screening process.

There is also an urgent need for further research aimed at improving the understanding of differences between the short- and long-term effects of cannabis use, particularly on the developing adolescent brain. Such research should include mechanistic studies regarding alteration of cellular structure and function related to cannabis to determine the impact on adolescent brain development. Of particular concern are the impacts of the dramatic increase in concentrations of tetrahydrocannabinol (THC), the main psychoactive ingredient of the cannabis plant, over the past 25 years. The average potency of federally seized cannabis in the US has steadily increased from 3.5% in 1985 to 13.2% in 2012.⁵ In light of such an increase in potency, some historical findings about the health and developmental effects of cannabis use might not be relevant when trying to predict effects on contemporary users.

More research is also needed to shed light on the influence of cannabis policy on public health, public safety, and other outcomes. The current understanding of the impact of cannabis policy on market forces, such as healthcare costs, lost productivity costs, and tax revenues, for example, is very limited, as is overall understanding of how perception, use, and outcomes interrelate around this drug.

In an effort to help “clear the smoke,” the Canadian Centre on Substance Abuse is currently undertaking a comprehensive review and synthesis of the literature on the effects of cannabis use during adolescence that will highlight key areas for action in policy, practice, and research. This much-needed work will provide clarity to misperceptions about cannabis, and make sense of some conflicting evidence about the effects of cannabis use and the impact of early or regular use during a time when the brain is still developing. By integrating neuroscience with the behavioral and social context of cannabis use by youth, this report will provide a much-needed resource for those working with youth and those involved in making decisions about policies, programs, or practices related to cannabis. The report is expected to be released in the spring of 2015.

Conflict of Interest

AJ Porath-Waller has provided expert testimony at the Standing Committee on Health’s (HESA) recent report on Marijuana’s Health Risks and Harms, October 2014.

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