SciEng Pages

The Health Effects and Science of Cannabis

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CANNABIS WILL BE LEGAL IN CANADA AS OF OCTOBER 17, 2018. The change means that adults will be able to grow (in most provinces), buy and possess small amounts of cannabis for recreational use and share it with other adults. The federal government set the minimum age to buy or use recreational cannabis at 18, but in most provinces and territories it has been set at 19, to harmonize with the legal age for purchasing alcohol. The government will set the rules for the sale of edibles, extracts and concentrates by October 2019.

But there remain major gaps and a lack of consensus around what we actually know in several key areas. The science is far from settled when it comes to cannabis use and its implications for personal health and public health.

MARIJUANA USE IN CANADA

Cannabis (marijuana) was criminalized in Canada in 1923, when it was added to the Opium and Narcotic Drug Act. Its inclusion occurred without debate, so the reasons for making it illegal remain a bit of a mystery. Few Canadians used marijuana at the time and the first police seizure of cannabis in Canada didn't occur until 1937. Marijuana-related arrests accounted for only two per cent of all drug arrests in Canada between 1946 and 1961[1].

Criminalizing cannabis has not deterred people from using it. In a national survey of substance use in the general population, 45 per cent of Canadians said they

had used cannabis at least once[2]. Its use is highest among younger populations. Almost 17% of students in grades 7-12 reported using cannabis in the past year, rising to almost 28% for grades 10-12[3]. An international comparison of youth drug use indicated that 27 per cent of 15-year-olds from Canada had used marijuana in past year – the heaviest use among teenagers living in developed countries[4].

Canadians also tend to use cannabis more than other illicit substances. In 2015, 12 per cent of Canadians aged 15 and older said they had used cannabis in the past year, compared to around 1 per cent for cocaine, crack or ecstasy[5].

COMPELLING REASONS FOR LEGALIZATION

Canada is reforming its cannabis policies to keep youth from using cannabis, improve public health and safety by adding limits and quality control, and to displace the illegal market for cannabis[6].

The legalization of cannabis eliminates the criminal penalties associated with the possession of small amounts of the drug. In 2016, 76 per cent of cannabis-related offenses in Canada were for possession[7]. A criminal conviction for minor possession can make it difficult for someone to rent a home, find a job and travel. It can often lead to poverty, which is a major determinant of poor health.

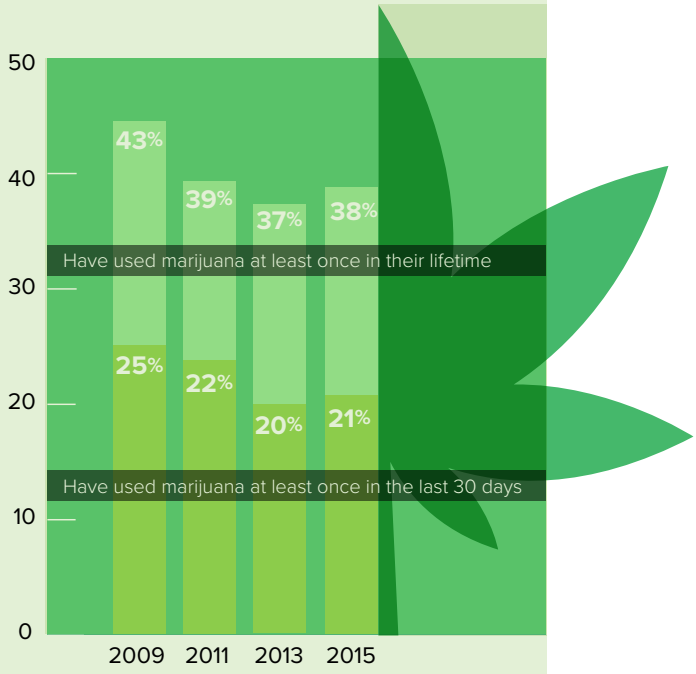
In the U.S., there is some evidence that the probability of arrest for breaking federal marijuana laws is greater for people who are poor and black[8]. The same may be said for Canada: recent investigations by the *Toronto Star*[9] and *Vice*[10] found that black and Indigenous Canadians were more likely to be arrested than white Canadians. Cannabis-related arrests decreased in Denver and Seattle after Colorado and Washington legalized recreational cannabis use[11].

CANNABIS USE AFTER LEGALIZATION

So far, the data from other jurisdictions suggest that concerns about increased cannabis use by youth following legalization are not borne out[12]. Preliminary data from Colorado shows that self-reported use by adolescents did not increase in the year immediately following the legalization of recreational cannabis[13]. And a review of studies found no increase in adolescent use in states that had legalized medical marijuana compared to states that had not[14]. However, these short-term outcomes, evaluated

YOUTH USE IN THE UNITED STATES

YOUTH MARIJUANA USE REMAINS RELATIVELY UNCHANGED



Two state-level surveys of high school students from Washington and Colorado found no significant change in cannabis use after these states legalized cannabis for recreational use for adults 21 years of age or older in 2014.

a few years post-legalization, may not capture the long-term impact of legalization on adolescent use.

After Colorado and Washington legalized cannabis, admissions to substance abuse treatment programs decreased in Denver and Seattle, perhaps suggesting a substitution effect when cannabis is used instead of other substances. There is also evidence from Portugal that more people with substance abuse issues seek treatment after decriminalization because they no longer fear arrest[15]. Legalizing marijuana may even reduce opioid use. Analysis of data from 28 states indicated that medical marijuana policies were significantly associated with reduced opioid-related hospitalizations[16]. For those enrolled in Medicaid, a U.S. federal-state program that provides health coverage to people with limited income and resources, opioid prescriptions were reduced by approximately six per cent[17]. As with many aspects of cannabis, more work is needed to confirm these trends[18].

HEALTH EFFECTS OF CANNABIS USE

Although cannabis use is widespread, our understanding of its effects remains incomplete. One of the reasons we lack useful research results is because marijuana use has been illegal, making it difficult for researchers to conduct research on it. Despite legalization and decriminalization in many American states, the U.S. federal prohibition on marijuana has also generally made it difficult to get studies approved and completed.

Cannabis contains hundreds of different compounds, including tetrahydrocannabinol (THC) and cannabidiol (CBD). THC is a psychoactive substance with mood-altering effects, generally known for producing the "high." CBD is not psychoactive, and can be relaxing and calming for some people.

BRAIN DEVELOPMENT

A recent study of 50 women found that low levels of marijuana chemicals, like THC, could be detected in mothers' breast milk six days after smoking marijuana or consuming cannabis edibles[19]. But researchers still don't know if these low levels of cannabinoids have an effect on an infant's brain development.

Some research has been done on adolescents. The brain continues to mature and grow after adolescence and does not stop developing until around the age of 25. Cannabis use by adolescents, even those 18-25, could have important negative effects on attention, memory and learning[20]. However, this research has not been reliably reproduced and is confounded by other factors (alcohol use, life stress, risk taking behavior and socio-economic status) that could influence the results.

The best interpretation of the available data is that the heavy use of cannabis with high levels of THC may affect brain development. However, there is no compelling scientific evidence that cannabis use influences normal brain development in the majority of adolescents that use it recreationally.

Legalization of recreational marijuana use has led to some unexpected adverse health outcomes. Colorado, for example, saw increases in hospital admissions following legalization, including an increase in visits for marijuana intoxication – anxiety, panic attacks, public intoxication, and vomiting – primarily from edible products. Children there are now being evaluated in the emergency department for unintentional ingestion of edible THC products, whereas there had been none in the five years prior to legalization,

which might be expected when the stigma of an illegal drug is removed and parents no longer worry about child protection intervention when seeking health care services. The majority are admitted to hospital, many to intensive care[21]. These trends are similar in Seattle, Washington.[22]

The key to managing any risks in children is the continued development of evidence-based guidelines and age-appropriate education materials, and ensuring these are promoted and taught[23]. Educational materials should highlight the increased risks associated with using cannabis before age 16 and of cannabis containing high levels of THC[24]. This is well-reflected in the legislation: giving or selling cannabis to someone under the age of 18 or using a youth to commit a cannabis-related offence are new criminal offenses with maximum penalties of 14 years in jail.

CANNABIS AND IMPAIRMENT

Using cannabis and driving is illegal — and potentially dangerous.

Studies have shown that drivers under the influence of cannabis have slower reaction times and tend to weave between lanes. However, unlike what is seen following alcohol intoxication, individuals high on cannabis appear to be aware of their level of intoxication and try to compensate by lowering their speed, keeping distance and taking fewer risks[25]. The data suggest the risk of having a car accident is greater if the driver has recently used cannabis. In France, where cannabis is illegal, one study of car accidents found drivers intoxicated on cannabis were two to six times more likely to be involved in a car accident than those who weren't [26]. However, the study also found it was more dangerous to drive under the influence of alcohol. Once blood alcohol levels exceeded 2.0 grams per litre (the legal limit is 0.8 g/L), drivers were 17 to 100 times more likely to be involved in a motor vehicle accident.

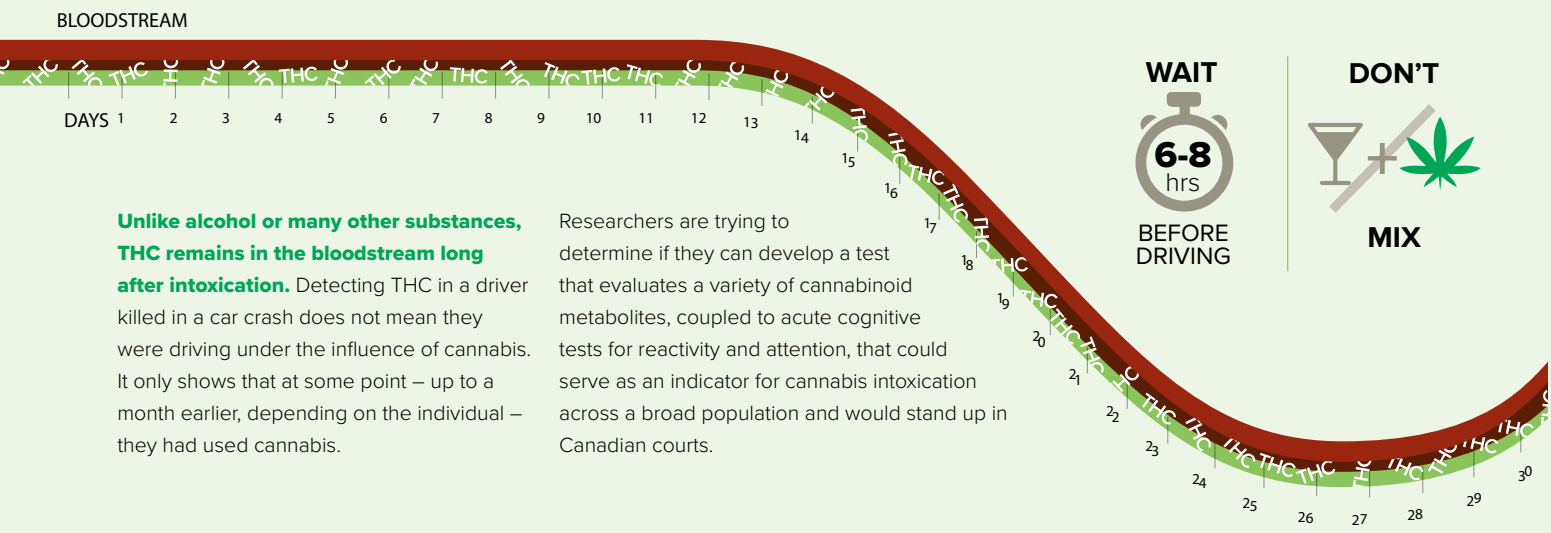
Drug impaired driving is on the rise in Canada, and nearly 19 per cent of fatally injured drivers tested positive for marijuana in 2014[27].

To reduce the risk of injury and death, current recommendations suggest people not drive within six to eight hours of cannabis consumption[28] and should not combine alcohol and cannabis, even at low doses. The absence of suitable and reliable roadside drug testing will pose a major challenge to obtaining criminal convictions of driving under the influence of cannabis[29], and will also pose challenges for medical cannabis users who may have a high THC blood level but not necessarily be impaired at the time of an accident.

Canadian employers are also worried about whether recreational cannabis use will lead to an increase in occupational injuries or poor performance. Employees expect a level of privacy, making workplace drug testing an issue, and the presence of THC in an employee's system may not prove they are unable to do their job.

Among workers in Colorado, cannabis use was highest among those employed in the hotel and food services industry (30 per cent), followed by those in the arts, entertainment and recreation industry (28 per cent). Workers in the mining, oil and gas industry had the lowest reported use (5 per cent)[30]. The American College of Occupational and Environmental Medicine and the Canadian Centre for Occupational Health and Safety have issued guidelines to help physicians and employers[31][32] keep workplaces safe.

THC CONCENTRATIONS IN THE BLOOD, INTOXICATION AND ROADSIDE TESTING



Unlike alcohol or many other substances, THC remains in the bloodstream long after intoxication. Detecting THC in a driver killed in a car crash does not mean they were driving under the influence of cannabis. It only shows that at some point – up to a month earlier, depending on the individual – they had used cannabis.

Researchers are trying to determine if they can develop a test that evaluates a variety of cannabinoid metabolites, coupled to acute cognitive tests for reactivity and attention, that could serve as an indicator for cannabis intoxication across a broad population and would stand up in Canadian courts.

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ABOUT

SciEng Pages

SciEng Pages (sciencepages.ca) is an initiative of the Partnership Group for Science and Engineering (pagse.org). SciEng Pages aims to increase discussion on topical issues that have science and engineering at their core, by summarizing the current state of knowledge and policy landscape. Each issue is prepared and reviewed by a multidisciplinary team and is published free of charge.

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