

# Clearing the Smoke on Cannabis

## Highlights

### – An Update

*This document highlights findings from a series of reports that reviews the effects of cannabis use on various aspects of human functioning and development. Specifically, the reports address: Chronic Use and Cognitive Functioning and Mental Health; Maternal Cannabis Use during Pregnancy; Cannabis Use and Driving; Respiratory Effects of Cannabis Smoking; and Medical Use of Cannabis and Cannabinoids. This series is intended for a broad audience, including health professionals, policy makers and researchers.*

### What is it?

- Cannabis is a greenish or brownish material consisting of the dried flowering, fruiting tops and leaves of the cannabis plant *Cannabis Sativa*.
- Hashish or cannabis resin is the dried brown or black resinous secretion coating the flowering tops of the cannabis plant.
- Cannabis is known by many names including marijuana, weed, hash—and others.
- Cannabis is most often smoked in a “joint.” It is also smoked in a water pipe or “bong,” where the smoke is drawn through water to cool it and filter out small particles before inhaling. It can also be vaporized in an e-cigarette or consumed in edible products.
- Currently in Canada, licensed producers and registered individuals can supply cannabis for medical purposes in fresh, dried and oil forms (Health Canada, 2016).

### Who’s using it?

**After alcohol, cannabis is the most widely used psychoactive substance in Canada.**

- About 11% of all Canadians aged 15 and older have used cannabis at least once in the past year according to the 2013 Canadian Tobacco, Alcohol and Drugs Survey (CTADS) (Statistics Canada, 2015).
- In the CTADS report for 2013, about 28% of those who used cannabis in the past three months reported that they used it every day or almost every day (Statistics Canada, 2015).



- The use of cannabis is generally higher among youth. According to CTADS, the rate of past-year use in 2013 was more than three times higher among Canadian youth aged 15–24 years (24.4%) compared to adults (8.0%). Approximately 22% of youth aged 15–19 and about 26% of young adults aged 20–24 reported using cannabis during the past year in 2013 (Statistics Canada, 2015).
- Nearly 3% of drivers in Canada reported driving within two hours of using cannabis in 2012; 5% of youth drivers aged 15–24 reported such behaviour according to the 2012 Canadian Alcohol and Drug Use Monitoring Survey (Health Canada, 2013).

### What does *chronic* use mean?

*Researchers don't have a single definition for chronic use, but in general, the term refers to daily, weekly or more frequent use over months or years, posing a possible risk to a user's health. Other terms that are often used interchangeably with chronic use include heavy use, frequent use, regular use, long-term use, abuse and dependence.*

### What's the issue?

A growing body of research evidence suggests that using cannabis could negatively affect different aspects of people's lives, including:

- Mental and physical health;
- Cognitive functioning (skills such as memory, attention span and psychomotor speed);
- Ability to safely operate and drive a motor vehicle; and
- Health and development of children born to those who use cannabis.

### High on Cannabis—What does that mean?

- *People will use cannabis because it makes them feel happy, relaxed or very aware—or in some cases if people are ill, they use it to help increase their appetite or reduce their pain.*
- *Symptoms of "being high" on cannabis include decreased attention span, increased heart rate, slowed reaction times and a lack of a sense of time. These symptoms can last several hours. Sometimes less enjoyable symptoms—like nervousness or paranoia—can be experienced.*

### Cannabis and Cognitive Functioning and Mental Health

**Definition:** *Cognitive functioning* refers to skills such as memory, attention span and psychomotor speed—the amount of time it takes a person to process a signal, prepare a response and carry out that response.

**Definition:** *Psychosis* is a serious mental disorder in which people lose touch with reality so that they are unable to function normally in society. It is often characterized by delusions and hallucinations.

### Key Findings:

#### Cognitive Functioning

- Chronic cannabis use does not appear to produce significant, lasting cognitive impairments (problems with memory, attention, or other cognitive problems) in adults.

#### BUT...

- Starting cannabis use early (prior to mid-20s in age), while the brain is still developing, may lead to more lasting problems.
- Although the cognitive deficits resulting from chronic cannabis use have been shown in certain cases to be reversible after a month of discontinued use in adults, the same may **not** be true for those who start using cannabis in early adolescence.

### Mental Health

- People who use cannabis—especially those who start using it earlier in life and use it frequently—are at increased risk for psychosis and psychotic symptoms. Some research suggests that the risk is increased for individuals who use cannabis products that are high in tetrahydrocannabinol (THC), the active ingredient in cannabis.
- Those who are already prone to psychosis (i.e., they may have a family member who suffers from psychosis) are especially at increased risk for developing psychosis with cannabis use.
- Chronic cannabis use has been linked to depression, anxiety and suicidal behaviours, but at this point there is not enough evidence to show that cannabis use can cause these mental health outcomes.

### Implications:

- Efforts to inform the public—such as through educational campaigns—about the risks of chronic cannabis use may help Canadians make informed choices about using cannabis.
- Investments in evidence-informed prevention and educational initiatives to find effective approaches could reduce the frequency of cannabis use and delay initiation of use among youth, which could reduce the potential harms.
- Increasing the capacity of those who work with youth by providing them with the necessary tools and resources could also reduce the harms of cannabis use by youth.
- Efforts to prevent, reduce or delay the use of cannabis—especially among youth who are particularly susceptible to the risks posed by cannabis—could be accompanied by decreases in the harms associated with cannabis use.

### Cannabis and Maternal Use during Pregnancy

**Definition:** *Maternal use* of cannabis refers to the use of cannabis during pregnancy.

#### Key Findings:

- Cannabis is the illicit drug most commonly used during pregnancy.
- There is little evidence to suggest an association of cannabis use during pregnancy with an increased risk of premature birth, miscarriage or major physical abnormalities.

- Cannabis use during pregnancy has been shown, however, to affect the development and learning skills of children starting at about the age of three years, and these effects continue at least until the teenage years.
- Specifically, cannabis use during pregnancy has been shown to affect children's cognitive functioning, behaviour, substance use and mental health.
- There is emerging evidence of an increased likelihood of smoking, problematic substance use and delinquency among adolescents who were prenatally exposed to cannabis.

#### Implications:

- A child who was exposed to cannabis as a fetus may experience problems with academic functioning. This might require additional educational supports to help protect against future learning problems.
- Efforts to prevent or reduce cannabis use during pregnancy could have significant benefits to future generations, potentially reducing rates of mental health problems and substance use.
- Information on the effects of cannabis use during pregnancy is essential to help healthcare practitioners advise patients about the impact of cannabis use and improve the health and well-being of patients' children.

### Cannabis and Driving

**Definition:** *Drug-impaired driving* refers to the operation of a motor vehicle, including snowmobiles, all-terrain vehicles, boats, trains and airplanes, while one's ability is adversely affected by a drug, including illegal drugs, prescription drugs, over-the-counter medications and volatile inhalants such as toluene or nitrous oxide.

#### Key Findings:

- Among young drivers in Canada, driving after using cannabis is more prevalent than driving after drinking.
- Males are three times more likely than females to drive after using cannabis.
- Cannabis impairs the cognitive and motor abilities necessary to operate a motor vehicle and doubles the risk of crash involvement.
- After alcohol, cannabis is the most commonly detected substance among drivers who die in traffic crashes in Canada.

- The police have the tools and authority required to detect and arrest drivers who are impaired by cannabis.

### Effects of Cannabis on Driving Performance

*Cannabis can compromise a driver's reaction time and visual ability. While experienced drivers might be able to compensate for some of these effects, decreased attention and impaired decision making can increase the likelihood of a crash.*

#### Implications:

- Increased use of cannabis in Canada may contribute to increasing rates of cannabis-impaired driving. Efforts to prevent, reduce or delay cannabis use—especially in youth—will help to prevent or decrease rates of cannabis-impaired driving in Canada.
- Many people are not aware that cannabis use impairs their ability to drive, that cannabis use can be detected in drivers, and that those caught will be charged just as if they were impaired by alcohol. Greater efforts are needed to ensure that drivers understand the risks of driving after using cannabis.
- To be successful, any approach to reduce cannabis-impaired driving—and cannabis use in general—must target high-risk groups (such as youth) and will require a combination of research, prevention, enforcement and treatment or rehabilitation.

### Detecting Drivers Impaired by Cannabis

*Unlike alcohol, cannabis cannot be detected by a breath test. But the Drug Evaluation and Classification (DEC) program is used to help law enforcement recognize and evaluate behaviours and other psychological indicators that are common with cannabis and six other drugs. This information, together with a urine, oral fluid and/or blood test, can provide enough evidence for drug-impaired driving charges to be laid.*

## Cannabis and Respiratory Effects

**Definition:** The term *respiratory effects* refers to symptoms or ailments such as chronic obstructive pulmonary disease (COPD—a group of lung diseases without a cure, including emphysema and chronic bronchitis), lung cancer and infections of the lower respiratory tract such as pneumonia.

#### Key Findings:

- Cannabis smoke contains many of the same poisons and cancer-causing chemicals as tobacco smoke, and THC may make the lungs and airways more susceptible to respiratory problems.
- Research suggests smoking cannabis may be even more harmful to a person's airways and lungs than smoking tobacco, since cannabis smoking often involves unfiltered smoke, larger puffs, deeper inhalation and longer breath-holding. This means the negative respiratory effects may occur earlier with cannabis smoking.

*The respiratory system is the airways, lungs and muscles that you use to breathe.*

- Those who regularly smoke cannabis commonly report coughing on most days, wheezing, shortness of breath after exercise, chest tightness at night, sounds in their chest, early morning phlegm and mucus, and bronchitis.
- Quitting cannabis smoking can reverse some of the negative respiratory symptoms experienced by those who smoke cannabis.
- More research is needed to determine the impact of chronic cannabis smoking on COPD and to find out if there is a consistent link between smoking cannabis and lung cancer.

#### Implications:

- Clear messages about the risks to the lungs and airways, the potential suffering and costs to the healthcare system need to be communicated so that Canadians can make informed decisions about their use of cannabis.
- For those who choose to use cannabis, ways of ingesting the drug without smoking it may help to reduce—although not eliminate—the harms to the respiratory system.

## Medical Use of Cannabis and Cannabinoids

**Definition:** In Canada, cannabis for medical purposes is legally accessed through the *Access to Cannabis for Medical Purposes Regulations* (Health Canada, 2016). Authorization for access is provided by healthcare practitioners through a medical document.

**Definition:** *Cannabinoids* are chemicals found in the cannabis plant. A few account for most of the known actions of cannabis on mental and bodily functions. Cannabinoids may be natural (e.g., THC) or synthetic (i.e., made in a laboratory).

### Key Findings:

- Good quality evidence suggests that cannabis and cannabinoids are effective for the relief of nausea and vomiting, and certain types of pain, as well as for the stimulation of appetite. However, research to date does not indicate that cannabis and cannabinoids are always the most appropriate drugs to use for these purposes compared to newer drugs for nausea and pain relief.
- It has been suggested that cannabinoids may be usefully combined with other drugs to produce more effective methods of clinical use.
- There is a lack of research about the risks associated with the medical use of cannabis; however, reduced cognitive functioning and respiratory ailments are associated with chronic use.
- Patients who smoke cannabis for medical purposes are not assured the reliable, standardized and reproducible dose that they would otherwise receive from using cannabinoid products delivered in controlled doses (e.g., capsules, oral sprays).
- Research is currently examining the efficacy of potential therapeutic uses of cannabinoid products for conditions such as multiple sclerosis, epilepsy, cancer, obesity and glaucoma, and for psychiatric disorders, inflammatory diseases and neurodegenerative disorders. Although findings are mixed, there is promising research emerging for the treatment of some conditions.

### Implications:

- Healthcare practitioners need access to the best available scientific evidence to help clients make informed decisions about the use of cannabis and cannabinoids for medical purposes.
- Healthcare practitioners need additional education and training, and practical tools to better treat clients with cannabis for medical purposes.
- There is a pressing need for clinical trials in Canada to examine the effectiveness of cannabis and cannabinoids as therapeutic options for a number of conditions.
- Given the impairing effects of cannabis on driving, healthcare practitioners should advise their patients to refrain from operating a motor vehicle while under the influence of cannabis.
- Future development is likely to be focused on improving the specificity of synthetic cannabinoids and their delivery by safer methods than smoking.

## What Role Can You Play in Preventing or Reducing the Negative Effects of Cannabis?

Whether you are a researcher, manager of a research funding agency, healthcare practitioner, health promoter, teacher, law enforcement professional, parent or a person who uses cannabis, you have a role to play.

- Know the effects of cannabis use on human functioning and development—and help to make sure others have this knowledge too.
- Support efforts—whether they be in research, prevention, enforcement or treatment—to prevent, reduce or delay cannabis use or the harms associated with cannabis use.

*Cannabis is a controlled substance under the Controlled Drugs and Substances Act—meaning that the acts of growing, possessing, distributing and selling cannabis are illegal. The Canadian government elected in 2015 has indicated its intention to introduce legislation in spring 2017 to legalize and regulate cannabis for non-medical use.*

## About the *Clearing the Smoke on Cannabis* Series

This series reviews the effects of cannabis use on various aspects of human functioning and development. Each report in the series was prepared by an expert researcher in the field and peer reviewed. The production of the series was made possible through a financial contribution from Health Canada. The views expressed in the reports do not necessarily represent the views of Health Canada.

## References

- Beirness, D.J., & Porath-Waller, A.J. (2015). *Clearing the smoke on cannabis: cannabis use and driving—an update*. Ottawa, Ont.: Canadian Centre on Substance Abuse.
- Health Canada. (2013). *Canadian Alcohol and Drug Use Monitoring Survey (CADUMS)*. Ottawa, Ont.: Author.
- Health Canada. (2016). *Medical use of cannabis*. Retrieved August 16, 2016, from [www.hc-sc.gc.ca/dhp-mps/marihuana/index-eng.php](http://www.hc-sc.gc.ca/dhp-mps/marihuana/index-eng.php).
- Kalant, H., & Porath-Waller, A.J. (2016). *Clearing the smoke on cannabis: medical use of cannabis and cannabinoids—an update*. Ottawa, Ont.: Canadian Centre on Substance Abuse.
- McInnis, O.A., & Plecas, D. (2016). *Clearing the smoke on cannabis: respiratory effects of cannabis smoking—an update*. Ottawa, Ont.: Canadian Centre on Substance Abuse.
- McInnis, O.A., & Porath-Waller, A.J. (2016). *Clearing the smoke on cannabis: chronic use and cognitive functioning and mental health—an update*. Ottawa, Ont.: Canadian Centre on Substance Abuse.
- Porath-Waller, A.J. (2015). *Clearing the smoke on cannabis: maternal cannabis use during pregnancy—an update*. Ottawa, Ont.: Canadian Centre on Substance Abuse.
- Statistics Canada. (2015). *Canadian Tobacco, Alcohol and Drugs Survey: summary of results for 2013*. Ottawa, Ont.: Author.

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## About CCSA

CCSA is Canada's only agency with a legislated mandate to reduce the harms of alcohol and other drugs on Canadians. We do so by providing the latest body of evidence and sharing that evidence widely. Created by an Act of Parliament in 1988, CCSA has provided national leadership and expert advice, advanced knowledge, and prepared information and resources based on the latest evidence to inform policy, practice and programs. Together with our partners, we help mobilize individual and collective efforts to achieve collective impact on the major health and social issue of problematic substance use. Advancing and promoting the evidence surrounding quality programs and enhancing access to services to address alcohol- and other drug-related harms is at the core of what we do every day.

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