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THE MATHISON CENTRE
for MENTAL HEALTH RESEARCH & EDUCATION

The Mathison Centre for Mental Health Research & Education

Basics on Cannabis:

A COMPILATION OF RESEARCH BASED EVIDENCE AND GUIDELINES

The Mathison Centre for Mental Health Research & Education does not hold a stance in favor of nor against the use of recreational cannabis. However, we advise caution on the use of recreational cannabis among vulnerable populations, particularly among youth.





Canada's move to legalize cannabis in 2018 has resulted in a lot of discussion and desire for information by various sectors of society. This brief provides an overview of cannabis based on selected studies and reports. Its primary goal is to present key information and evidence on various topics on cannabis for a broad audience that may include the public, professionals, policy makers and researchers.

Key Background Points

- Cannabis is a psychoactive drug which is widely used for its recreational and/or therapeutic properties.
- Many Canadians use cannabis, particularly Canadian youth.
- Cannabis can be dangerous for some vulnerable populations.
- Cannabis can be an addictive drug.
- The combined effect resulting from interaction between cannabis and other drugs is known to be greater than the sum of the effect of each individual drug.
- Similar to other substances like alcohol and tobacco, cannabis use can be harmful.
- There is a well-established unregulated and dangerous illicit market that enables access to recreational cannabis.
- Criminalization and prohibition have not been useful in promoting abstinence.

SECTION 1:

BACKGROUND ON CANNABIS AND THE CANADIAN CONTEXT

What is cannabis?

The words “**cannabis**” and “**marijuana**” are often used interchangeably; however, these are two separate entities. Marijuana refers to certain processed forms of the cannabis plant used for smoking. Cannabis is the most accurate term to describe any organic products derived from the Cannabis plant (e.g., cannabinoids like Tetrahydrocannabinol or THC, oils, seeds, flowers, and hemp). These products are used for medical, recreational, spiritual and industrial purposes.

We will use the word **cannabis** throughout this brief.

Prevalence of cannabis use

- Cannabis is the most commonly used illicit drug in Canada and the world.
- A *UNICEF* study of 29 developed nations indicates Canadian youth rank first in cannabis use.
- *The Canadian Tobacco, Alcohol and Drugs Survey (CTADS)* 2013 and 2015 indicate a lifetime use of 33.7 per cent and 44.5 per cent respectively, among the general Canadian population. A possible explanation for this apparent increase in use is that the ongoing discourse around legalization, the changing policy context in the US, and increased use by youth has led to less stigmatization; as a result, more people are willing to admit their use of cannabis.



Why is it being legalized?

As outlined by the *Canadian Federal Task Force on Marijuana Legalization and Regulation*, the objectives guiding legalization are as follows:

- Despite the existence of serious criminal penalties for possessing, producing, and selling cannabis, Canadians have significant experience with cannabis use and cultivation.
- Canadian youth are more likely to consume cannabis than Canadians in older age groups or their peers worldwide (*CTADS Survey 2015* — in the past year, 21 per cent of those aged 15–19, and 30 per cent of those aged 20–24).
- The primary objective of legalization is to place public health and safety at the centre of a balanced approach that shifts cannabis from an illicit market to a highly-regulated supply.
- Public education and prevention messaging are core components of Canada’s recommended ‘public health approach’ to legalization.
- A regulated legal framework will eliminate criminal records for cannabis possession and the burden this places on the public, law enforcement and the justice system.
- The known risks and harms for the use of tobacco and alcohol (both legal in Canada) far outweigh those of cannabis.
- The public health implications of quality, safety and potency of cannabis and the control of access for eligible users can be addressed under a legalized regime.
- Regulation may create an opportunity to stipulate who can consume (e.g. lower age limit), where they can consume (e.g. public places, homes, etc.), what can be consumed (e.g. potency levels) and how consumption may take place (means of administration — smoking, oral ingestion, vaporizing etc.).
- Cannabis dealers act as a conduit for teenagers to get access to “hard” drugs (e.g. cocaine, opiates, etc.). Legalization can help cut off this conduit, curb exposure to hard drugs, and thus curb use among teenagers.

SECTION 2:

THE CANNABIS SUBSTANCE AND ITS USE

Complexities around THC content

Variations in growing and production techniques can alter the concentration of THC (the main psychoactive ingredient of cannabis) in cannabis products. Potency is measured as percentage of THC by weight of the product. The higher the THC content, the greater the psychoactive effect. This relationship is similar to alcoholic products where, for instance, tequila has a higher percentage of alcohol than beer, and is more intoxicating as a result. The THC potency in dried cannabis seized by police in Canada has risen from an average of 3 per cent in the 1980's to around 15 per cent in 2016. Producers of licensed medical cannabis can grow cannabis with levels of THC higher than 30 per cent. While high levels of THC are not required for most users to experience the psychoactive effects of cannabis, greater demand persists for products with higher potency.

The production of higher-potency products known as “shatter” and dabs” in the illicit market is also a risky activity as it requires using highly flammable solvents such as butane to extract cannabinoids from plants. Inherently dangerous extraction processes can leave carcinogenic residues, heavy metals and other impurities in the end products, raising significant health and safety concerns.

There is inadequate evidence to specify a “safe” potency limit of THC content in cannabis products. There is evidence however that the higher the potency, the lower the quantity required to attain a psychoactive effect, the greater the risk of developing dependence and the higher the risk of a toxic dose particularly for inexperienced users.

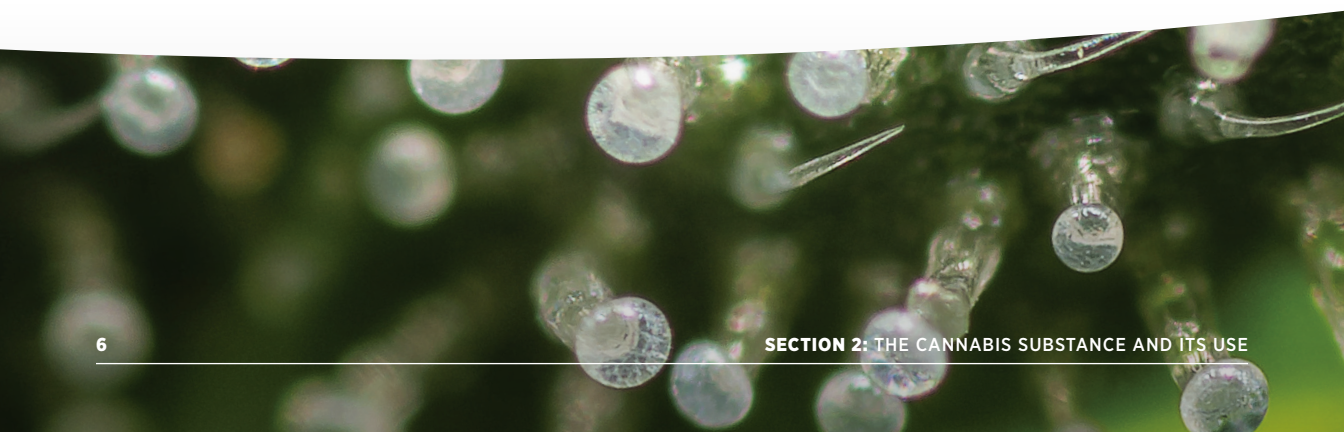
What is a cannabis overdose?

While cannabis overdoses are relatively rare and do not cause death, overconsumption can result in hospitalization. Overdose symptoms include hallucinations, shaking, nausea and feelings of paranoia, fear and anxiety. Serious long-term health effects can also result from overuse.

Synthetic cannabis

Synthetic cannabinoids exist in variants such as Spice, K2, and Eclipse as alternatives to cannabis. These synthetics are typically blends of various plant spices and herbs that are sprayed with synthetic cannabinoids and, in some instances, other non-cannabinoid psychoactive chemicals.

Synthetics are more commonly used among youth because they tend to be easily available/accessible (including through online purchase), difficult to detect through drug screening processes and comparatively inexpensive. Unlike cannabis, synthetic cannabinoids have been associated with mortalities (especially due to cardiac reactions) and represent a much more dangerous and unregulated alternative.



Administration of cannabis

The means of using or administering cannabis affects the positive and negative effects associated with use.

- Smoking rapidly diffuses THC content to the brain, resulting in a higher and quicker psychoactive effect. This effect subsides on the average within 1 to 3.5 hours.
- Oral ingestion of cannabis does not typically produce effects for up to 30 minutes to 2 hours, but the psychoactive effect is known to be relatively prolonged (up to five to eight hours or more). The slower-acting effect produced by orally ingesting cannabis poses a risk for excessive use and potential toxicity.
- Vaporizing entails heating the cannabis product (typically flowers or oils) to just under the point of combustion so the user can inhale the resulting fume. The process results in quick absorption comparable to smoking but eliminates the harmful effects of smoking (particularly on the lungs).
- Generally, once THC is absorbed into the bloodstream, it can be detectable through screening, depending on the frequency of use, for up to four weeks.

Problem use associated with cannabis

Not everyone will experience problems associated with their cannabis use such as toxicity, overdoses and dependence. However, there is substantial evidence that problem cannabis use is associated with:

- Being male
- Smoking cigarettes
- Early initiation of cannabis use
- Increased frequency of cannabis use

SECTION 3:

HEALTH AND PUBLIC POLICY INSIGHTS ON CANNABIS

Relative harm of cannabis vs tobacco, alcohol and other drugs

Cannabis is associated with less harmful outcomes than other widely-used legal and illegal substances including alcohol, heroin, cocaine and tobacco. For instance, according to the Canadian Institute for Health Information, alcohol-related harm in Canada cost taxpayers more than \$14 billion in 2002. Of the direct health care costs estimated at \$3.3 billion, hospitalizations due partly or entirely to alcohol accounted for the majority.

Overview of Health Effects

For many years, research on cannabis focused on harms rather than potential benefits. While the scientific evidence is still developing, there are now several research studies that suggest medical cannabis or isolated cannabinoids are effective in the treatment of some disease conditions and in these cases, we state that the evidence is substantial. However, for many diseases, scientists need to see the results of more research before drawing conclusions; we state in this brief that the evidence is limited in those cases. For some diseases, scientists are convinced that there is no evidence to support use of medical cannabis in treatment. In the light of risks of cannabis use, it is typically recommended that individuals consider a treatment only when the evidence is substantial and after consulting with their physicians.

Benefits

There is substantial evidence that medical cannabis is effective for treatment of:

- Chronic pain
- Nausea and vomiting caused by chemotherapy
- Muscle spasms associated with Multiple Sclerosis (MS)

Risks/Harms

There is substantial evidence that cannabis use is associated with the following:

- The development of schizophrenia among people with pre-existing vulnerability (e.g. family history of psychotic illness), with the highest likelihood among the most frequent users.
- There is a significant relationship between cannabis smoking and increased respiratory symptoms and more frequent chronic bronchitis episodes (but not asthma or *Chronic Obstructive Pulmonary Disease*, COPD).
- There is a higher likelihood of problematic use among individuals who start using cannabis at an earlier age and individuals with higher frequency of use. About 9 per cent of users may develop dependence. In addition, the National Institute on Drug Abuse estimates that individuals who begin using marijuana before age 18 are 4 to 7 times more likely to develop problem use than those who start using as adults.
- Increased likelihood of motor vehicle crashes if used prior to driving.
- Lower birth weight of offspring.
- Studies have indicated that chronic and acute exposure to cannabis can result in impaired cognition. However, potential moderating factors such as genetic differences, sex and use of other drugs have been under-studied.

Law enforcement challenges

At least 500,000 Canadians hold criminal records for possession of cannabis. It is estimated that nearly 3 per cent (about 60,000 people) of all arrests annually in Canada are for the possession of cannabis. A criminal record limits a person's ability to travel and to pursue work opportunities.

From a financial perspective, the cost of enforcing cannabis laws is high. In 2002, for instance, it is estimated that Canada spent about \$1.2 billion on enforcing cannabis laws.

Harm reduction

The Centre for Addiction and Mental Health (CAMH) developed and published a set of lower-risk cannabis use guidelines (LRCUG). The highlights of the guidelines are:

- Use should be delayed until early adulthood.
- The health risks of use are best avoided by abstaining.
- Frequent (daily or near-daily) use should be avoided.
- Users should shift away from smoking to less harmful delivery systems such as vaporizers.
- Less potent products should be used.
- Avoid using synthetic cannabinoids.
- Avoid driving for at least 3 to 4 hours after use.
- People with higher risk of cannabis-related problems (e.g., those with a personal or family history of schizophrenia, those with cardiovascular problems, and pregnant women) should abstain altogether.
- Avoid combining risks of cannabis use.

Practical take-home messages for the public on the legalization of cannabis

- Evidence from the Colorado experience does not suggest that legalization in Canada will result in a substantial increase of use in Canada.
- The availability of high THC containing products makes over-consumption more probable.
- Educate and empower, don't "protect" ("don't do drugs" messages simply do not work).
- The best prevention isn't drug-specific i.e., a holistic approach works best.
- Be aware of cultural and social values at play in various communities around cannabis use.
- Stigmatization of the user does not discourage use.

Lessons learnt from Colorado

Colorado legalized cannabis in 2014 and this is what has been learnt:

- Contrary to expectations, cannabis is still not yet a significant revenue stream for the state.
- While Colorado has reported little change in adult or youth prevalence of use, lessons are still being learnt on changes in prevalence of use in other states across the US.
- There have been significant increases in numbers of emergency department visits and hospitalizations due to acute overdoses.
- Decline in ER visits for fatal opiate overdoses are likely due to some users switching to cannabis.
- State officials have greater concern about impaired driving.
- An emerging development is workplace safety concerns.
- There has been a significant drop in criminal arrests.
- The state is facing the challenge of managing "pot tourism".
- Alcohol is still ranked first as the most problematic substance used.

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References

- Health Canada. (2016). *A Framework for the Legalization and Regulation of Cannabis in Canada: The Final Report of the Task Force on Cannabis Legalization and Regulation*. Ottawa, Canada. Cat: H14-220/2016E-PDF.
- National Academies of Sciences, Engineering, and Medicine. (2017). *The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*. Washington, DC: The National Academies Press. doi:<https://doi.org/10.17226/24625>.
- Statistics Canada, *Canadian Tobacco, Alcohol and Drugs Survey: 2015*. Retrieved from <https://www.canada.ca/en/health-canada/services/canadian-tobacco-alcohol-drugs-survey/2015-summary.html>.
- Centre for Addictions and Mental Health (October 2014). *Cannabis Policy Framework*, Jean-François Crépault, MA. Retrieved from https://www.camh.ca/en/hospital/about_camh/influencing_public_policy/documents/camhcannabispolicyframework.pdf.
- United Nations Office on Drugs and Crime, (2011). *Synthetic cannabinoids in herbal products*. Retrieved from https://www.unodc.org/documents/scientific/Synthetic_Cannabinoids.pdf
- RAND Corporation, (2012). *Important Facts About Marijuana Legalization*. California, USA. Jonathan P. Caulkin, Angela Hawken, Beau Kilmer, Mark A. R. Kleiman.
- Samantha J. Broyd, Hendrika H. van Hell, Camilla Beale, Murat Yücel, and Nadia Solowij (2016). *Acute and Chronic Effects of Cannabinoids on Human Cognition — A Systematic Review*. Biological Psychiatry, Volume 79, Issue 7, Pages 557–567
- NIDA. (2017, February 28). Marijuana. Retrieved from <https://www.drugabuse.gov/publications/drugfacts/marijuana>
- Lawrence Genen, MD, MBA; Chief Editor: David Bienenfeld, MD et al. (2017). *Cannabis-Related Disorders Clinical Presentation*. Medscape. Retrieved from <http://emedicine.medscape.com/article/286661-clinical>
- Kirsten Weir (2015). *Marijuana and the developing brain*. American Psychological Association, Volume 46, No. 10, Print version page 48. Retrieved from <http://www.apa.org/monitor/2015/11/marijuana-brain.aspx>
- Nutt, David J et al. (2010). *Drug harms in the UK: a multicriteria decision analysis*. The Lancet, Volume 376, Issue 9752, 1558 — 1565. Retrieved from [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(10\)61462-6/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)61462-6/fulltext)
- Madeline H. Meier, Avshalom Caspi, Antony Ambler, HonaLee Harrington, Renate Houts, Richard S. E. Keefe, Kay McDonald, Aimee Ward, Richie Poulton, and Terrie E. Moffitt (2012). *Persistent cannabis users show neuropsychological decline from childhood to midlife*. PNAS Plus — Social Sciences — Psychological and Cognitive Sciences: PNAS 2012 109 (40) E2657–E2664; Retrieved from <http://www.pnas.org/content/109/40/E2657.full>
- Canadian Institute for Health Information. *Alcohol Harm in Canada: Examining Hospitalizations Entirely Caused by Alcohol and Strategies to Reduce Alcohol Harm*. Ottawa, ON: CIHI; 2017. Retrieved from <http://www.cihi.ca/sites/default/files/document/report-alcohol-hospitalizations-en-web.pdf>
- Canadian Psychiatric Association. Position Statement. *Implications of Cannabis Legalization on Youth and Young Adults*. Ottawa, ON: 2017.





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