Canadian Centre on Substance Abuse
Centre canadien de lutte contre les toxicomanies

Partnership. Knowledge. Change.
Collaboration. Connaissance. Changement.

www.ccsa.ca • www.cclt.ca

National Research Agenda on the Health Impacts of Non-Medical Cannabis Use

The Issue

As Canada moves towards regulating cannabis for non-medical use, there is a pressing need for evidence on the health-related effects of non-medical cannabis use to inform policy decisions. Legislative changes and the impact of these changes must be informed by current, high-quality research and must be monitored to avoid negative impacts on the health of Canadians. Because cannabis use, regulations and impacts cross jurisdictional and sectoral boundaries, generating this research requires a collaborative approach.

The Canadian Centre on Substance Abuse (CCSA) was created by an Act of Parliament to provide national leadership to address substance use in Canada. A trusted counsel, CCSA provides national guidance to decision makers by harnessing the power of research, curating knowledge and bringing together diverse perspectives.

Expert and Stakeholder Meeting

Since 2008, CCSA has worked with federal, provincial and municipal partners at the bureaucratic and political levels to provide evidence-informed advice and analysis on the health impacts of cannabis through a variety of research and knowledge mobilization initiatives (see Additional Resources).

On October 18–19, 2016, CCSA hosted a meeting to start developing a national research agenda on the health impacts of non-medical use of cannabis. The meeting was organized in collaboration with CCSA's Expert Advisory Group on Cannabis, Health Canada, the Canadian Institutes of Health Research, the Canadian Academy of Health Sciences, Public Safety Canada and the U.S. National Institute on Drug Abuse — International Program. (A list of participants is at the end of this summary.)

The meeting brought together close to 50 experts and stakeholders representing a wide range of perspectives, including public health, law enforcement, prevention, academia and non-governmental organizations, and federal and provincial representatives:

- To identify current knowledge and research gaps related to the health effects of non-medical cannabis use;
- To identify existing data sources that can augment available data and knowledge in this area;
- To prioritize the short-, medium- and long-term opportunities for research on the health effects of non-medical cannabis use; and
- To discuss opportunities for collaboration among researchers and tangible next steps for moving forward with the research agenda.

Meeting discussions were structured into six thematic areas:

1. The Endocannabinoid System
2. Neuroscience and the Effects on the Brain and Behaviour
3. Mental Health, Dependence, Treatment and Polysubstance Use
4. Psychomotor Performance, Impaired Driving, Detection and Polysubstance Use
5. Effective Approaches for Health Promotion and Harm Prevention
6. Social Determinants of Health, Psychosocial Impacts and Epidemiology

Participants heard presentations from Canadian and international experts on the major gaps in knowledge in each thematic area and discussed each area in focused, small-group discussions. Participants then worked together to establish priorities within and across each thematic area, identifying the key next steps to be taken to begin to address the research questions.

Research Agenda

The group's work is summarized in the following pages by thematic area organized into research questions and issues, and next steps for the field. As the group worked through the thematic areas, certain questions and considerations arose consistently. These cross-cutting questions and issues are summarized below and should be considered when undertaking research, and monitoring and surveillance efforts in each thematic area.

Cross-Cutting Issues

While much has been learned from the research undertaken to date, the group highlighted the limitations of the existing research due to inconsistencies across studies in the methodologies, measured outcomes and contexts. This heterogeneity makes it difficult to draw conclusions across studies as to the health impacts of non-medical cannabis use over time. Moreover, the group noted that there has been a dramatic rise in the potency of cannabis in recent years, corresponding to a shift in the composition of cannabinoids in the strains of cannabis being consumed. These changes might make older studies less relevant to understanding the current health impacts of cannabis use.

Attendees noted the length of time it will take to determine the long-term impacts of chronic cannabis use, particularly with respect to clarifying causality and the permanence of observed effects. The group agreed that understanding long-term impacts will require developing and implementing a robust, sustained funding strategy and longitudinal research on non-medical cannabis use. This requirement is especially valid given a policy and regulatory context that will continue to change and evolve over time. The group also agreed that it will be important for researchers to study and identify unintended consequences over time of policy decisions (e.g., age limits, enforcement decisions) about the regulation of cannabis.

When considering how best to move forward, meeting participants noted the importance of national coordination to effectively harness existing knowledge and expertise across disciplines, and to make efficient use of limited resources. The group identified the need for three different kinds of coordination:

i. Coordination of working groups to advance progress in each of the thematic areas;
ii. Coordination of national surveillance and monitoring of cannabis use trends; and
iii. Coordination and operation of the governance structure needed to mobilize around and implement the national research agenda.

Participants agreed that a national research agenda should focus on closing gaps in the research in areas in which Canada has deep expertise or capability.[1] The group noted the potential contribution to be made by Canadian researchers given their access to diverse, quality-tested cannabis strains and products using different routes of administration (e.g., concentrates, edibles). All agreed that as the national research agenda on cannabis is advanced, the Canadian research community should seek to integrate the work done on medical and non-medical cannabis use (for example, to provide a fuller picture of the effects of cannabis at different dosage ranges and over varying lengths of time). The community should also engage from the outset with cannabis industry stakeholders operating within the legal framework (e.g., to share information and collaborate to address emerging issues affecting the health of Canadians).

Research Questions and Issues

Meeting participants agreed that the following research questions and issues related to monitoring and surveillance should be considered across all thematic areas and research priorities:

- **Definitions and measures:** Can the currently heterogeneous set of definitions and measures (e.g., dose, product type,[2] frequency of use, age of onset of use, route of administration,[3] outcomes, etc.) be clarified and harmonized to enable both increased comparability of study results and enhanced monitoring and surveillance capability over time?
- **Baseline data:** How can existing data and data collection tools and surveys[4] be leveraged and enhanced to develop a robust baseline dataset against which to measure and monitor the health impacts of cannabis use over time?
- **Engagement of stakeholders:** What are the most effective approaches to engage stakeholders, particularly youth and their families, in the research process from beginning to end?
- **Individual characteristics:** How do the effects (e.g., brain, behaviour) of cannabis vary with differences in characteristics of individuals who use, including:
  - Sex/gender, along the gender continuum;
  - Age and across the life span, including children, youth, young adults (transitional age youth), adults, and older adults and seniors;
  - Race and ethnicity, including specific discussion of Indigenous peoples; and
  - Presence of mental and physical health comorbidities?
- **Polysubstance use:** How do the effects (e.g., brain, behaviour) of cannabis vary:

[1] Example areas cited included the impact of: sex differences on cannabis use and its impacts; maternal cannabis use in pregnancy; concurrent alcohol and cannabis use.

[2] For example, strains, derivatives.

[3] For example, vaping, edibles, concentrates, second-hand smoke.

[4] Examples of data collection tools and surveys include the 2012 Canadian Community Health Survey; administrative data on emergency department use (i.e., from the National Ambulatory Care Reporting System); the MedEffect Canada, Canada Vigilance Adverse Reaction Online Database; the Centre for Addiction and Mental Health's report of the cost of cannabis in Canada; the National Collision Database; the U.S. National Institute of Mental Health Data Archive; the Canadian Tobacco, Alcohol and Drugs Survey; and the Canadian Student Tobacco, Alcohol and Drugs Survey.

  - When it is used in combination with other substances (e.g., pharmaceutical, recreational or nutraceutical[5] substances); and
  - When substituted for other substances (e.g., what are the opioid-sparing and substitution effects of cannabis and cannabinoids)?
- **Validation of existing research:** What research needs to be redone and which data need to be reanalyzed given the recalibration of measures and differences in the strains and routes of administration used in past studies versus today?

Next Steps for the Field

The group identified a number of next steps related to research, and monitoring and surveillance that applied across several thematic areas:

- **Define and harmonize measures:** Build on existing work[6] to establish and harmonize a pragmatic set of definitions and measures that speak accurately to the impact of cannabis on the brain and behaviour, including by dose, product, and route of administration.
- **Collate baseline data:** Review and enhance existing data collection tools and surveys to establish a baseline understanding of cannabis use in Canada.
- **Engage youth and families:** Identify and build on effective strategies to meaningfully engage youth and families in the development, implementation and evaluation of the national research agenda on cannabis.
- **Identify and conduct targeted, small-scale studies:** Identify opportunities to address current knowledge gaps through the design and implementation of targeted, small-scale, local area studies, with a particular focus on better understanding the nature and impact of cannabis and polysubstance use in and effective interventions for vulnerable and high-risk populations, including those not covered by population surveys and larger-scale studies.
- **Conduct a systematic review on what is known about the harmful and beneficial effects of cannabis and its component compounds:** This review should seek to complement a recently released U.S. Institute of Medicine report on the topic by addressing specific knowledge gaps related to transitional-aged youth and sex-based differences in the actions and effects of cannabis.
- Establish or enhance existing research networks: Establish or enhance existing research networks to enable the sharing of cannabis-related data and research findings within and across thematic areas.
- **Establish monitoring and surveillance infrastructure:** Establish a central monitoring and surveillance infrastructure to coordinate research efforts and analytics, enhance knowledge exchange, and report on the health impacts of cannabis in Canada, including evidence about effective health promotion, harm prevention, treatment models and programs, locally and nationally.
- **Update existing research:** Review existing studies to determine which need to be updated using new, harmonized measures and current cannabis strains and routes of administration.

[5] A nutraceutical is a pharmaceutical-grade, standardized nutrient, isolated or purified from foods that is generally sold in medicinal forms (e.g., pills, powders) not generally associated with food. Examples include vitamins, minerals, herbal and non-herbal dietary supplements.

[6] For example, leverage and build on work conducted and data collected by the U.S. National Institutes of Health, U.S. National Institutes of Mental Health, and within the PhenX Toolkit

- **Fund new research:** Fund and conduct new research in an integrative manner using a multi-centre collaborative approach bringing Canadian and international researchers together to focus on the above initiatives and the research questions for specific thematic areas outlined in this report.

Endocannabinoid System

The effects of cannabis on the body are mainly mediated by the endocannabinoid system (ECS).[7] In the past 10 to 15 years a large amount of research has been conducted on the ECS and there is now extensive knowledge about its constituent parts; their location in different regions of the brain and in other organs and tissues elsewhere in the body; their role in retrograde signaling in synapses using glutamate, serotonin, GABA, endogenous opioids and a variety of other neurotransmitters and neuromodulators; and their roles in neurogenesis, angiogenesis, synaptic plasticity, nervous system maturation, inflammation and numerous other physiological and pathological processes. Much of this research has been motivated by the search for potential therapeutic agents, but increasing interest has been shown in the effects of altered ECS function in the production of the adverse effects of cannabis and other agents on health.

Gene variants of different elements of the ECS, including the CB1 receptor and the enzymes that synthesize and degrade the endocannabinoids themselves, have been shown to be linked to a variety of pathological processes in the brain, as well as in other tissues and organs. Discussion at the meeting revealed a broad range of potential basic and clinical research priorities related to the effects of cannabis on the ECS.

Research Questions

For a number of their actions, the concentration and effect relationships of cannabinoids have an unusual inverted-U shape, such that effects seen at low concentrations are replaced by opposite effects at high concentrations ("endocannabinoid overload"). It is not known whether the inverted-U shape applies equally to high doses of herbal cannabis. It might be a factor in the production of some of the adverse effects of exogenous cannabinoids, as well as of genetic variants of components of the ECS. It is a priority to find answers to the following questions:

- Are some of the adverse effects of high doses and prolonged exposure to Δ^9-tetrahydrocannabinol (THC) mediated by endocannabinoid overload or equivalent effects of exogenous cannabinoids on the ECS?
- Do genetic variants of component parts of the ECS affect risk for psychosis, impaired development of cognitive functions and other adverse effects of THC and other phytocannabinoids?
- Do the composition differences among different strains or preparations of cannabis produce differences of ECS function that can give rise to adverse effects on health?
- Are there age, sex or ethnic differences in ECS function that might alter responses to cannabis?
- Are there specific features of the ECS that can serve as biomarkers to identify vulnerable individuals who should be guided not to use cannabis?
- Do the interactions between cannabis use and receptors and enzyme systems of other key metabolic and regulatory pathways implicated in interactions with the ECS, including the

[7]The endocannabinoid system consists of the cannabinoid receptors, endogenous cannabinoid ligands (endocannabinoids), and their biosynthetic, metabolic and degradative enzymes.

endogenous opioid and eicosanoid[8] systems, contribute to the adverse health effects of non-medical use of cannabis?

Next Steps for the Field

To guide the development of a strategy for dealing with the research questions listed above, a useful first step would be to prepare up-to-date critical reviews of the literature on ECS. This literature includes somewhat contradictory research on the linkage of ECS variants to major adverse effects on brain function and on peripheral tissue disease processes such as obesity, anorexia, anxiety disorder, diabetic retinopathy, cannabinoid hyperemesis syndrome and cannabinoid tolerance, and on response to therapy of dependence on alcohol and other concurrently used drugs. The following next steps also identify high priority laboratory and clinical studies for which suitable methods already exist:

- Mapping of single nucleotide polymorphism (SNP)[9] variants of ECS components in groups of individuals who do not use cannabis, those who use occasionally and those who use heavily with adverse effects, to see which variants are clearly linked to the occurrence of such effects. Those that are reliably linked would then have to be studied further in the following ways:
    - Examination of the nature of those linkages by scanning for them in young adolescents before the start of cannabis use, and at intervals during adolescence and young adulthood, to see whether the linkages exist before onset of use or develop after onset;
    - Independent replication of studies reporting interaction of variants of endocannabinoid-degrading enzymes and childhood adversity on risk of development of cannabis dependence, psychosis and other major adverse effects;
    - Study of outcome of treatment of dependence on alcohol, cannabis and opioids in individuals with and without ECS gene variants;
    - Examination of dose and effect curves of cannabis preparations with different levels and ratios of THC and CBD, including recent very high THC strains and extracts, in individuals with and without ECS gene variants; and
    - Animal experiments to compare vulnerability to epigenetic[10] changes in the ECS with and without specific ECS gene variants.

In addition to the studies listed above, the effect of ECS variants could be tested as part of the studies outlined in the other sections of this document.

Neuroscience and Effects on Brain and Behaviour

Meeting attendees discussed how existing research has demonstrated that the brain and behaviour are impacted by cannabis use, but that our understanding of the extent, persistence and reversibility of these impacts are confounded by many different factors that must be disentangled and further

[8] Eicosanoids are lipids derived from arachidonic acid including the prostaglandins and their derivatives that mediate a number of important physiological functions including inflammation, allergy, fever, pain and others.

[9] Genes consist of long chains of nucleotides linked together in a specific sequence. Single nucleotide polymorphisms (SNPs), are variations in genes in which a nucleotide at a specific position in the sequence in the majority of the population is replaced by a different nucleotide in a small percentage of the population. This change can alter the functional properties of the gene.

[10] **Epigenetic** refers to chemical modification of gene expression arising from factors other than changes in the chemical structure of the gene itself. Such factors can arise within the organism or in the external environment.

studied. Developing and harmonizing a practical, validated set of measures for cognitive effects, behaviours, and the impact of cannabis on brain structure and function is critically important.

Research Questions

Participants agreed that it is a priority to understand the following issues in greater detail:

- How do the brain and behaviour effects of cannabis use vary with differences in dose, type of preparation (e.g., different cannabis strains, natural phytocannabinoids, synthetically modified cannabinoid derivatives, etc.), route of administration (e.g., vaping, edibles, concentrates, second-hand smoke, etc.), frequency and duration of use, onset of use, and cross-cutting characteristics?
- What can animal studies modelled closely on the human condition tell us about the above?
- Are structural and functional brain alterations due to cannabis use are reversible after abstinence, and how is reversibility impacted by THC/CBD concentration, frequency and duration of use, and cross-cutting characteristics?
- How do lingering levels of THC impact the brain, including the mechanisms of and relationship to tolerance development (by cannabis use history, and acute and cumulative exposure)?
- How can answers to the above questions increase our understanding of the neuroscience of substance use and addiction processes (i.e., why people want to use and the reinforcing properties of use)?
- What are the long-term brain- and behaviour-related impacts of cannabis use?

Next Steps for the Field

Participants agreed that with regards to the above questions, Canadian researchers should capitalize on their ability to conduct research that researchers elsewhere (e.g., the U.S.) cannot easily undertake given our access to more diverse cannabis strains, and to types and routes of administration that better reflect those being used non-medically. The group identified two next steps for immediate action in the field:

- Harmonize and use a battery of pragmatic measures of the impact of cannabis use on the brain and behaviour (e.g., National Institutes of Health's PhenX Toolkit , National Institutes of Mental Health data archive); and
- Determine the potential to collaborate on the National Institutes of Health's Adolescent Brain Cognitive Development (ABCD) Study, either through establishing a Canadian ABCD site or launching an ABCD-type study that begins prenatally.

Mental Health, Dependence, Treatment and Polysubstance Use

Cannabis is frequently used together with other addictive and psychoactive substances (e.g., tobacco, alcohol, etc.), making it difficult to disentangle the trajectories of cannabis use and the process of dependence development from those of other substances. In the face of cannabis regulation, participants also highlighted the need to determine the readiness of the health, mental health and addiction service systems to respond to people with cannabis use disorder both with and without additional mental health needs.

Research Questions

Meeting attendees identified the following questions for research, and monitoring and surveillance in this area:

- What is the prevalence of comorbid cannabis use and mental health disorders?
- What are the mechanisms that underlie the relationship between cannabis use and mental illness, recognizing the bi-directional nature of the relationship and the impact of cross-cutting considerations (e.g., sex, age, race, age of onset, etc.)?
- How does the use of high-potency cannabis products, polysubstance use and occasional cannabis use impact mental health?
- What are the individual and contextual or environmental factors that trigger or prevent the expression of genetic predisposition to problematic use or addiction?
- What are the most effective, evidence-informed treatments for comorbid cannabis use and mental health disorders?
- What are appropriate treatment goals and clinical outcomes (recognizing that these are most likely a range determined by individual characteristics and context)?
- How ready is the treatment system to meet people's cannabis use-related needs (e.g., capacity, coverage, detection capability, workforce development, etc.)?

Next Steps for the Field

While organizing to support the funding and conducting of new research, and monitoring and surveillance efforts in this area, participants identified four immediate next steps as listed below:

- Determine the prevalence and relationship of concurrent cannabis use and mental health disorders by establishing targeted sentinel surveillance sites and mining existing data sources (e.g., Canadian Institute for Health Information data; MedEffect Canada, Canada Vigilance Adverse Reaction Online Database;
- Identify appropriate treatment goals and clinical outcomes, as informed by youth and other cannabis-using populations;
- Conduct an assessment of the current treatment system's state of readiness to meet people's needs related to cannabis use; and
- Design and collect survey data on the use of other drugs (i.e., pharmaceuticals, non-pharmaceuticals, nutraceuticals) with cannabis, and extend earlier studies of effects of THC and CBD on the metabolism of other drugs by Cytochromes P450 (CYP) enzymes.

The group also identified one longer-term initiative:

- Determine effective approaches to treatment by synthesizing existing evidence; conducting implementation and outcome evaluations of current and emerging interventions and treatments; and launching smaller area studies to close specific knowledge gaps (taking cross-cutting considerations into account).

Psychomotor Performance, Impaired Driving, Detection and Polysubstance Use

Existing data and ongoing research provide a solid knowledge base as to the impact of cannabis on psychomotor performance, impaired driving, and detection.

Research Questions

Participants agreed that it is a priority to continue existing studies and launch new research, and monitoring and surveillance activities (as needed) to understand the following issues:

- What is the prevalence of driving under the influence of cannabis by time of day of the week, age and other cross-cutting characteristics?
- How are the effects of acute impairment on driving impacted by the individual characteristics of individuals who use cannabis, cannabis strain, administration method, polysubstance use and tolerance development (and what are the residual effects for those who quit chronic use)?
- What are the best ways to measure and detect impairment in those who use cannabis?
- What are the best ways to regulate and enforce regulations and laws about impaired driving (e.g., use and feasibility of a "zero tolerance" policy, use of "per se" limits, implementation of Drug Recognition Evaluators)?
- What is the impact of public awareness and education campaigns on driver behaviour, especially among youth?
- What is the impact of cannabis' effects on psychomotor performance and workplace and workforce safety?

Next Steps for the Field

Meeting participants identified the immediate need to conduct the reviews of existing research in the following areas:

- Psychomotor performance, impaired driving and detection, to determine which, if any, studies need to be updated using currently available cannabis strains;
- To determine the best way of measuring impairment associated with cannabis use; and
- To determine the most appropriate approach to regulating cannabis use and driving.

The group also identified the following two medium- to longer-term next steps:

- Identify and capitalize on opportunities to conduct appropriately designed case-control studies[11] to clarify the impact of cannabis on psychomotor performance, impaired driving and crash risk; and
- Identify crash risks for different driver populations that vary in terms of cross-cutting characteristics, strain used, route of administration used, polysubstance use and tolerance development.

[11] That is, studies that compare the prevalence of cannabis use among drivers injured or killed in traffic accidents with a control group of other drivers.

Health Promotion and Harm Prevention

Participants discussed the unique challenges of cannabis-related health promotion and harm prevention efforts, as unlike alcohol and tobacco, cannabis has been shown to have some therapeutic effects for specific conditions. The potential, particularly for youth, to hear "mixed messages" about cannabis use requires the development, implementation and evaluation of a more nuanced set of health promotion and harm prevention messages and interventions to support people in their decision-making around cannabis use.

Research Questions

Participants identified the following priority research questions, and monitoring and surveillance activities to address gaps in the area:

- What should be measured (and how) to best inform health promotion and harm prevention activities? There should be a particular focus on:
    - Understanding the causes and motivations that influence cannabis use (with consideration of cross-cutting characteristics); and
    - Defining what outcomes are desired, what messages are required and how these messages should be communicated.
- What does the cannabis market looks like (e.g., how much of which products are being used, how and with what other substances) and what are the resulting implications for health promotion and harm prevention efforts?
- How can cannabis-related initiatives be integrated effectively into a comprehensive health promotion and harm prevention model? The model should include:
    - What effective, cannabis-focused population-level models for health promotion and harm prevention interventions look like; and
    - What the current state of the health promotion and harm prevention landscape is with respect to cannabis-specific health promotion and harm prevention (e.g., capacity, interventions used, evaluation capacity, workforce development, etc.).
- How can alternative methods of delivery (e.g., use of technology, social media, community-based settings, etc.) be leveraged to support deployment of effective interventions for a broad and diverse population?

Next Steps for the Field

When developing the next steps for health promotion and harm prevention, participants highlighted the fundamental importance of harmonizing measures related to this and other thematic areas. In addition to this cross-cutting next step, meeting attendees identified the following two immediate next steps for the field:

- Define an initial set of desired outcomes, key messages and communication strategies, based on the existing knowledge base; and
- Evaluate the efficacy of existing adult-focused lower-risk cannabis guidelines (i.e., guidelines that help people reduce the risk of immediate and long-term cannabis-related harm) and their validity

for youth and those with comorbid mental health disorders, with a specific focus on the anticipated impact on trajectories of use.

The group also identified the following two longer-term initiatives:

- Have a central monitoring and evaluation infrastructure coordinate efforts for effective health promotion and harm reduction models, programs and interventions, locally and nationally; and
- Enhance knowledge exchange about effective health promotion and harm reduction models, programs and interventions, locally and nationally.

Build community capacity to support implementation of effective programs by:

- Building on what we know about effective health promotion and harm prevention, using implementation science approaches;
- Addressing current knowledge gaps with respect to cannabis-specific interventions (through population-level and smaller-scale targeted studies, the latter of which are referenced above);
- Evaluating and monitoring community needs and intervention delivery capacity; and
- Applying existing and newly generated knowledge to workforce development.

Social Determinants of Health, Psychosocial Impacts and Epidemiology

The discussion among participants revealed a wide range of research priorities related to the social determinants of health, psychosocial impacts and epidemiology. Participants agreed quickly on the need both to establish consistent definitions and measures of cannabis use, and to review and enhance existing data collection tools and surveys to establish a baseline and ongoing monitoring of cannabis use in Canada.

Research Questions

Meeting attendees identified the following priority questions for research, and monitoring and surveillance in this area:

- How does cannabis use, its health effects and related psychosocial impacts vary by selected populations for which there are currently gaps in the data (e.g., women and girls, including during pregnancy; Indigenous peoples; residents of urban, rural and remote locations; and racialized communities)?[12]
- What are the trajectories of cannabis use (i.e., timing and nature of initiation, escalation, persistence or duration, and stopping of use; impact of factors such as social context and the social determinants of health, regulatory framework and pricing on use patterns), how do these trajectories inform our models of dependence or addiction, management of withdrawal and the recovery process, and how does the regulation of cannabis impact these trajectories?

[12] Frequently referred to as "visible minorities," the term "**racialized communities**" encompasses all people that are non-Caucasian in race or non-white in colour.

- What higher-level socio-political considerations (e.g., impact of UN treaties, legal policy decisions, subsequent regulations, etc.) are likely to impact the implementation of cannabis regulation and in what ways across different communities?
- What are the psychosocial impacts of cannabis use, before and after regulation (e.g., on school performance, with respect to substance substitution effects and the resulting impact on harms to self or others, etc.)?
- What is the role of media, social media and marketing in establishing norms associated with cannabis use, and what are the implications for the regulation of product promotion?
- What are older adults' motivations for, experiences in and consequences of using cannabis (a particular gap in the existing research)?
- What impact does cannabis use have on parenting behaviour?

Next Steps for the Field

Participants identified the following four immediate next steps related to research, and monitoring and surveillance efforts for the field:

- Establish consistent definitions and measures of use that speak accurately to the health impacts of cannabis use by product type (e.g., strains, derivatives, etc.) and methods of administration (e.g., vaping, edibles, concentrates, etc.);
- Review and enhance existing data collection tools and surveys to establish a baseline understanding of cannabis use in Canada, and conduct ongoing monitoring;
- Conduct an environmental scan to identify existing studies and conduct additional small-scale, targeted studies to address specific data gaps about cannabis use, its effects and its psychosocial impacts on women and girls, including during pregnancy; Indigenous peoples; residents of urban, rural and remote location; and racialized communities; and
- Establish a central infrastructure to coordinate monitoring and surveillance, analytics and reporting across sites.

Conclusions and Next Steps for the Field

The meeting concluded with a discussion of the governance and infrastructure required to take the research agenda forward. Participants agreed that a central coordination role was essential to leverage the resources required to address knowledge gaps within and across thematic areas. National coordination is particularly important for promoting consistency and comparability of measures across diverse data sources and geographic locations (for example, with respect to the proposed research networks and targeted, small-scale local-area studies). The group discussed a range of options and considerations for both structuring and resourcing this central coordination function, and developed three key next steps:

1. **Infrastructure and governance**: Assign responsibility for coordinating, monitoring and reporting on progress made in carrying out the cannabis research agenda, in collaboration with a multidisciplinary research network. This responsibility could be assigned to a newly established or existing organization or network. However assigned, the responsible organization or network must meet the requirements for **independent, transparent and accountable governance**. Functions would include:

- Facilitating harmonization of key definitions and measures;
- Coordinating and sharing of information on local, national and international research initiatives, including development of partnerships with other research networks and multi-site studies;
- Monitoring and reporting on the health impacts of cannabis in Canada (including evidence on effective health promotion, harm prevention, treatment models and programs, both locally and nationally) and progress in carrying out the national research agenda on cannabis; and
- Engaging youth and families in developing, implementing and evaluating the national research agenda on cannabis.

2. **Funding:** Participants recommend that a **percentage of cannabis-related sales revenues** be dedicated to establish and maintain the central coordination function and advance the research priorities within and across the six thematic areas. Participants were clear that **we do not yet know enough about the health impacts of the non-medical use of newer, high-potency genetically modified cannabis preparations.** As Canada moves toward its regulation, an enhanced and sustained investment in cannabis-related research is required. While the specific percentage to be dedicated needs to be determined, a **minimum figure of 10%** resonated with the group as a preliminary estimate. The group also noted that **immediate resources would be needed** to support initial development work prior to the generation of sales or tax revenues. Foundations, industry and government could partner in their support of this work.
3. **Maintaining momentum:** Participants agreed that work should begin on the immediate next steps identified within and across the thematic areas. CCSA agreed to coordinate this early work as a follow-up to the meeting in line with its unique legislated national mandate, while recognizing that proper resourcing would be required for active, sustained support of the work going forward. Participants put their names forward to advance the identified next steps in their specific areas of interest. Participants also recognized that not all expertise was present in the room and agreed that the group should be expanded and made inclusive of all the diverse stakeholders in this area.

As Canada moves towards regulating non-medical cannabis use, there is a pressing need for access to evidence on the health-related effects of non-medical cannabis to best inform policy decisions. Such legislative changes and the impact of these changes, must be informed by current, high-quality research and must be monitored to ensure the health of Canadians is not negatively impacted by them. Canada deserves rigorous and excellent research to inform the many health and public policy decisions before us. Through the development of a comprehensive pan-Canadian research agenda on non-medical cannabis, decisions can be grounded in evidence, which will improve the quality of services provided to Canadians and reduce the potential for cannabis-related harms. Such an agenda would also help support the discoveries and innovations needed to improve the health of Canadians and strengthen the Canadian healthcare system's ability to effectively prevent and address cannabis-related harms.

Additional Resources

- The Effects of Cannabis Use during Adolescence (Substance Abuse in Canada)
- Cannabis Regulation: Lessons Learned in Colorado and Washington State
- Clearing the Smoke on Cannabis series: Highlights
- What Canadian Youth Think about Cannabis
- Impaired Driving in Canada (Topic Summary)
- Cannabis, Driving and Implications for Youth (Topic Summary)
- Marijuana for Non-Therapeutic Purposes (Policy Brief)
- Marijuana for Medical Purposes (Policy Brief)

List of Participants

Name	Affiliation
Hanan Abramovici	Health Canada
Mark Asbridge	Dalhousie University
Lynda Balneaves	University of Manitoba
Jacob Borodovsky	Dartmouth College
Alan Budney	Geisel School of Medicine at Dartmouth
Kim Bulger	Department of National Defense
Natalie Castellanos-Ryan	University of Montreal
John Clare	Health Canada
Patricia Conrad	University of Montreal
Kim Corace	Royal Ottawa Mental Health Centre
Eric Costen	Health Canada
Kevin Doucette	Canadian Medical Association
Katie Fleming	Canadian Centre on Substance Abuse
Peter Fried	Carleton University
David Hammond	University of Waterloo
Joanna Henderson	Centre for Addiction and Mental Health
Michael Holmes	Public Safety Canada
Didier Jutras-Aswad	University of Montreal
Harold Kalant	University of Toronto
Julie LaRoche	Health Canada
Bernard Le Foll	Centre for Addiction and Mental Health
Anton Maslov	Public Safety Canada

Name	Affiliation
Anna McKiernan	Canadian Centre on Substance Abuse
M.-J. Milloy	University of British Columbia
Heather Mustoe	Canadian Institutes of Health Research
Laura O'Dell	Department of National Defence
Elizabeth Osuch	London Health Sciences Centre
Rosalie Pacula	Rand Corporation
Amy Peaire	Government of Ontario
Anthony Phillips	University of British Columbia, Canadian Institutes of Health Research
Amy Porath	Canadian Centre on Substance Abuse
Alana Riccio	Public Safety Canada
Adair Roberts	Adair Roberts & Associates
Gillian Sayer	Royal Canadian Mounted Police
Keith Sharkey	University of Calgary
Andra Smith	University of Ottawa
Lis Sondergaard	Canadian Centre on Substance Abuse
Rachel Tyndale	University of Toronto, Centre for Addiction and Mental Health
Karen Urbanoski	University of Victoria, Centre for Addictions Research of B.C.
Zachary Walsh	University of British Columbia
Mark Ware	McGill University
Susan Weiss	National Institute on Drug Abuse
Frank Welsh	Canadian Public Health Association

ISBN 978-1-77178-405-4

Canadian Centre on Substance Abuse
Centre canadien de lutte contre les toxicomanies

CCSA was created by Parliament to provide national leadership to address substance use in Canada. A trusted counsel, we provide national guidance to decision makers by harnessing the power of research, curating knowledge and bringing together diverse perspectives.

CCSA activities and products are made possible through a financial contribution from Health Canada. The views of CCSA do not necessarily represent the views of the Government of Canada.