Lower Risk Cannabis Use Guidelines for Youth, By Youth

University of Victoria
Canadian Institute for Substance Use Research

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Mental Health Commission of Canada
Commission de la santé mentale du Canada

Contents

Citation

Card, K.G., Koenig, B., Moebes, Z., Muratov, M., Jansson, M., Selfridge, M., Korol, K., Benoit, C., and the Victoria Youth Foundry Clinic's Youth and Cannabis Working Group, March 2023. *Lower Risk Cannabis Use Guidelines for Youth, by Youth*. Canadian Institute for Substance Use Research, University of Victoria, Victoria, BC, CA.

Funding

This study was funded by the Canadian Institutes of Health Research and the Mental Health Commission of Canada (Funding Number 454848).

Acknowledgements

We would like to thank our community partner organizations, in particular, the Victoria Youth Clinic Foundry and the Youth-Led Working Group. Without their generous input, this work would not have been possible.

Lower Risk Cannabis Use Guidelines for Youth, by Youth

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Executive Summary

Currently, cannabis use is legal for adults in Canada but illegal for youth under age 18. Canadian Lower Risk Cannabis Guidelines have been developed for adults 18 years and older as a public health promotion tool in order to reduce potential risks. However, there are no parallel youth-led and evidence-based lower risk guidelines for young people under age 18.

To develop lower-risk cannabis use guidelines for youth, we adopted a multi-prong research approach which included: 1) a digital environmental scan of existing cannabis use guidelines; 2) a scoping review of meta-analyses and literature reviews of the impact of cannabis on young people; 3) a quantitative survey that examined personal and event-level factors associated with positive and negative experiences among youth using cannabis; and 4) engagement with a Working Group of young people with lived experience of cannabis use to elicit feedback and guidance for each stage of data collection and analysis.

Results from the quantitative survey demonstrate that positive experiences while using cannabis were associated with more frequent cannabis use, having a stronger high, being in a less stressful environment, not using cannabis alone, and experiencing fewer or less severe negative symptoms. In contrast, having more negative experiences while using cannabis was associated with less frequent cannabis use, starting cannabis use at a younger age, getting higher than the user normally does, and having cannabis supplied by someone else. Based on these results, along with findings from the scoping review and qualitative feedback from the Working Group, the research team drafted six guidelines to help young people minimize the harms and maximize the positive effects of cannabis use: (1) Get educated before you use; (2) Know your reasons for using cannabis and pay attention to how it is affecting you; (3) It is okay to wait until you are older or to not use cannabis at all; (4) Start low, go slow; (5) Consider where you are and who you use with; and (6) Choose your products and how you use carefully. The last step in developing the

guidelines involved receiving feedback from the Working Group on the feasibility and acceptability of the guidelines based on their own lived experience.

These guidelines are intended to offer evidence-based and youth-led strategies to help young people who use cannabis. The variety of evidence supporting these guidelines and the focus on youths' lived experience provides nuanced, practical, and feasible strategies to help mitigate the harms of cannabis while maximizing the event-level benefits.

Key Messages

- Youth who use cannabis report a number of positive but also negative experiences while using and there are various factors that influence the quality of their experiences.
- Environment and social contexts are key factors that shape youths' experiences with cannabis use, yet these factors are often unaddressed in public health messaging.
- Lower-risk cannabis use guidelines need to account for the multi-level factors that affect the experiences youth have with cannabis use in order to help them make more informed decisions about their use.

LOWER RISK CANNABIS USE GUIDELINES FOR YOUTH, BY YOUTH

1. Get educated before you use.

Frequent cannabis use can have negative health and social outcomes. Being educated about cannabis use is an important way to reduce harms and maximize benefits. Some important factors to be educated about include the different ways of using cannabis, the differences between Tetrahydrocannabinol (THC) and Cannabidiol (CBD), the legal status of cannabis in your province, and the long-term effects of cannabis use.

2. Know your reasons for using cannabis and pay attention to how it's affecting you.

Young people use cannabis for a variety of reasons, such as to experience positive sensations, to relax or deal with boredom, to cope with negative mental health, to help in social situations, to deal with chronic pain, and as a substitute for other drugs or alcohol. Make sure that you are aware of your reasons for using and whether cannabis is benefitting you now and in the future.

In the long-term, cannabis use has been linked to worse mental health, particularly regarding anxiety, mood disorders and psychosis. Using more than once or twice per week can lead to negative mental health outcomes. Beyond mental health, cannabis can negatively impact cognition, psychomotor control, attention, concentration, decision-making skills, impulsivity, and reaction time. These effects were found to be stronger among younger users.

Experiences with the long-term impact of cannabis use vary between individuals and youth should be mindful about how their health and wellbeing change over time as they use cannabis. Being aware of these effects is important in ensuring you get the most out of your cannabis use. If you begin to experience adverse effects, it may be time to limit your cannabis use. Some users can experience withdrawal symptoms when cutting down their cannabis use. If you are having trouble cutting down on your cannabis use, find support, such as through a medical or mental health professional.

3. It's okay to wait until you're older or to not use cannabis at all.

There is no "right" time to start using cannabis and it's okay not to use at all. Consider the reasons why you want to start using cannabis and whether you can wait until you're older or until you have more information about cannabis use. Some evidence has shown that cannabis use can impact the developing brain and suggest that it is best for young people to wait until the brain has fully developed before using. Some groups of young people, such as those experiencing severe mental health challenges, those with a family history of psychosis, and those who are pregnant, should try to delay their cannabis use. However, the choice to use cannabis must be weighed carefully by all individuals and they must choose for themselves whether using is appropriate.

4. Start low, go slow.

For young people who do not know their limits or who are inexperienced with using cannabis, one of the most important things you can do is be careful about your use. Youth can have a number of positive experiences while using cannabis and most of the time youth are able to achieve these experiences. For an experienced user, a strong high can be a positive experience. However, it is easy to overdo it. Getting higher than you intend to can increase your likelihood of having a bad experience. When people use too much cannabis, it can lead to nausea, sweating, and vomiting ("greening out"). Practicing starting low and going slow by initially using at low doses and using less frequently can help you learn where your tolerance is and how you are impacted by the substances you use. Using less frequently can also help minimize negative long-term effects. The impacts of cannabis can vary based on a number of factors and you may have a different tolerance than the people you are with. It is okay to use less than the people you are with.

Importantly, the effects of cannabis vary by mode of consumption. In particular, edibles take longer to reach full effect (2-4 hours) compared to smoking or inhaling (30 minutes). For an edible, a starting dose is about 2.5 milligrams of THC. For a joint or inhalant, 1-3 puffs at 10% THC content and waiting for 30 minutes is a good starting dose. It is recommended to start with these dosages the first few times you use cannabis. If you are unsure about the exact THC content of your cannabis product, use less than you think you should and wait before consuming more. It is also okay to stay at a low dose every time.

5. Consider where you are and who you use with.

Your social setting and physical environment can affect your experience using cannabis. Using with people who you are familiar with can help create a sense of safety and increase positive experiences while using cannabis. Avoiding using drugs in social situations that are

unfamiliar or dangerous is a key part to ensuring you are in a safe setting. Cannabis use while driving can be particularly dangerous, and is illegal in Canada, as it can lead to a slower reaction time and is associated with increased crash risk. You should always avoid driving when intoxicated with any substance, including cannabis.

6. Consider your products, and how you use, carefully whenever possible.

Not all cannabis products are created equal and it is important to know where your products come from. Knowing the source and type of product you are consuming is important for safer use. For example, synthetic cannabis products have been linked to abdominal distress, paranoia, and increased aggression. In addition to avoiding synthetic or contaminated products, it is also recommended that you should use higher CBD products and products with less than 10% THC. Waiting until you are of legal age to purchase cannabis can help you make informed decisions about the products you use when purchased from a regulated source.

Cannabis and other substances: Using cannabis with other substances, including alcohol and tobacco, can negatively affect your physical and mental health. Cannabis use can also have negative interactions with prescription medication; it is important to check that cannabis does not interact with any medication you are using. Ask a pharmacist if you are unsure.

Mode of consumption: The way that you consume cannabis is important. Smoking leads to a quicker high but can lead to inflamed lungs and chronic cough. Deep-breathing techniques can be particularly harmful to lungs. Blunts contain more cannabis than joints which can lead to consuming more than intended. Bongs produce more tar and carbon monoxide which harm the lungs and can increase the risk of dependence. Some evidence shows that vaporizing natural cannabis is less harmful to your lungs and is associated with fewer respiratory symptoms. However, using “vape-pens” or “e-cigarettes” that use cannabis concentrates may contain additional toxins that lead to respiratory symptoms. Cannabis concentrates also contain higher levels of THC and you should be careful when using these products. Using edibles can help you avoid the respiratory effects of inhalation but is more difficult to dose and may lead to using more cannabis than intended because of the delayed onset of the drug’s effect that comes with ingestion. In brief, there are potential harms and benefits of each method of consumption and you should weigh these when deciding how to consume cannabis.

Read the full report on these guidelines at https://youthcannabis.cisur.ca/.

Introduction

Lower Risk Substance Use Guidelines are a type of health promotion tool that aims to help people reduce the potential risks and maximize the potential benefits associated with the use of certain substances, such as cannabis. Canadian Lower Risk Cannabis Use Guidelines developed for the general population have not been tailored to youth. This is despite the reality that youth experience distinct risks associated with cannabis use. Existing guidelines related to use overemphasize the value of abstinence, which fail to support harm reduction for youth who continue to use despite these recommendations.

Prior to cannabis legalization for adults in Canada in 2018, there were three primary concerns regarding how the change in policy would affect youth: that cannabis use among youth would increase, that the use of cannabis during adolescence would cause irreversible damage to their developing brains, and that there would be an increased incidence of severe mental illness or injury from cannabis use (Haines-Saah & Fischer, 2021). Following legalization, Haines-Saah & Fischer (2021) investigated whether these concerns were valid or not. They found no significant change in the patterns of use among youth after legalization for adults.

Cannabis is known to contribute to several negative health outcomes, such as anxiety, cognitive impairment, and cannabis dependency (Campeny et al., 2020), with some individuals being more at risk than others. While studies have found a relationship between high intensity and frequent cannabis use and harm to the developing brain (Hasan et al., 2020; Murray et al., 2016), not all youth use cannabis this way and therefore findings from such studies may not be relevant to all young people who use cannabis. Similarly, studies have found that some of the negative effects of cannabis subside after a prolonged period of abstinence (Hoch et al., 2015). Legalization (discussed below) provides an opportunity for health experts to address these risks in ways that reduce harms associated with cannabis. One of the measures that health experts take is through published guidelines, including Canada's Lower-Risk Cannabis Use Guidelines (Fischer et al., 2017), which aim to promote healthier cannabis use patterns. Because these guidelines were designed for adults and do not account for young cannabis users (Fischer et al., 2017), there is the need to develop Lower Risk Cannabis Use Guidelines for Youth that account for their distinct experiences with cannabis in order to better tailor harm-reduction strategies.

Legal context

In 2018, the Government of Canada passed the Cannabis Act which legalized the possession and distribution of cannabis for adults, subject to provincial and territorial

restrictions (Government of Canada, 2018). The Cannabis Act specifically aims to restrict access to cannabis for young people and under the current legislation, it is illegal for youth under 18 years of age to possess more than 5 grams of dried cannabis. Further, it is illegal for individuals who are 18 years of age or older to distribute cannabis to an individual who is younger than 18 years of age. These legal restrictions to regulated cannabis means that individuals who are younger than 18 years of age act illegally in order to obtain and use cannabis. Provincial and Territorial differences in the definition of children means that in those regions, including British Columbia, where adulthood is defined at age 19, cannabis is restricted from youth aged 18 (Government of British Columbia, 2018).

Purpose

The purpose of this research project was to develop lower-risk cannabis use guidelines for and by youth.

Methods: Multiple prong approach

To achieve our study purpose, this project leveraged the pre-existing collaborative relationship between youth and staff at the Victoria Youth Clinic Foundry (VYCF) and researchers at the Canadian Institute for Substance Use Research (CISUR).

In order to develop lower-risk cannabis use guidelines, we obtained data from 1) a digital environmental scan of existing cannabis use guidelines; 2) a scoping review of meta-analyses and literature reviews of the impact of cannabis on young people; 3) a quantitative survey that examined personal and event-level factors associated with positive and negative experiences among youth using cannabis; and 4) engaging with a Working Group of young people with lived experience of cannabis use.

Research team

The primary research team included Kiffer Card, Brett Koenig, Zakkaery Moebes, Maxim Muratov and Cecilia Benoit, the nominated principal investigator of the research grant funded by the Mental Health Commission of Canada and the Canadian Institutes of Health Research in 2021. The research team led the development of the data collection tools, the data collection and analysis, and the literature review. Additionally, the research team facilitated the iterative consultations with the Working Group and incorporated their feedback throughout the research process and the development of the guidelines. Furthermore, the authors of this report have had a long-term commitment to health equity among youth and youth harm-reduction, through both direct care and research (see:

Benoit et al., 2008; Selfridge et al., 2020; Magnuson et al., 2021; Card et al., 2021; Greer et al., 2022).

The Victoria Youth Clinic Foundry is a youth-centred health clinic that provides integrated and comprehensive mental health, substance use care, and primary health services for youth, aged 12-24 years, living in the Greater Victoria Area. It is part of a province-wide network of youth-oriented clinics, known as the Foundry BC. Website: https://www.victoriayouthclinic.ca

The Canadian Institute for Substance Use Research is an interdisciplinary research institute at the University of Victoria with an international reputation in evaluating the costs and harms of substance use and methods for promoting harm reduction, social inclusion, and empowerment for marginalized groups. Working in partnership with the VYCF ensured that the research team worked within youth community priorities throughout the entirety of the research project. Website: https://www.cisur.ca

Environmental Scan and Scoping Review of Literature Related to Cannabis Use Guidelines

This project began by identifying existing lower-risk substance use guidelines (LRSUGs) relevant to youth. To identify official or pseudo-official guidelines, we conducted a digital environmental scan using the google search engine by searching key terms about cannabis use. We then extracted the returned search results from the first five pages of Google search, resulting in fifty links for each search. This search strategy was supported by previous research showing that youth frequently use the first few search results within search engines as a source of health information (Hansen et al., 2003). Articles that fit our inclusion criteria but did not provide youth-specific guidelines were included in the final search results because youth may still access and use these guidelines. This search process resulted in a list of potential guidelines related to lower-risk cannabis use that could reasonably be used by youth under the age of 18 (Appendix A). Similar guidelines were combined and synthesized to avoid repetition.

After identifying common recommendations related to lower-risk cannabis use, we conducted a scoping review using the PubMed search database to identify literature reviews and meta-analyses that could inform or support the guidelines we identified

through our digital environmental scan. Evidence from this review was then synthesized and used in the development of lower-risk cannabis use guidelines for youth (Moebes et al., 2023).

Qualitative Discussions with Youth-Led Working Group

In order to develop lower-risk cannabis use guidelines for youth, we worked closely with a Youth-Led Working Group (WG), affiliated with the VYCF. To be eligible for the WG, participants had to be between 16-30 years old, have lived or living experience of cannabis use, live in British Columbia, and be willing to participate in a longitudinal engagement process. Members of the VYCF's Youth Advisory Council (i.e., a team of service users that advise on VYCF's programming) were first invited to join the WG. Following this, we reached out to other community organizations and an online group of youth service providers to recruit WG members. Interested youth completed an eligibility and demographic survey online. Thirteen youth were invited to participate in the WG. These youth were purposely selected to reflect a diversity of youth's lived experiences across frequency and history of cannabis use, age, gender identity, Indigeneity, and race. Of these participants, 10 confirmed their interest and were invited to attend all engagement sessions across the 2021-2022 duration of the project. Seven of the invited youth participated in at least one of the engagement sessions, constituting the WG. Due to COVID-19 public health restrictions, engagement sessions occurred over Zoom in a group and via individual email communications. Working group members received $50 CAD for every engagement session they participated in. *Table 1* provides a description of the WG.

Table 1. Characteristics of Working Group Members (N=7)

	N
Age	
16-18	3
19-21	0
22-25	4
Gender	
Cis man	1
Cis woman	5
Non-binary	1
Indigenous	1
People of colour (e.g., Black, Asian or another racialized group)	2
Sexual minority	4
Person with self-identified disability	2
Past or current mental health problem	5

Frequency of Cannabis Use	
A few times a year or less	0
About once a month	2
A few times a month	2
About once a week	1
A few times a week	0
Daily or almost daily	2

During engagement sessions, WG members were involved as co-investigators using a participatory research design, in which the research team facilitated nine engagement sessions with the WG between 2021-2022. During these sessions, WG members reviewed existing lower-risk cannabis use guidelines and informed the development of new lower-risk guidelines through iterative discussions with the research team and a document review processes (e.g., providing edits and comments on guideline documents, survey tools, etc). Feedback from the WG members was incorporated into each stage of data collection and analysis. Once initial guidelines were drafted by the research team based on findings from our research and the existing empirical literature, the WG members reviewed them for accuracy and feasibility based on their own living/lived experience.

Analysis of Survey Data from Youth Who Use Cannabis

Based on discussions with the WG, an online survey was created to examine personal and event-level factors associated with positive and negative experiences with cannabis use. Survey participants lived in Canada, were between 16-24 years old, and had used cannabis in the previous six months. Instead of using study advertisements for recruitment, survey participants were recruited through snowball sampling, a form of purposive non-probability sampling that is useful for recruiting populations that are traditionally difficult to recruit, such as youth who use criminalized substances (Benoit et al., 2005). Initial recruits included members of the WG. Each participant was able to refer up to 5 other people in their social network who met the eligibility criteria. Youth received $50 CAD for answering the survey and $20 CAD for each eligible person they referred who answered the survey. Recruitment occurred between April-June 2022. Recruitment tracking was conducted using individualized referral codes automatically generated by the survey platform.

The survey instrument included sections on demographic information, general patterns of cannabis use, self-perceived health, participants' most recent experience using cannabis, and perceptions of factors that impact youths' experiences with cannabis. The survey consisted of both closed- and open-ended questions and took approximately 25 minutes to

complete. Quantitative data from the survey were analyzed descriptively in RStudio by calculating the frequencies and percentages for each variable and appropriate bivariable summary statistics (e.g., Chi-Square test, t-test). Linear regression was also used to identify factors associated with the quality of participant's last experience using cannabis. The quality of their last experience was derived from a single variable in which participants were asked about the negativity/positivity of their most recent experience using cannabis on a 10-point scale, with 10 being extremely positive and 1 being extremely negative. *Table 2* provides a description of the study sample.

Open-ended questions asked about participants' experiences with cannabis as they related to mental health and the perceived positive or negative outcomes of using cannabis. To analyze the qualitative data, the research team followed a semantic thematic approach (Braun & Clark, 2006) driven by the question, "how do young people who use cannabis perceive the impacts of cannabis on their mental health?". Qualitative data were deductively coded based on the overarching question into positive experiences, negative experiences, and neutral or mixed experiences. Qualitative data were used to triangulate and give nuanced meaning to the quantitative findings. A summary of the qualitative findings for the open-ended questions is included in Appendix C.

Table 2. Characteristics of Survey Participants (N = 230)

	N/Mean	**%/SD**
Positivity of Most Recent Cannabis Experience *(Mean, SD)*	7.14	2.28
Age of first cannabis use	15	2.13
Correlation between age of first use and earliest age that participants recommended youth use	0.34	$p < 0.05$
Age *(N, %)*		
16 - 18	117	51%
19 - 21	71	31%
22 - 24	42	18%
Gender *(N, %)*		
Cis man	88	38%
Cis woman	108	47%
Non-binary	34	15%
Ethnicity[1] *(N, %)*		
White	182	69%
Black	7	3%
Indigenous	19	8%
Latin American	12	5%
East or Southeast Asian	28	11%

West or South Asian	11	4%
Other	5	2%
Sexual Orientation *(N, %)*		
Straight	129	56%
2SLGBQ+	101	44%
Disability Status *(N, %)*		
Lives with disability	60	26%
Does not live with disability	170	74%
Living Environment		
Rural area (<1,000 people)	4	2%
Small city/town (1,000-29,999 people)	42	18%
Medium city/town (30,000-99,999 people)	121	53%
Large urban centre (100,000+ people)	62	27%
Frequency of Cannabis Use		
Monthly or less (1 time per month or less)	53	23%
Weekly or less (2-4 times a month)	54	24%
A few times per week (2-3 times per week)	23	10%
Most days (≥4 per week)	100	43%
Cannabis Use Disorder[2]		
Normal use	71	33%
Use disorder	96	44%
Hazardous use	50	23%
Self-reported Mental Health		
Poor	51	22%
Fair	88	39%
Good	50	22%
Very Good	30	13%
Excellent	8	4%
Generalized Anxiety Disorder		
No disorder	118	52%
Possible disorder	110	48%
Patient Health Questionnaire-2		
No depressive disorder	137	60%
Likely depressive disorder	92	40%
How knowledgeable are you of the differences between THC and CBD?		
I know the differences	175	76%
Don't know	55	24%
Have you ever discussed the harms/benefits of cannabis use with		

your parents/guardians?		
Yes	173	76%
No	56	24%
Have you ever searched for guidelines on how to use cannabis more safely?		
Yes	117	52%
No	110	48%
Do you agree or disagree with the following statement: The larger quantity of cannabis I use, the better my mental health		
Neither agree nor disagree	80	35%
Somewhat disagree	61	27%
Strongly disagree	56	24%
Somewhat agree	28	12%
Strongly agree	4	2%
Do you agree or disagree with the following statement: The more frequently I use cannabis, the better my mental health.		
Neither agree nor disagree	78	35%
Somewhat disagree	54	24%
Strongly disagree	45	20%
Somewhat agree	41	18%
Strongly agree	6	3%
How often during the past 6 months did you find that you were not able to stop using cannabis once you had started?		
Never	120	53%
Less than monthly	39	17%
Monthly	14	6%
Weekly or more	53	23%
How often during the past 6 months did you fail to do what was normally expected from you because of using cannabis?		
Never	120	53%
Less than monthly	65	28%
Monthly	21	9%
Weekly or more	22	10%
How often in the past 6 months have you had a problem with your memory or concentration after using cannabis?		
Never	56	25%
Less than monthly	66	29%
Monthly	38	17%
Weekly or more	65	29%
The most recent time you used cannabis, how high did you feel?		

Not at all or only a little	67	29%
Moderately high	103	45%
Very high	47	20%
Extremely high	11	5%
I don't know or can't remember	2	1%
How often do you use cannabis in situations that could be physically hazardous, such as driving, operating machinery, or caring for children?		
Never	189	82%
Less than monthly	18	8%
Monthly	6	3%
Weekly or more	17	7%
Was the cannabis you used during the most recent time obtained through a legal source (ex: legally purchased at a dispensary)?		
Yes	164	72%
No	43	18%
I don't know or can't remember	22	10%
The most recent time you used cannabis, did you or someone else supply it?		
Someone else supplied it	114	50%
I supplied it	111	48%
I don't know or can't remember	5	2%
Was the product you were using high or low THC?		
High THC	141	61%
I don't know or can't remember	65	28%
Low THC	24	11%
Was the product you were using high or low CBD?		
Low CBD	115	50%
I don't know or can't remember	91	40%
High CBD	22	10%
In general, how often do you use cannabis do you ever mix with other drugs (including alcohol, nicotine, or other drugs)?		
Rarely or Never	83	36%
Sometimes	82	36%
Most of the time	46	20%
All of the time	18	8%

[1]Participants were able to select from multiple options and totals may not add up to 100%

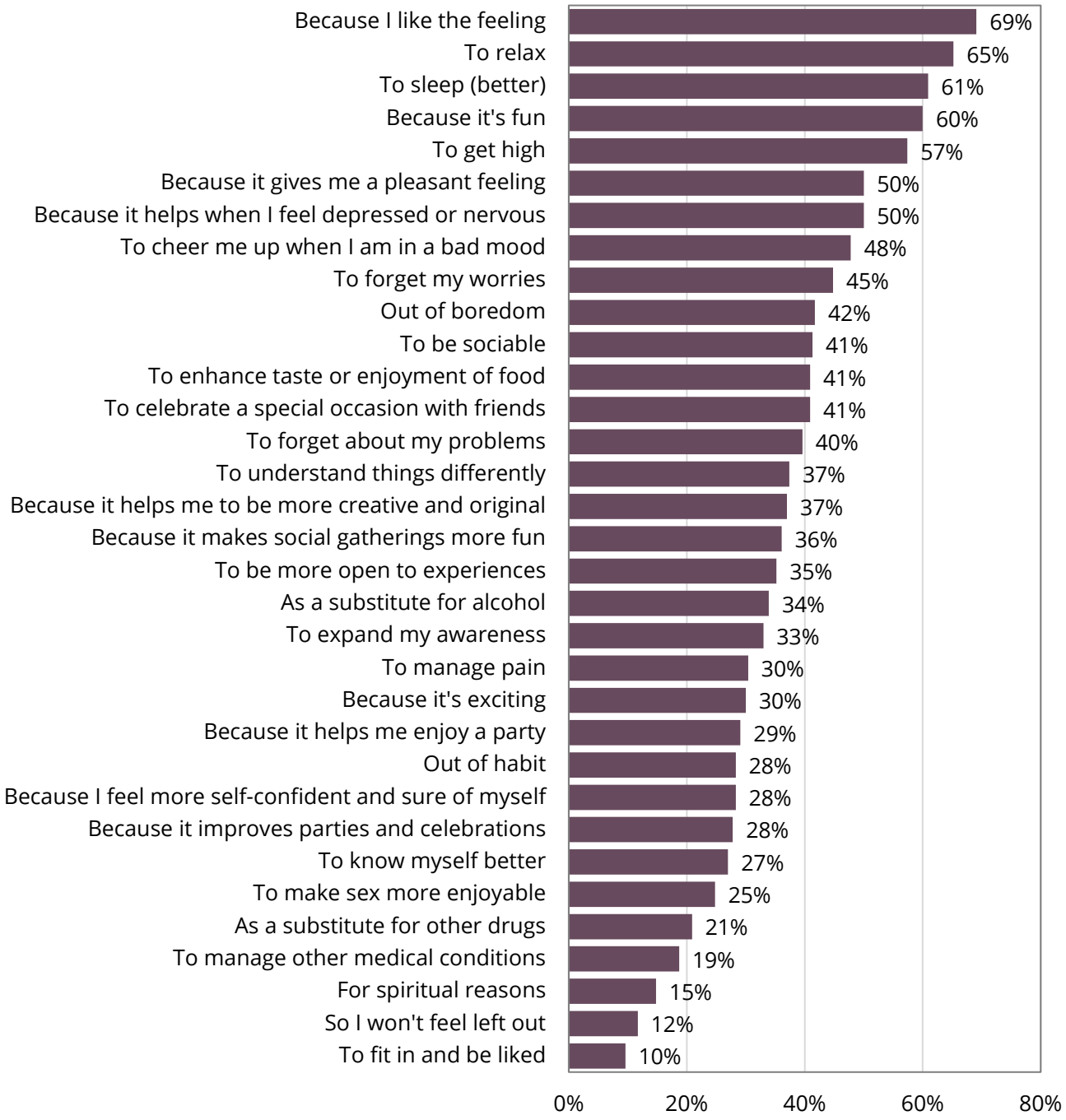
[2]Cannabis use disorder classified based on participant responses to the Cannabis Use Disorder Identification Test – Revised (Adamson et al., 2010)

Results

Youth participating in the WG and survey provided wide-ranging insight into their lived and living experiences using cannabis, as well as how youth can get the most out of their cannabis use while minimizing potential harms. Among these insights, our WG members and survey participants identified motives for cannabis use as being both wide ranging and important to understanding consumption. Participants were asked closed-ended questions on their reasons for using cannabis and were able to select as many options as were applicable.

Figure 1 shows some of the common motives driving cannabis use among youth. Importantly, youth also identified that their motives to use cannabis were related to how it made them feel. The most common reason that participants reported using cannabis was because they liked the feeling. Only 9.6% of participants said that they used cannabis to fit in and 11.7% stated that they used cannabis to not feel left out. Half of the participants stated that they used cannabis when they felt depressed or nervous.

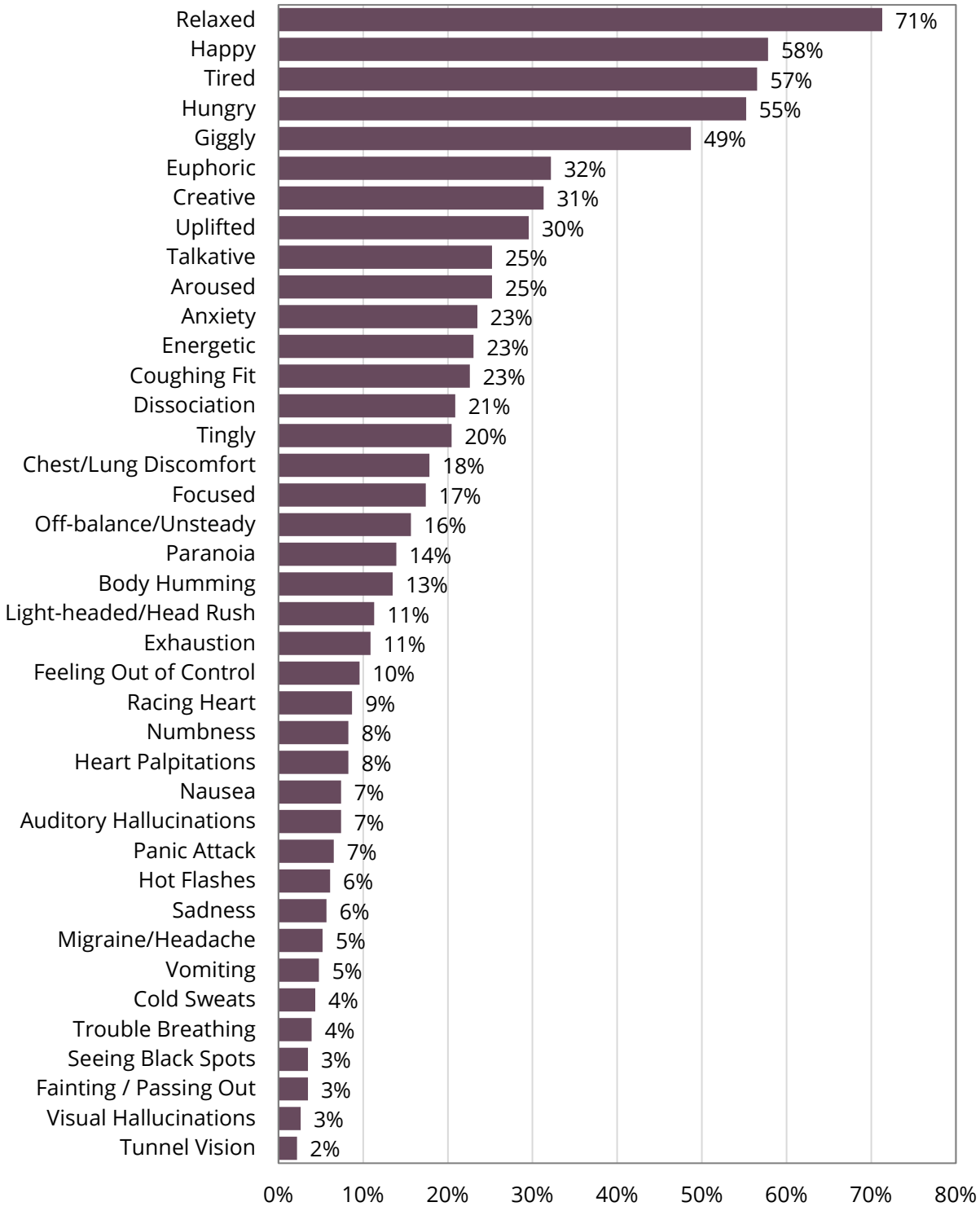
Figure 1. Reasons for Using Cannabis Among Survey Participants



Participants were also asked in a closed-ended question about any feelings and symptoms they had the most recent time they used cannabis. Youth were able to select as may options as were applicable. *Figure 2* shows the prevalence of some of the most common feelings and symptoms of cannabis use – both positive and negative – reported by survey participants. Most participants (71%) reported that they felt relaxed after using cannabis and 58% reported that they felt happy. While negative feelings were less common, a

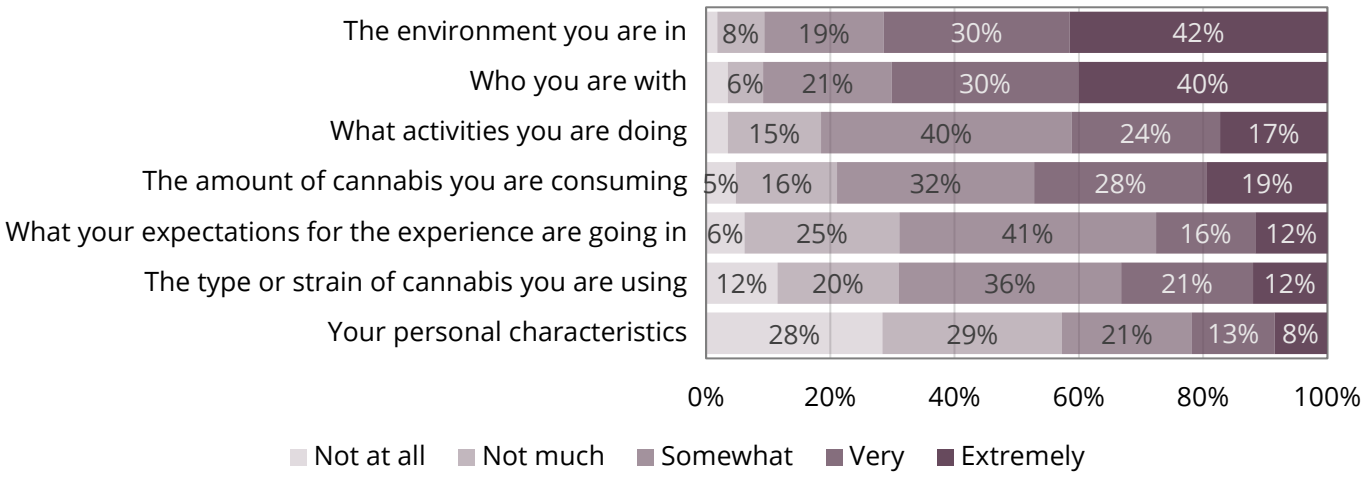
significant proportion of participants felt anxious (23%), dissociative (21%), paranoid (14%), and/or had chest or lung discomfort (18%).

Figure 2. Feelings Experienced by Survey Participants During Last Cannabis Use



The goal of lower-risk cannabis use guidelines is to help youth maximize their positive experiences while minimizing negative ones. Existing lower-risk guidelines often target certain areas of substance use, most notably regarding the quantity of substances being used. However, consultations with the WG shed light on other domains that may affect young people's experiences with cannabis use that may be important to address in youth-specific lower-risk guidelines. These domains were broad categories of factors that could influence youths' experiences while using cannabis, such as their physical and social environments. In our online survey, participants were asked to categorize how important each domain was to their experience while using cannabis, from being not at all important to extremely important. *Figure 3* shows how youth rate the relative importance of specific guideline domains in promoting positive cannabis use experiences. Each row in *Figure 3* represents a different guideline domain and the different coloured boxes represent a different rating of the perceived importance of that guideline (i.e., not at all important, somewhat important, extremely important, etc.). Percentages included in the figure represent the proportion of participants who rated each guideline with the corresponding level of importance.

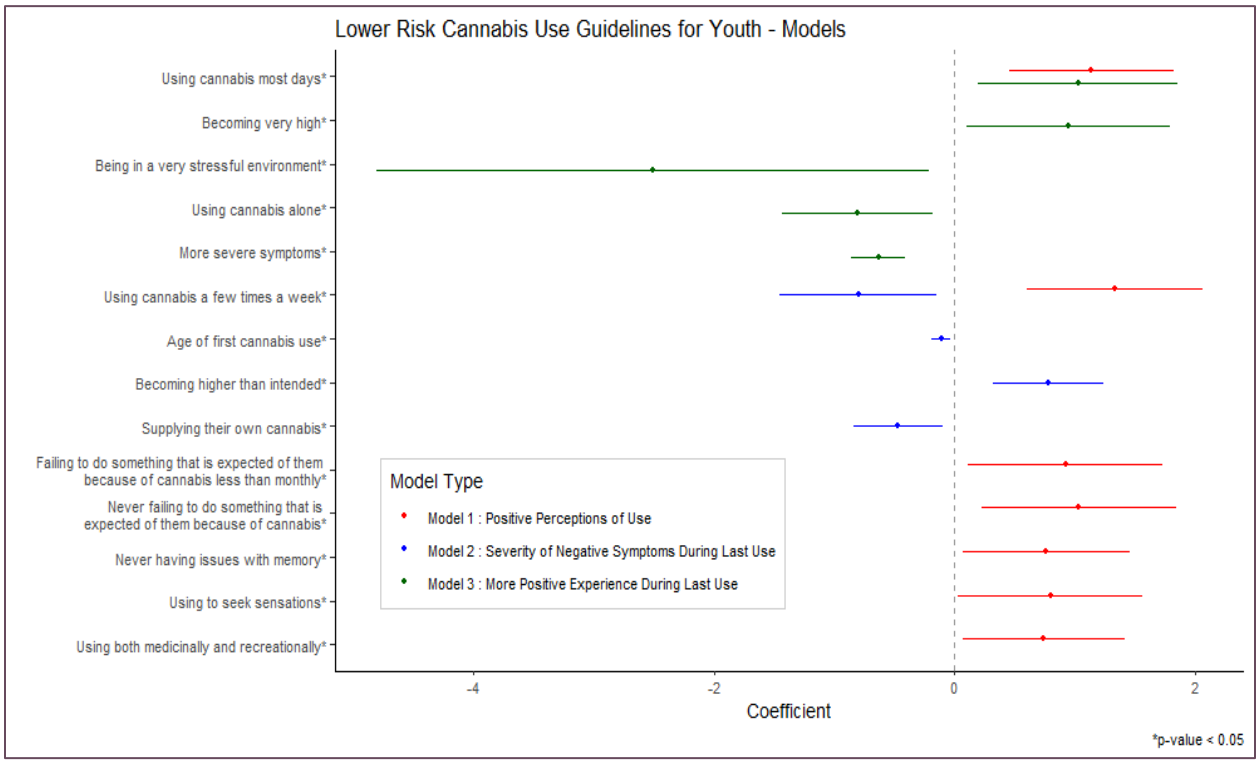
Figure 3. Survey Participant's Ratings of Importance for Various Guideline Domains



In addition to the young people's views on the importance of each domain on their experiences while using cannabis, we also sought to empirically identify the personal and event-level factors associated with participants' rating of the positivity of their last cannabis use experience. *Figure 4* shows variables associated with the reported positivity of their last cannabis use event (Model 3). A complete list of variables included in the modelling is found in Appendix B. In summary, the most salient and significant factors associated with reporting a more positive experience using cannabis were: using cannabis more frequently,

having a stronger high, being in a less stressful environment, not using cannabis alone, and experiencing fewer or less severe adverse symptoms.

Figure 4. Factors Associated with Perceived Positivity of General Cannabis Use, Severity of Symptoms During Last Use; and Perceived Positivity of Most Recent Experience Using Cannabis



In addition to assessing participants' overall positivity about their last cannabis use experience, *Figure 4* identifies factors specifically associated with the presence and severity of adverse symptoms during their last event (Model 2). Results show that having more severe adverse symptoms was associated with less frequent cannabis use, starting cannabis use at a younger age, getting higher than the participant normally does, and having cannabis supplied by someone else.

In addition to participants' last experience with cannabis, we sought their views of their overall use of cannabis. *Figure 4* shows factors associated with a more positive view of one's overall cannabis use (Model 1). In summary, a more positive view of one's cannabis use was associated with having used cannabis more frequently, not failing or rarely failing to meet

> I actually find that cannabis helps when I get overwhelmed with my mental health issues. I find smoking calms me down so I am able to concentrate on my emotional state.

> [Cannabis causes] extreme overthinking leading to fake situations that I would create in my head. Anxiety to the point that I cannot not perform basic everyday tasks. Depression.

responsibilities due to cannabis use, not experiencing memory problems from using cannabis, and with using cannabis for both medicinal and recreational reasons.

In order to provide further nuance to young people's perceptions of the impacts of cannabis, we analyzed the open-ended survey questions that pertained to how participants said cannabis affected their mental health (Appendix C). During the online survey, participants were asked a number of questions about the perceived impacts of cannabis, including the question "How do you think your mental health has been impacted by cannabis use?". While there was no singular narrative to describe the mental health effects of cannabis use, the qualitative responses corroborated many of the quantitative findings.

Many participants stated that cannabis improved their mental health in a number of ways, such as helping reduce trauma and depression. Others described cannabis as exacerbating existing mental health concerns, such as depression and anxiety. Many participants who described exacerbated mental health concerns noted that they were especially concerned about the long-term effects of cannabis. Participants who had either quit using cannabis within the previous six months or who had decreased the amount they were using often described that it was difficult to notice the effects of cannabis until use had stopped. Other participants described how cannabis could both positively and negatively impact their mental health, and that the effects changed over time and was dependent on their social and environmental context while using.

Many of these youth described how the impacts of cannabis varied between contexts and across different stages of their lives. Overall, qualitative responses gave greater nuance to why and how cannabis use can positively or negatively affect young people's mental health. Further, these responses demonstrated that young people have a high degree of awareness of the effects of their cannabis use, especially when they understood they were using it in harmful ways or in ways that were no longer useful.

> It has been extremely helpful for anxiety and stress but it has somewhat impacted my sadness, I do not have depression but I do have bouts of prolonged sadness and sometimes it's worse from using weed.

Lower Risk Cannabis Use Guidelines[1]

Based on these analyses above and our engagement with youth, we drafted a set of lower-risk cannabis use guidelines for youth under age 18. Below, we aim to provide qualitative and quantitative insight from youth, as well as evidence from previously published studies that supports each guideline. Further, we have included qualitative data from the open-ended questions in our survey that examined youth's perceptions of how they could optimize their mental health while using cannabis. The qualitative data corroborated many of the proposed guidelines and we have included quotes from participants to demonstrate their perspectives on how to reduce the harms associated with cannabis.

Research Limitations

Evidence for these guidelines was gathered from academic research and a small sample of youths' lived experiences in one urban region of Canada. There were demonstrable gaps in research on the nuances and particulars of cannabis use, such as the various methods of consumption and the long-term effects of cannabis use, especially among young people. However, youths' lived experiences provide many of the nuances that are missing from the academic literature and incorporating these experiences is an important way to ensure the efficacy of our draft guidelines. As additional research is conducted and we continue to learn more about cannabis use and its long-term effects, especially among youth who begin using cannabis before the age of 18, some evidence we have included may become less relevant. Therefore, it is important to incorporate emerging evidence with youth engagement into future iterations of lower-risk cannabis use guidelines.

Interpretation of the Guidelines

The guidelines presented should be interpreted under the current Canadian legislation which criminalizes adults who distribute cannabis to people under the age of 18 and restricts people under the age of 18 from possessing more than 5 grams of dried cannabis (Government of Canada, 2018).

Additionally, these guidelines must be interpreted within the context of relatively limited extant research that examines the long-term impacts of cannabis use on young people, especially across various patterns of use. Current evidence has shown that frequent and high-intensity cannabis use among youth is associated with adverse health outcomes,

[1] At the beginning of this document, we have included a set of condensed guidelines that are intended to be accessible to young people. These guidelines were presented to the Working Group, who provided crucial feedback and approved the feasibility of the guidelines for young people.

including harms to their cognitive development (Campeny et al., 2020). Additionally, the development of schizophrenia is higher among heavy cannabis users than non-users, particularly among those with a genetic predisposition to psychosis, although whether cannabis use causes greater risk of schizophrenia among these users is unclear (Campeny et al., 2020; van der Steur et al., 2020). Most research that was reviewed for this project examined the impact of heavy cannabis use on adolescent development. However, young people use cannabis in varying frequencies and intensities and there are limited long-term data on the impacts of low-intensity and infrequent cannabis use. There are also inconsistent data on the prevalence of cannabis dependency among youth. While pooled estimates have found that approximately 1 in 8 people who use cannabis develop a cannabis dependence, these data do not account for varying frequencies of use or age of cannabis use onset (Leung et al., 2020). There is some evidence that initiating cannabis at an earlier age may have long-term impacts as cannabis use disorder most often develops during late adolescence and early adulthood (Courtney et al., 2017). However, evidence also suggests that developing cannabis use disorder is associated with a range of psychological, social, and biological factors (Courtney et al., 2017). Therefore, there is an incomplete understanding of the factors that cause young people to develop cannabis use disorders and the best strategies to prevent these long-term impacts. However, there is the demonstrable need to improve the accessibility of mental health resources for young people to address the social and psychological factors that contribute to cannabis use dependency among youth (Courtney et al., 2017).

There are potential harms of using cannabis and potential benefits of delaying cannabis use after adolescence. Much of the reviewed literature and findings from our research emphasize the short-term effects of using cannabis as there is limited available longitudinal research that examines the effects of cannabis use, especially among youth. Therefore, the data we provide do not necessarily reflect the long-term positive or negative effects of cannabis use for youth. Instead of encouraging or discouraging youth from using cannabis, or establishing a definitive age that is appropriate to begin using cannabis, the following Lower Risk Cannabis Use Guidelines are intended to offer strategies to help young people make informed decisions about using cannabis.

1. Get educated before you use.

> Educate yourselves on the strength and the type of strain of the cannabis. Be aware of your triggers and always make sure you are in a safe place.

Members of the WG emphasized that being educated about cannabis use is important to mitigate its potential negative effects. Generally speaking, youth who use cannabis are very educated about using cannabis. For example, 76% of survey participants reported being knowledgeable about the differences between THC and CBD – two of the key components of cannabis. As demonstrated by the above analyses, more frequent cannabis use was associated with having a more positive view of one's general cannabis use, reporting less severe adverse experiences, and reporting that their most recent experience using cannabis was more positive. While frequent cannabis use has been linked to poorer health and social outcomes (Campeny et al., 2020; Hasan et al., 2020; Scott et al., 2018), the findings from our analyses likely reflect the value of experience. More experienced users may be better educated about how to use cannabis. However, prior to using cannabis, young people are able to educate themselves on cannabis through a number of avenues. For example, 76% of survey participants reporting that they had talked with parents about the harms and benefits of using cannabis. A sizable proportion of participants (52%) also used the internet to search for guidance on safer cannabis use.

> Figure out what works for you. How you consume, THC vs CBD, Indica vs Sativa, and even down to how high your THC percentage can really make a difference.

There are several important components of cannabis use that youth should educate themselves on before using cannabis, including the type of cannabis they are using and the dose of the product they are using. In our survey, 68% of participants stated that the type or strain of cannabis was a somewhat important to an extremely important predictor of the quality of their experience (Figure 3). Additionally, 79% of participants noted that the amount of cannabis they were using was an important predictor of the quality of their experience (Figure 3).

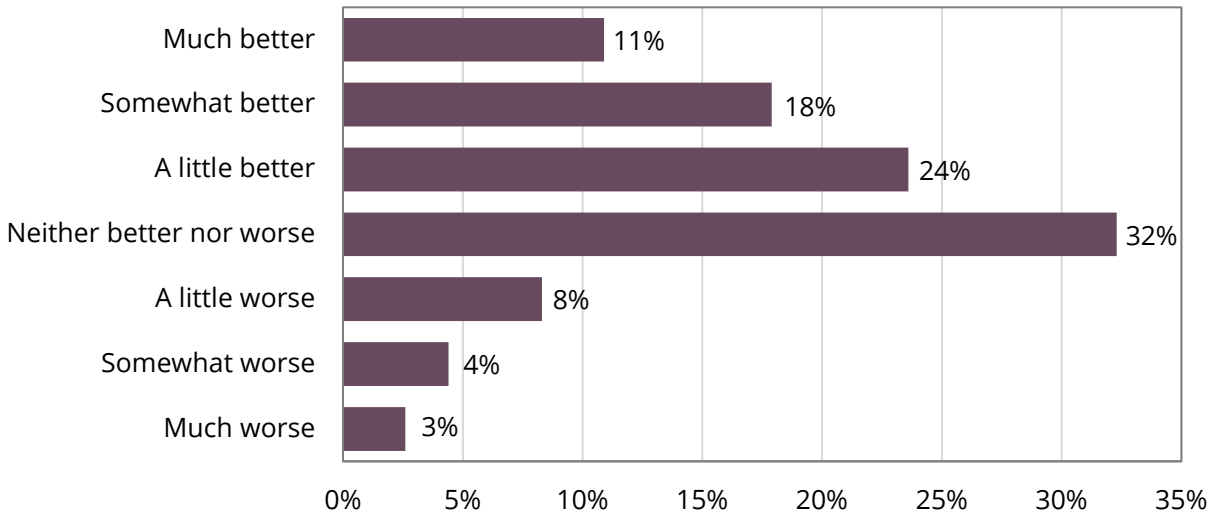
2. Know your reasons for using and pay attention to how cannabis is affecting you.

Cannabis has a wide range of uses. Approximately 69% of survey participants reported using cannabis for the feelings it gave them: 65% to relax or wind down, 41% in social situations, 42% to deal with boredom, 21% as a substitute for other drugs or alcohol, and 50% to cope with mental health or emotional challenges. Participants emphasized that youth should be aware of the reasons for their use and whether it is benefiting them, as it can have negative consequences. Regarding mental health, *Figure 5* shows that while many youth report some benefits of using cannabis for their mental health, the largest proportion said that it made little difference and most who stated that it had made a difference noted that their mental health was only a little bit or somewhat better because of their cannabis use. Furthermore, only 14% of participants agreed that higher doses of cannabis improved their mental health and only 21% of participants agreed that more frequent cannabis use had a positive mental health effect.

> If you use it to cope with stressors/challenging emotions, it will only make those problems worse. But if you use it when you are in a positive headspace and want to relax/have fun, cannabis use is rewarding.

> Don't use it to cope with things; cope in other ways and use it because you enjoy it.

Figure 5. Self-reported effect of cannabis use on mental health



> Be very mindful about your usage. It should be an active choice to use it, rather than a subconscious routine.

From our qualitative analysis of select survey data (Appendix C), many youth described using cannabis to cope with their negative mental health, especially in the absence of accessible mental health supports. However, some youth also noted how using cannabis as a substitute for formal mental health supports was harmful to their wellbeing in the long-term. In the academic literature, cannabis use has been linked to worsening mental health – particularly for mood and anxiety disorders and psychosis, and especially among those who used more than once or twice per week (Gobbi et al., 2019; Lalli et al., 2021; Xue et al., 2021; Hasan et al., 2020; van der Steur et al., 2020 It is important to recognize that individual experiences may vary and youth should be conscientious about how their mental health changes over time as they use cannabis. It is also important that young people who are struggling with their mental health be aware of their reasons for using cannabis. If youth are using cannabis as a substitute for formal mental health supports, it may be beneficial to seek support from a care provider.

Beyond mental health, academic studies suggest that cannabis impairs cognition, psychomotor control, attention, concentration, decision-making skills, impulsivity, and reaction time – with effects being more pronounced in new users (Alvarez et al., 2021). Paying attention to these effects can be important for users' long-term wellbeing. In particular, ensuring cannabis is not affecting the user's memory and that users are not developing a cannabis use disorder are important to young people's long-term safety. In our survey, 19% of participants reported that on at least a monthly basis they were not able to do what was expected of them because of their cannabis use. Nearly half (46%) reported that they experienced memory or concentration problems from their cannabis use on a monthly basis or more. Being aware of these effects are important to ensuring you get the most out of your cannabis use. Fortunately, academic evidence has shown that many of the negative cognitive impacts of cannabis use are reduced after prolonged periods of abstinence (Scott et al., 2018, Hoch et al., 2015). Therefore, limiting cannabis usage when users begin to experience adverse effects can help minimize the harms associated with cannabis use.

> Do not rely on cannabis as your sole method for managing mental health, use it as a tool and if you feel like it is negatively impacting you try to reduce use or seek help.

> Everything you do, do in moderation. If you feel the need to always use cannabis to maintain your mental health, try and cut down to see how your body reacts and go from there.

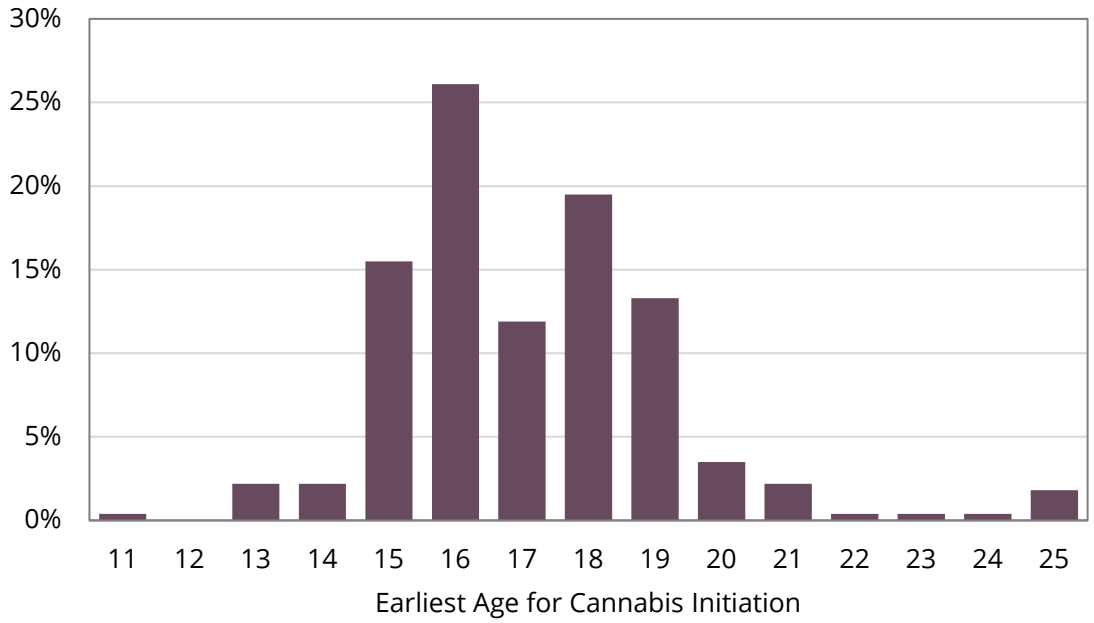
> Everything in balance, know your limits, ask yourself if you are able to stop.

However, for frequent cannabis users, ceasing or limiting cannabis use without support can be challenging. Working Group members emphasized that decreasing cannabis use was challenging for some youth. In our survey, 23% of survey participants reported that they were not able to stop using cannabis once they started on at least a weekly basis. Academic evidence has shown that 47% of regular cannabis users experienced cannabis withdrawal after they stopped using and that it is mostly associated with daily cannabis use and other substance use (Bahji et al., 2020). If young users are having difficulty limiting or reducing their use, it may be beneficial to seek support from medical or mental health professionals.

3. It's okay to wait until you're older or to not use cannabis at all.

In our survey, approximately 10% reported using cannabis to "fit in" or be liked, and 12% said they used it so they would not feel left out (Figure 1). However, youth also noted that it is acceptable for young people not to use cannabis. For example, most of our WG members stated that it was best to delay use until after age 18. Some members mentioned that it is best to wait until the brain is fully developed (i.e., mid-20s). One member who recommended youth be 16 years old said it was still important to incorporate cannabis education at younger ages to avoid harm. *Figure 6* shows the distribution of the earliest recommended ages for cannabis initiation from survey participants. On average, participants said that youth should be 17 years of age before using cannabis. Notably, the average age participants started using cannabis was slightly younger (15 years of age), and there was a moderate but significant correlation between age of first use and age of recommended use ($r=0.34$, $p<0.01$), suggesting that older youth thought that there were benefits to delaying the onset of cannabis use.

Figure 6. Participant's recommendations for earliest age of cannabis initiation



Research has found that frequent and high intensity cannabis use among young people has adverse effects on long-term adolescent cognitive development (Camchong, Lim & Kumra, 2016; Hasan et al., 2020; Murray et al., 2016; Jacobus et al., 2019). Negative neurological effects were found to be particularly notable among frequent users (Jacobus et al., 2019). Importantly, research has also shown that the long-term impacts of cannabis use on adolescent brain development are also impacted by pre-existing neurological differences unrelated to cannabis use (Jacobus et al., 2019). Due to the impacts of cannabis use on brain development, there has been significant debate on the safest age to begin cannabis use. One Canadian study demonstrated that commencing cannabis use at age 19 has better long term physical and mental health outcomes than beginning use at age 18, but does not have significantly better outcomes than beginning use at older ages (Nguyen et al., 2020). The research suggests that high intensity and frequent cannabis use may have long-term negative effects for adolescents, and that it may be

> I smoked cannabis every day for 3 years at a young age. I eventually had to stop due to developing severe anxiety. I could not sleep without it and I had built a strong dependence on it which really affected my life. I feel as though I shouldn't have started smoking till the age I am now (20) because I think it affected my brain development, motivation, and even may have given me depression.

best to delay heavy use until the brain has more fully developed. However, there has been limited research on the impacts of less frequent and lower intensity cannabis use and it remains unclear how varying degrees of cannabis use affect adolescent brain development.

Cannabis use is also associated with exacerbating severe mental health concerns among youth (Campeny et al., 2020; Urits et al., 2020), increased risk of psychosis for youth with a genetic predisposition (van der Steur et al., 2020), and is not recommended during pregnancy (Corsi et al., 2020; Gunn et al., 2016; Singh et al., 2019). While these are key factors in the decision to not use cannabis or to delay cannabis use, the choice to use cannabis must be weighed carefully by all individuals and they must choose for themselves whether using is appropriate.

4. Start low, go slow.

> Seek balance and moderation. I recommend experimenting to find the smallest quantity that yields the most desirable effect. This enhances the cost-effectiveness of cannabis for both recreational and medicinal use. One-hitters are good for moderating and tracking consumption.

For young people who do not know their limits or who are inexperienced with using cannabis, one of the most important things youth can do is be careful about their use. It is clear from the analyses above that there are several positive experiences associated with using cannabis and most of the time youth are able to achieve these positive experiences. However, a key factor contributing to the severity of adverse symptoms in our survey was whether participants got higher than they usually do. For an experienced user, a strong high can be a positive experience. However, it is easy to overdo it. The common adage of "start low, go slow" encourages people to begin using at low doses and using less frequently in order to learn their tolerance level and how they are impacted by the substances they use. Additionally, while there is limited research on the long-term impacts of lower-intensity and infrequent cannabis use, the best available evidence shows that frequent cannabis use is associated with long-term adverse impacts to young people's cognitive development (Camchong, Lim & Kumra, 2016; Hasan et al., 2020; Murray et al., 2016; Jacobus et al., 2019). Therefore, there may be additional benefits to avoiding frequent cannabis use, especially at higher doses.

> Use in moderation, we need more education on how to use cannabis moderately and like, how to find low THC options for beginners.

Importantly, the impact of various different dosages can vary by mode of consumption. In particular, edibles take longer to reach full effect (2-4 hours) compared to smoking or inhaling (30 minutes). For an edible, a starting dose is about 2.5 milligrams of THC. For a joint or inhalant, 1-3 puffs at 10% THC content is a reasonable starting dose. Even for experienced cannabis users, using higher quantities of cannabis does not necessarily lead to better experiences. Survey participants were asked how the quantity of cannabis they used impacted their experience and 51% of participants either somewhat or strongly disagreed that using higher quantities of cannabis improved their mental health. In our study, the majority of people using cannabis only became a little (26%) or moderately (45%) high. It is recommended that new users start with these lower doses of cannabis and gradually increase the dose as needed. It is also okay to stay at a low dose every time. However, a large portion of youth (~28-40%) reported not being aware of the THC and CBD contents of the products that they use, suggesting that dose-specific guidelines might not always be easily interpretable. For youth who are unsure about the THC and CBD content of the products that they are consuming, it is recommended to use less than they think they should to begin and then wait before consuming more.

> Don't overdo it. Consuming multiple times a week in smaller amounts can be beneficial. Consuming a copious amount in a single session has diminishing returns.

Table 3. Examples of dosing recommendations for different forms of cannabis consumption

Form of Consumption	Recommended Dosing	Onset	Peak	Full Duration
Edibles	**First timer**: 2.5 mg THC **Beginners**: 5-10 mg THC **Experienced Users**: >10mg THC	30-60 minutes	2-3 hours	5-10 hours
Vaping	**First timer**: 1-3 “puffs”, waiting to see effects between each puff **Beginners**: 4-6 puffs **Experienced Users**: 6+ puffs	10-15 minutes	30 minutes	3-6 hours

5. Consider where you are and who you use with.

> Only use with people you feel comfortable, safe, clean, and yourself around.

> Do it safely with a supportive circle of friends or family.

Another important factor that youth identified was the role of the setting in which individuals find themselves. From our survey, participants rated the environment as being one of the most important predictors for safer cannabis use, with 91% of participants stating that the environment they were in while using cannabis was somewhat important to extremely important to the quality of their experience (Figure 3). Our analyses revealed that stressful experiences, using alone, and being with the "wrong" people were all important event level predictors of the quality of one's experience using cannabis. Research has shown that solitary cannabis use during adolescence is associated with poor physical health and an increased risk of developing cannabis use disorder (Courtney et al., 2017). The WG also identified that it is important that youth are comfortable with the people around them while using cannabis. From our survey, 91% of participants noted that who they were with while using cannabis was somewhat important to extremely important to the quality of their experience (Figure 3). Using cannabis with people who the user is comfortable being around can help create a sense of safety and help reduce the risk for violence or sexual assault while high (Johnson et al., 2017; Dellazizzo et al., 2020).

> Use sparingly with good friends.

In addition to using cannabis in comfortable social environments, it is important to avoid using cannabis in situations that are physically hazardous, such as driving, operating machinery, or caring for children. From the survey, 82% of participants said they always avoid hazardous situations when using cannabis. Cannabis use while driving can be particularly dangerous, with cannabis use being positively associated with increased lane position and slower reaction time while driving (Alvarez et al., 2021). Rogeberg (2019) found that THC caused an increase in crash risk. People who use cannabis should always avoid driving when intoxicated.

6. Choose your products carefully.

Not all cannabis products are created equally, and it is important to know where your products are from. Most participants report that their cannabis is from legal sources (72%), though youth only report supplying the cannabis themselves about half the time (48%). When stratified by age, 61% of participants aged 16-18 report that their cannabis was obtained from a legal source (i.e., a licensed dispensary), while 82% of participants aged 19-

21 and 83% of participants aged 22-24 reported that their cannabis was from a legal source ($p<0.01$). Further, 32% of participants aged 16-18 reported supplying the cannabis they used during their most recent experience using cannabis, rather than using cannabis from someone they were with. This was compared to 64% of those aged 19-21 and 67% of those aged 22-24 ($p<0.01$). Knowing the source and type of product you are consuming is important for safer use. However, the current laws in Canada prevent the legal distribution of cannabis to people under the age of 18, meaning that young people cannot be certain about the products they are consuming if they are not obtained directly from a regulated source. Our findings demonstrate that cannabis users younger than 19 years of age, the legal age for cannabis possession in British Columbia, are more likely to be using cannabis from unknown or unregulated sources. This suggests that they are less likely to know the contents of the cannabis that they are using. Youth's ability to access regulated cannabis as noted above, is further complicated by the fact that adults face severe legal consequences for supplying cannabis to someone younger than 18 years of age in Canada (Government of Canada, 2018).

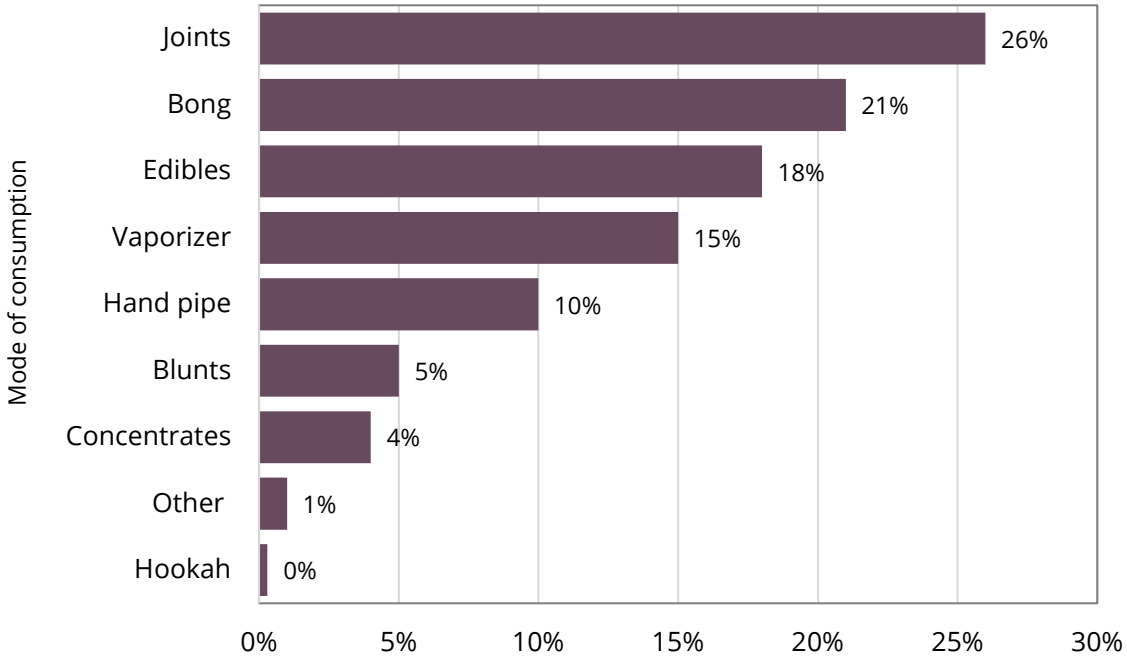
In the academic literature, synthetic cannabinoids are of particular concern and have been found to cause neuropsychiatric, cardiovascular and gastrointestinal adverse effects including vomiting, abdominal pain, tachycardia, myocardial tissue damage, paranoia, agitation, hallucinations, delusions, increased aggression, and even death (Hobbs et al., 2018; Radaelli et al., 2021). Users of synthetic cannabinoids also display higher levels of psychotic symptoms, require higher doses of antipsychotic medications, and longer stays in psychiatric hospitals (Hobbs et al., 2018). It is therefore beneficial for young people to avoid using synthetic cannabinoids.

It was also recommended that people who use cannabis should use higher CBD products and lower THC products (i.e., less than 10% THC). However, 61% of participants report that they use high THC products and 54% of participants report that they use low CBD products. Further, many youth (~28-40%) reported not being aware of the THC and CBD contents of the products that they use. Certain cannabis products, such as concentrates, have particularly high THC contents (Fischer et al., 2017) and young people should be mindful when consuming them.

Additionally, it is beneficial to avoid mixing cannabis with other drugs. Using tobacco and cannabis together has been linked to worse respiratory outcomes than cannabis by itself, worse mental health, and worse dependence outcomes (Bahji et al., 2020; Russell et al., 2018). Simultaneous use of alcohol and cannabis has been linked to an increased risk of substance-related problems later in life (Brière et al., 2011). In our survey, about 36% of participants noted that they rarely or never mixed cannabis with other drugs. In addition to

combining cannabis with alcohol and other drugs, it is also important to ensure that cannabis use does not interact with any prescription medications youth are taking in order to avoid unwanted adverse effects. Cannabis has been found to cause reactions with other drugs, ranging from a minor to a major risk of adverse reaction, with most drugs studied being classified as moderate risk (Antoniou et al., 2020; Lopera et al., 2021). Some drugs such as ketoconazole have been found to significantly increase cannabinoid concentrations (Antoniou et al., 2020).

Figure 7: Modes of cannabis consumption participants used at least 25% of the time



Finally, the mode of cannabis consumption is important. *Figure 7* shows the mode of cannabis consumption that our survey participants reported using at least 25% of the time and demonstrates the variety of ways that young people consume cannabis. Cannabis smoke has been found to contain particulates and oxidating compounds and has been associated with chronic cough, chronic sputum, wheezing, dyspnea, bronchitis, inflamed lungs, epithelial injury, and increased risk of lung cancer, among other pulmonary complications (Campeny et al., 2020; Ghasemiesfe et al., 2018). Despite the limited number of studies on vaporized cannabis, research shows vaporizers may contain volatile toxins, produce the same respiratory effects as smoke, as well as a chance of the electronic components combusting (Russell et al., 2018). Fischer et al. (2017) recommends against using deep-breathing techniques as there is an increased risk of harming the lungs. While edibles avoid these negative respiratory effects, their delayed onset make it more difficult

to dose. This can lead to a distressing experience if the effects are stronger than intended (Russell et al., 2018). As blunts contain more cannabis than joints, they can lead to consuming greater quantities of cannabis and are also associated with higher carbon monoxide absorption and increased risk of dependence (Russell et al., 2018). Bongs have been found to produce more tar and carbon dioxide than pipes or joints, increase the risk of pulmonary tuberculosis, and increase the risk of dependence (Russell et al., 2018). In summary, while there is a growing body of literature on the harms of each consumption method, more research needs to be conducted on the benefits of different ways of consuming cannabis and on how to reduce the harms associated with the specific modes of consumption.

Conclusion

Our community based experiential youth-led multi-method research process identified a set of guidelines that can help youth under age 18 lower the risk of adverse experiences so that they can derive more benefits and fewer harms from their cannabis use. While cannabis use is never completely safe, it is our hope that these guidelines will help youth under age 18 to be more informed about their cannabis use and the potential harms that can arise when misusing substances. In doing so, our research addresses an important gap in evidence-based harm reduction practice by providing guidelines developed for youth and by youth, an important population whose voices are seldom heard.

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Appendix A

Table 1: Lower Risk Cannabis Use Guidelines identified through digital environmental scan

The best way to avoid the negative effects of cannabis is to abstain from using.
It is best to delay cannabis use until after age of: • *16+ years of age* • *18+ years of age* • *21+ years of age* • *25+ years of age*
These users refrain from using cannabis because of increased risk of adverse effects: • *Users with a personal or family history of mental health problems, middle-aged men with cardiovascular issues, and pregnant women*.
Synthetic cannabis can lead to acute and severe adverse health effects (including instances of death) compared to non-synthetic cannabis. The use of synthetic cannabis should be avoided.
Cannabis can make you hungry, so load up on your favorite snacks beforehand. Bring water, cannabis can prevent your body from producing saliva, leading to dry mouth; water can help with thirst, headaches, fatigue, and coughing.
Have a safety plan or contact in case you feel you are in trouble. If you are planning to use any substances, tell your friends what you are taking and how much. If anything goes wrong, they are equipped with the necessary information to tell medical personnel.
Eat a satisfying meal at least three hours before a party. A full stomach can moderate some of the negative effects of cannabis. This reduces your chances of nausea and serves as protection for the stomach if you plan to use substances.
If you need more information or support, talk to your parent/guardian, a trusted teacher, trusted coach, or another trusted adult.
Combining risky behaviour will magnify the risk of negative outcomes from using cannabis.

Appendix A

Do not drive or operate machinery while under the influence. Make sure you have money for a cab, bus rides or designate a sober driver. Wait until you are sober before you drive, this can take: • *15 minutes* • *1-2 hours* • *3 hours* • *5-8 hours* Do not ride with someone who is under the influence (of substances)
Prevent burns on your lips or fingers. Use a small piece of rolled unbleached cardboard as a filter. Avoid using cigarette filters—they do not remove toxins in the smoke.
Seek medical attention if the person is unconscious and cannot be awakened, breathing is irregular and/or shallow, skin is clammy or pale, or there's blood in their vomit. Place the person on his/her side, with one arm extended above the head (recovery position).
Only use cannabis in smart and safe contexts. Trying cannabis at a weekend party is less likely to result in trouble or harm than smoking cannabis on school property or driving after using cannabis. Making informed decisions about where to use and with whom to use cannabis with, helps to minimize harms. It is also a good idea to have a responsible adult present who is not under the influence of liquor or drugs.
Respect others: Do not smoke in designated non-smoking areas. Limit exposure of second-hand smoke to others, and especially do not smoke around children or if you are responsible for watching children.
Change the cannabis variety if the one you are using seems to be losing its effectiveness. Take note of what effect each variety produces for you (therapeutic and side effects); keeping a log can be helpful.
Users should avoid deep inhalation, breath-holding, or other harmful smoking practices. Take smaller, shallower inhalations rather than deep inhales.
Use higher potency cannabis so you use a smaller amount of cannabis. Concentrates can be useful, particularly if you need higher doses. Using less cannabis can help avoid unnecessary smoke and toxins from getting in your lungs while still getting the same high.
Higher strength cannabis can worsen the negative effects of cannabis and can lead to a higher chance of overdosing. Use cannabis with a lower THC content. It is also advisable to use cannabis with a high CBD:THC ratio. (For extracts look for products

with less than 10% THC (100mg/g) and higher or equal levels of CBD)
Frequent use (i.e., daily, or near-daily use) is associated with most severe problems and should be avoided. Try to use cannabis only occasionally (e.g., use only on 1 day/week, weekend use only, etc.).
Cannabis use has been associated with risky sexual behaviour. To avoid STI transmission and unwanted conception, it is recommended that cannabis users carry condoms.
The method of consumption and strain can affect dosage strength, effects, and the risks to the user: • *Smoking is one of the easiest ways to dose cannabis, but it can lead to respiratory harm.* • *Water bongs require the user to puff harder, increasing the amount of tar inhaled, as well as exposing the user to inhaled water vapor drops.* • *Edibles have no respiratory risk but can be difficult to dose due to the long onset time.* • *Dabbing concentrates is one of the cleanest ways to smoke cannabis. This is because you are inhaling vapor instead of smoke. These products frequently contain higher THC than other cannabis products, thus risks associated with high THC also apply to dabbing, and in some cases even more so. Dabbing products also may contain other chemicals.* • *Choose joints over blunts which can contain leftover carcinogens as well as potentially harmful chemicals themselves - they are also bigger, leading to a bigger dose.* • *Use pills containing hash or cannabis oil or ingest via tincture or sprays; like edibles effects may take a while to kick in.* • *Topicals are one of the safest ways to consume cannabis but may not result in psychoactive effects*
Care about the quality of the cannabis you are using and make sure the cannabis is from a reliable source, (i.e., unadulterated, pesticide free). Shop at a legitimate dispensary that sells lab-tested cannabis with labels that say how much THC is inside. Some edible products may have expiry dates and ingredients that can cause allergic reactions. The label should always be checked before consuming.
Use only one drug at a time. Complications are more likely if you mix drugs. This includes alcohol, tobacco, medication, herbal supplements, and street drugs. You should speak to your doctor or another medical professional before using cannabis with other drugs. Be aware of any synergistic affects cannabis and any other drugs you are taking have; and avoid using if you are on any medication, herbal

supplements, or other products that interact with Cannabis.
Keep your stuff clean. Keep your bongs and pipes clean, and do not roll your weed on dirty surfaces.
Educate yourself about your rights, health risks, laws, and consequences of using cannabis. Do not break any cannabis laws such as distribution, possession, age requirements, areas where you can use cannabis, etc.
Be mindful of where you leave your cannabis. Store it and dispose of it somewhere that is out of reach of children and animals.
Know how cannabis affects you and know your limits. Cannabis can make users feel heavy-bodied, distracted, tired, etc. You will not be able to function regularly or complete your routines after using cannabis, thus avoid using it before work, school, or before other obligations and/or responsibilities.
If you feel too high, don' t panic, acknowledge it as anxiety, eat, hydrate, find a safe place, and distract yourself (a friend can help with this, and talk you down). Remember that nothing bad is going to happen. Effects wear off within 2-8 hours. Some ways to reduce the high are to consume black peppercorn, CBD, stay hydrated and nourished, ibuprofen, smelling limonene terpenes, and to breathe deeply.
The material you smoke out of can contain harmful chemicals. Stick to glass, stainless steel, or brass bongs and pipes. Avoid wood, aluminum, rubber, and plastic bongs and pipes. Some can give off toxic fumes. Plastic bongs can contain chemicals like BPA and phthalates, which have been linked to serious health effects, including cancer. To avoid inhaling unnecessary chemicals, use hemp paper coated with beeswax to light your cannabis rather than matches or a lighter.

Appendix A

Start low and go slow, limit the amount of substance used and only start with a small amount. This is especially the case if you are using an unfamiliar cannabis product and/or are a new cannabis user:

- *Try 1 to 3 inhalations and wait 10 to 15 minutes to find the right dosage, increase dosage, as necessary.*
- *Start with 1 or 2 puffs of a vape or a joint with 10% (100 mg/g) or less THC.*
- *After consuming, wait at least an hour to gauge effects before consuming more.*
- *Wait to feel the effects before you take more, it takes seconds to minutes to feel the effects of smoking or vaping.*
- *Start with an initial dose of 10mg or less.*
- *Start with an initial dose of 5mg.*
- *Users should wait until they feel the effects before consuming more or wait until the next day; and increase the next dose by 5-10mg.*
- *When using edibles, start with an initial dose of 2.5mg. Users should wait until they feel the effects before consuming more edibles. Effects can be felt within 30 minutes - 2 hours (full effects may take as long as 4 hours to be felt), and users should wait at least 2 hours before consuming more edibles.*
- *When using tinctures or sprays start with no more than two drops and wait an hour before increasing dosage.*

Be clear about why you are using cannabis. Avoid using it to have fun or to cope with negative emotions. You should reconsider and/or stop using cannabis if it is negatively affecting your mental health, you use it frequently, you find it difficult to control your use, or if you are making others uncomfortable with your behaviour.

If consuming with others, try not to share the smoking device. Sharing smoking devices increases the likelihood of spreading germs and viruses. If you do share, hold joints or devices in a way that you can inhale the smoke/vapor without touching them to your lips, or quickly apply flame to the pipe mouthpiece/wipe it with rubbing alcohol to kill germs.

Appendix B

Table 4. Factors Associated with Higher Self-rated Positivity of Survey Participant's Last Cannabis Use Experience

Variable	β	SE	P-value
Age	-0.07	0.06	0.24
Gender			
Man	ref		
Non-Binary	0.2	0.48	0.68
Woman	0.49	0.34	0.16
Race/Ethnicity			
White	ref		
Racialized	-0.2	0.3	0.49
Disability Identification			
Yes	0.5	0.34	0.13
No	ref		
Sexual Orientation			
Straight	ref		
2SLGBT	-0.58	0.33	0.08
Anxiety Symptoms (GAD-2)	-0.12	0.08	0.14
Depression Symptoms (PHQ-2)	0.12	0.09	0.18
Cannabis Use Frequency			
Monthly or Less	ref		
2-4 times a month (e.g., About once per week or less, but more than once per month)	0.76	0.41	0.06
2-3 times a week (e.g., A few times a week)	0.76	0.55	0.17
4 or more times a week (e.g., Most days)	1.06	0.43	0.01*
Age at first Cannabis Use	-0.02	0.07	0.81
Reason for Use			
Substitution for other drugs or alcohol	0.45	0.3	0.14
Boredom	-0.43	0.28	0.12
Self-improvement	-0.03	0.3	0.92
Peer Pressure / Conformity	-0.66	0.4	0.1
Sociability	-0.25	0.3	0.42
Sensation Seeking	0.06	0.54	0.92
Relaxation	0.47	0.34	0.17
Coping	-0.13	0.37	0.73
EL - Amount Used			
About the Same	ref		

Less than normal	-0.5	0.33	0.13
More than normal	0.22	0.38	0.58
EL - THC Dose			
High THC	ref		
Low THC	-0.46	0.46	0.32
EL - How High?			
Not at all or only a little			
A little			
Moderately	0.47	0.34	0.17
Very high	0.92	0.43	0.03
EL - High compared to normal?			
About the same	ref		
More than normal	-0.65	0.38	0.09
Less than normal	-0.61	0.34	0.08
EL - Used other Drugs			
No	ref		
Yes	-0.04	0.29	0.89
EL - Stressful Environment			
Not at all	ref		
A little or somewhat	0.4	0.3	0.19
Quite or Very	-2.5	1.17	0.04*
EL - Duration of High (Hours)	-0.05	0.07	0.45
EL - Mode of Consumption			
Edibles	ref		
Smoking/Inhalation	-0.14	0.35	0.7
Concentrates	0.36	0.69	0.61
EL - People Made You Uneasy?			
Not applicable, Alone	-0.8	0.32	0.01*
No	ref		
Yes	-0.21	0.55	0.7
EL - Severity of Distress from Adverse or Unwanted Symptoms	-0.63	0.12	0.0001*

Note: EL = Event Level (i.e., Last Cannabis Use Experience)

Appendix B

Table 5. Factors Associated with The Presence and Severity of Adverse Symptoms During Survey Participants' Last Cannabis Use Experience

Variable	β	SE	P-value
Age	0.07	0.04	0.08
Gender			
Man	ref		
Non-Binary	0.3	0.31	0.33
Woman	0.26	0.21	0.29
Race/Ethnicity			
White	ref		
Racialized	0.16	0.19	0.39
Disability Identification			
Yes	0.1	0.21	0.65
No	ref		
Sexual Orientation			
Straight	ref		
2SLGBT	-0.02	0.20	0.9
Anxiety Symptoms (GAD-2)	0.04	0.05	0.46
Depression Symptoms (PHQ-2)	0.02	0.06	0.71
Cannabis Use Frequency			
Monthly or Less	ref		
2-4 times a month (e.g., About once per week or less, but more than once per month)	-0.29	0.25	0.25
2-3 times a week (e.g., A few times a week)	-0.8	0.33	0.02*
4 or more times a week (e.g., Most days)	-0.5	0.28	0.07
Reason for Use			
Substitution for other drugs or alcohol	-0.04	0.19	0.83
Boredom	0.04	0.18	0.84
Self-improvement	-0.14	0.19	0.46
Peer Pressure / Conformity	0.23	0.25	0.37
Sociability	0.22	0.19	0.25
Sensation Seeking	-0.44	0.34	0.19
Relaxation	-0.32	0.21	0.13
Coping	-0.007	0.23	0.97
Age at first Cannabis Use	-0.11	0.04	0.007*
EL - Amount Used			
About the Same	ref		
Less than normal	-0.19	0.21	0.35

More than normal	-0.45	0.26	0.08
EL - THC Dose			
High THC	ref		
Low THC	-0.006	0.29	0.98
EL - How High?			
Not at all or only a little			
A little			
Moderately	0.27	0.21	0.19
Very high	0.15	0.27	0.57
EL - High compared to normal?			
About the same	ref		
More than normal	0.77	0.23	0.001*
Less than normal	0.3	0.22	0.16
EL - Used other Drugs			
No	ref		
Yes	0.24	0.18	0.18
EL - Stressful Environment			
Not at all	ref		
A little or somewhat	0.08	0.19	0.69
Quite or Very	0.84	0.66	0.21
EL - Duration of High (Hours)	0.04	0.05	0.44
EL - Mode of Consumption			
Edibles	ref		
Smoking/Inhalation	0.15	0.22	0.5
Concentrates	-0.06	0.43	0.89
EL - People Made You Uneasy?			
Not applicable, Alone	0.08	0.2	0.68
No	ref		
Yes	0.38	0.34	0.26
EL - Source?			
I supplied it	-0.47	0.19	0.014*
Someone else supplied it	ref		
EL - Legal Source?			
No	ref		
Yes	0.005	0.22	0.98

Note: EL = Event Level (i.e., Last Cannabis Use Experience)

Appendix B

Table 6. Factors Associated with Having A More Positive View of One's Cannabis Use

Variable	β	SE	P-value
Age	-0.05	0.05	0.26
Gender			
Man	ref		
Non-Binary	-0.63	0.37	0.09
Woman	-0.36	0.27	0.18
Race/Ethnicity			
White	ref		
Racialized	-0.13	0.24	0.59
Disability Identification			
Yes	-0.13	0.24	0.59
No	ref		
Sexual Orientation			
Straight	ref		
2SLGBT	0.35	0.25	0.16
Anxiety Symptoms (GAD-2)	-0.11	0.07	0.12
Depression Symptoms (PHQ-2)	0.008	0.07	0.9
Cannabis Use Frequency			
Monthly or Less	ref		
2-4 times a month (e.g., About once per week or less, but more than once per month)	0.44	0.31	0.16
2-3 times a week (e.g., A few times a week)	1.4	0.38	0.0003*
4 or more times a week (e.g., Most days)	1.22	0.35	0.0006*
Not able to stop using cannabis once you had started? P6M			
Never	0.58	0.33	0.07
Less than monthly	0.31	0.35	0.38
Monthly	0.1	0.47	0.84
Weekly or More	ref		
Failed to do what was normally expected from you because of using cannabis? P6M			
Never	1.0	0.43	0.02*
Less than monthly	0.85	0.43	0.05*
Monthly	0.26	0.5	0.61
Weekly or More	ref		
Had a problem with your memory or concentration after using cannabis? P6M			
Never	0.79	0.36	0.03*

Less than monthly	0.53	0.32	0.1
Monthly	0.52	0.34	0.13
Weekly or More	ref		
Use cannabis in situations that could be physically hazardous, such as driving, operating machinery, or caring for children? P6M			
Never	-0.37	0.54	0.4
Less than monthly	0.09	0.54	0.87
Monthly	-1.25	0.74	0.09
Weekly or More	ref		
Typical Duration of (Perceived) High			
Less than 2 hours	ref		
3 to 4	-0.03	0.24	0.89
5 to 6	-0.37	0.37	0.31
7 or more	-0.37	0.37	0.31
Reason for Use			
Substitution for other drugs or alcohol	0.11	0.24	0.65
Boredom	-0.31	0.23	0.91
Self-improvement	-0.03	0.23	0.91
Peer Pressure / Conformity	-0.22	0.31	0.49
Sociability	0.23	0.23	0.32
Sensation Seeking	0.59	0.43	0.17
Relaxation	-0.04	0.27	0.9
Coping	-0.2	0.28	0.48
Age at first Cannabis Use	0.04	0.05	0.49
Cannabis Recommended by Doctor			
No	ref		
Yes	-0.44	0.57	0.44
Yes, but I use it recreationally as well	0.85	0.36	0.02*

Note: P6M = Past Six Months

Appendix C
Perceived Impacts on Mental Health

Participants were asked to qualitatively describe their perceptions of how cannabis has affected their mental health. In many ways, youths' qualitative responses echoed the quantitative responses for their perceived impacts of cannabis on mental health. While many said cannabis did not affect their mental health, others said their mental health and their cannabis use were largely connected. For these participants, the mental health impacts of cannabis can be broken down into positive, negative, and mixed impacts.

Positive Mental Health Impacts

Many youth stated using cannabis positively shaped their mental health and would use cannabis to deal with underlying mental health concerns, such as anxiety and depression. Others noted that using cannabis helped them cope with trauma and avoid dependence on other substances.

"Cannabis allows me to handle my anxiety and depression, it has completely saved my life. It also saved me from alcoholism."

"I actually find that cannabis helps when I get overwhelmed with my mental health issues. I find smoking calms me down so I am able to concentrate on my emotional state"

"My mental health overall has definitely increased due to my cannabis use, as I suffer with ADHD, PTSD, as well as many issues related to my autism. Due to the fact that I am unable to get appropriate meds to help me with these issues, micro-dosing cannabis is the only way I can properly function (i.e. school work, household chores, sleep, general mental hygiene)"

As this last participant described, cannabis was sometimes used as a substitute for prescription drugs, especially when youth were not able to access formal and regulated supports. However, many participants also noted that cannabis only provided short-term support for underlying mental health concerns.

"[Cannabis] makes me feel so much better and I think it's made me look forward to life more, as once or twice a week I can actually enjoy life for a few hours."

For this participant, cannabis provided temporary relief from underlying mental health concerns.

Appendix C

Negative Mental Health Impacts

Importantly, many participants also described cannabis as negatively impacting their mental health. For these youth, cannabis contributed to anxiety, depression, and negatively affected their social connections.

"Extreme overthinking leading to fake situations that I would create in my head. Anxiety to the point that I cannot not perform basic everyday tasks. Depression.

"More anxious, less outgoing. Worry about things I shouldn't worry about"

Some participants also stated that cannabis had long-term effects on their mental health.

"I smoked cannabis everyday for 3 years at a young age. I eventually had to stop due to developing severe anxiety. I could not sleep without it and I had built a strong dependence on it which really affected my life. I feel as though I shouldn't have started smoking till the age I am now (20) because I think it affected my brain development, motivation, and even may have given me depression."

As this participant described, using cannabis as a young person contributed to them being dependent on cannabis and negatively shaped their long-term mental health. Such narratives demonstrate how youth may perceive the development of a cannabis use disorder. For this participant, these negative effects were related to how frequently they used and their age of onset.

Although participants often reported using cannabis for the perceived positive impacts on their mental health, the previous participant also demonstrates that it is not always possible to know the long-term effects of cannabis on young people's mental health. This was notable for some participants who described using cannabis as a substitute for prescription drugs or other formal supports. For some of these participants, while cannabis was perceived as being effective in the short-term, they ultimately decided that it was not a useful treatment and could be harmful in the long-term.

"I have struggled with depression, anxiety, and I did not know until I stopped that I was self medicating with weed for my ADHD."

"At first I started using cannabis as a way to cope with my diagnosed anxiety and major depressive disorder and for a while it helped. However, I don't like that I need to use something to feel okay. I don't like that the cannabis makes me feel numb to my emotions sometimes. My goal is to feel happy and healthy without the use of cannabis."

As demonstrated by these responses, some youth used cannabis as a substitute for formal mental health supports, such as prescription medication or counseling services. For these participants, using cannabis as a substitute for other supports was ultimately

not beneficial to their mental health. However, young people did not always have easy access to these mental health supports and might be reliant on using cannabis instead.

Mixed Impacts on Mental Health

As the above responses also described, it can be difficult for youth to definitively determine how cannabis was affecting their mental health. Many participants also noted that it was difficult to identify the specific effects of cannabis use due to existing mental health conditions.

"I feel there is no concrete link between by mental health worries and cannabis, particularly because I had many of my issues prior, and cannabis is often a useful coping mechanism."

For some young people, there was not always a clear pathway between mental health and cannabis use. Other participants also noted that cannabis use had multiple, and sometimes contradictory, effects on their mental health.

"[My mental health] deteriorated a bit because I wouldn't remember things, at the same time it temporarily relieved anxiety"

"It has been extremely helpful for anxiety and stress but it has somewhat impacted my sadness, I do not have depression but I do have bouts of prolonged sadness and sometimes it's worse from using weed"

For many participants, cannabis use was perceived as simultaneously improving and harming their mental health, leading to less anxiety but more depression. Youth also described the ways that the perceived effect of cannabis could change over time and across contexts. Some participants noted that the mental health impacts of cannabis were most notable in particular social situations.

"Usually I find it improves it unless I am under the influence and subjected to a negative experience while high. For example being harassed while high made the experience worse."

"Sometimes I feel bad, dirty, or ashamed of using cannabis, both while I'm using and after. But cannabis also makes me feel enlightened and confident other days. When I have a solid grip on my usage, then I feel alright about weed. However, some time in my late teens, weed started triggering anxiety in me while high, and it has never stopped since then. It's always a struggle of rationality and affirmation against anxiety when I smoke now."

As indicated in these responses, some young people stated the experiencing negative events and stigma while using cannabis exacerbated the negative mental health impacts. Further, as this previous participant illustrated, some young people noted the effects of cannabis vary at different stages of their lives. While many experienced poor mental

health impacts when using cannabis at a younger age, some described that the effects dissipated as they aged. *"[Cannabis] has in the past made anxiety worse, but I stopped for a year and tried it again and since then it's made my anxiety way better. It often gets me motivated to clean my house or take care of myself."* In contrast, others noted that using cannabis was helpful when they were younger, but the mental health effects became negative as they aged. *"When I was younger it helped me step away from my issues at home and relieve stress. Now it just causes anxiety as I rarely use it anymore."*
Young people's perceptions of how cannabis impacted their mental health varied and there was no singular narrative to describe the effects of cannabis use. Overall, the qualitative responses from youth corroborated many of the quantitative findings. They also gave greater context for why and how cannabis use either positively or negatively affected their mental health. Further, youth demonstrated a high degree of awareness on the effects of their cannabis use, especially when they thought that they were using it in harmful ways or in ways that were no longer useful.