Marijuana Use in Canada:

Patterns of Use Among Medical Marijuana Users

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Research evidence supports the use of marijuana for the purpose of relieving medical symptoms and, therefore, the Canadian courts granted Canadians legal access to marijuana for medical purposes. More than 40,000 Canadians are currently approved to use medical marijuana, with an additional 400,000 Canadians reporting use of marijuana for medical purposes. During the study period, Marihuana for Medical Purposes Regulations (MMPR) was the medical marijuana regulation in effect in Canada, which allowed patients with a medical document from a physician to purchase dried marijuana from a Health Canada licensed producer. Medical marijuana regulations infer how medical marijuana is to be accessed and used. The mode of delivery—whether marijuana is smoked, vapourized, or consumed—may have important implications for potential therapeutic efficacy, as well as health risks. Anecdotal evidence suggests that the use of alternative and innovative modes of delivery is on the rise; however, there is very little evidence on current patterns of use among Canadian medical marijuana users, particularly with respect to modes of delivery. The primary objective of the current research was to examine patterns of use among Canadians using marijuana for medical purposes. The study had five specific aims: 1) To estimate the prevalence of different modes of delivery, 2) To examine perceptions and importance of various factors for different modes of delivery, 3) To estimate the prevalence of different forms of marijuana, 4) To examine the reasons for using different forms of marijuana, and 5) To assess prevalence and perceptions of different sources for obtaining medical marijuana. An overall sample of 364 approved adult Canadian medical marijuana users completed an online cross-sectional survey between April 29 and June 8, 2015. Participants were recruited through a convenience sample from Health Canada licensed producers. Nine Health Canada licensed producers from across Canada helped recruit participants mainly through email. The results showed that using a vapourizer was the most popular mode of delivery currently used (53%), even more so than smoking a joint (47%), indicating a possible increase in the use of vapourizers among approved medical users since the introduction of the MMPR. The main reason participants reported using a vapourizer was to reduce negative health consequences associated with smoking. Furthermore, current use of a vapourizer was

associated with fewer respiratory symptoms (OR=1.28, 95%CI: 1.05-1.56, p=0.01) supporting that the use of vapourizers may be less harmful than smoking. Overall, 75% of participants reported using dried herb due to it's easy accessibility, as it was the only legal form of marijuana available for purchase from licensed producers. It is important to note that accessibility of the forms of marijuana may change due to the recent revision to the MMPR allowing alternative forms of marijuana, in addition to dried herb, to be sold by licensed producers. Licensed producers, as the only legal source for obtaining medical marijuana at the time, was preferred by most approved users (44%). However, the city of Vancouver did not agree that licensed producers were a sufficient source for obtaining medical marijuana, thus, against federal medical marijuana law, decided to allow dispensaries and clubs to sell marijuana. Monitoring implications of such current and future changes to medical marijuana regulations may be beneficial to policymakers. Specifically, continuing to monitor and track medical marijuana use trends in terms of modes, forms, and sources in light of the present data. Overall, the current study addressed an important evidence gap on patterns of medical marijuana use in Canada following the introduction of the MMPR as it is critical to understand the population of medical users in order to inform marijuana policy.

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1.0 INTRODUCTION

1.1 Marijuana

Marijuana is a mixture of dried and shredded leaves, stems, seeds, and flowers of Cannabis Sativa or Indica also known as the hemp plant[1]. Marijuana has been used throughout history and all around the world recreationally, as well as for medicinal purposes[2]. However, in recent years there has been an increase in attention regarding the use of marijuana as a therapeutic medicine, as well as a growing push for the possible legalization of its use.

1.2 Physiological effects

Approximately 70 compounds have been identified in the marijuana plant, which are called cannabinoids. Delta-9-tetrahydrocannabinol (THC) is the main active cannabinoid in marijuana and is responsible for the psychoactive and some medicinal effects[3,4]. Other cannabinoids include cannabidiol (CBD), which may be accountable for some therapeutic benefits, and cannabinol (CBN), which has approximately 10% of the activity of THC[3,5]. Cannabinoids bind to cannabinoid receptors that are present in the peripheral cells and neurons of the central nervous system[6]. Cannabinoids may bind to and act through two receptor types: cannabinoid receptor 1 (CB1) and cannabinoid receptor 2 (CB2)[4]. CB1 receptors are primarily found in the central nervous system, whereas CB2 receptors are thought to be primarily distributed in the peripheral system[6]. Cannabinoids affect neurotransmitter release through binding to CB1 and CB2 receptors, which may result in multiple behavioural and mood changes, as well as euphoria[6]. Receptor distribution may vary from person to person; therefore, individual variation in the effects resulting from marijuana use can occur as well as expected effects of marijuana can influence individuals' experiences[6].

The psychoactive effects associated with marijuana use include euphoria, relaxation, time-distortion, intensified sensory experiences, loss of inhibitions, and at moderate and higher doses, decreased short-term memory and motor skills[3,7]. These psychoactive effects, primarily caused by THC, generally last several hours and may be accompanied by hunger cravings[2]. THC is lipid soluble and inactive THC metabolites can be detected in urine up to one month after use in the case of regular users[2].

1.3 Therapeutic Benefits

The effectiveness of marijuana as a medicine is complicated by the diverse conditions, symptoms, marijuana strains, modes of delivery, and genetics. To date, biological and clinical research evidence provides strong support for the therapeutic benefits of marijuana for the following: analgesic for pain, antispasm for multiple sclerosis, anticonvulsive for epilepsy, nausea suppressant for chemotherapy, and appetite stimulant for wasting in HIV/AIDS patients[3,8,9]. Additionally, marijuana can reduce intraocular pressure for the treatment of glaucoma, however, other medications are recognized as more effective at this time[8,9]. There is promising data demonstrating anti-inflammatory effects of marijuana in treating rheumatoid arthritis and inflammatory diseases of the gastrointestinal tract[8]. On the other hand, the evidence is less clear regarding marijuana's therapeutic effect for psychiatric disorders, including anxiety, depression, sleep disorders, and post-traumatic stress disorder[3].

There seems to be a high prevalence of medical marijuana users who use their medical marijuana to treat multiple conditions[10]. For example, one study found that users treated an average of more than six conditions with marijuana[11-13]. The most frequently cited reasons for using medical marijuana are pain, anxiety, sleep problems, nausea, and depression[12-14]. Canadian studies show as many as 10% of

people living with chronic pain[15], 14-16% of people with multiple sclerosis[16,17], and about 21% of people with epilepsy[18] use marijuana to manage certain symptoms of their illness. Another Canadian study showed that medical marijuana use was reported by 25% of patients with chronic pain, 22% with multiple sclerosis, 22% with depression, 21% with arthritis, and 19% with neuropathy[19]. Further conditions and reasons for medical marijuana use found in previous studies include: cancer, HIV, glaucoma, Crohn's disease, hepatitis C, anorexia, cramping, migraine pain, stress, insomnia, and weight loss[11,12,20].

1.4 Side Effects, Health Risks, and Harms of Medical Marijuana Use

Studies conducted among medical marijuana users suggest that the most common side effects are feeling quiet and mellow, sedated, euphoric, lazy, paranoid, increased appetite, exacerbated weakness, hallucinations, and coughing or throat irritation[20,21]. A small proportion of marijuana users, who have used marijuana daily and for many years, experience cannabis hyperemesis syndrome (CHS). CHS is characterized by consistent severe episodes of nausea, cyclic vomiting, and abdominal pain[3]. However, generally more than half of users report no side effects from using marijuana and no deaths have ever been reported due to a marijuana overdose[3,20].

Evidence shows that one in ten individuals who ever use marijuana will experience a dependence syndrome[22,23]. Marijuana dependence syndrome has been found to occur in heavy chronic users and includes difficulty controlling their use and continuing to use marijuana despite experiencing negative personal consequences[23]. Additionally, there is some evidence of withdrawal symptoms from marijuana use such as irritability, sleeping difficulties, dysphoria, craving, and anxiety. Withdrawal

symptoms indicate the presence of an addiction and also makes cessation more difficult possibly contributing to a relapse[8].

Marijuana use has been associated with mental illness. Non-medical marijuana users have been consistently shown to be at an increased risk of developing psychotic symptoms and disorders[6,23]. Marijuana use itself has not been shown to directly cause schizophrenia; however, marijuana use may precipitate or worsen schizophrenia in vulnerable individuals. Brain imaging data shows a correlation between regular marijuana use and significantly altered brain structures and functions, which include impaired cognition, dysfunctional mood regulation, and reduced memory[6]. Marijuana use during adolescence is particularly concerning given that active brain development occurs throughout these youth years making adolescents more vulnerable to the long-term negative effects of marijuana[8].

Marijuana use is associated with an increase in the risk of using other harmful drugs, such as cocaine[14]. Epidemiological studies have shown that heavy marijuana use in adolescence may be associated with an increased susceptibility to drug abuse and addiction to several other drugs later in life[8]. One explanation may be that previous marijuana use can prepare the brain for a heightened response to other drugs as seen in animal studies[8]. On the other hand, individuals who are more vulnerable to drug use behaviours may be more likely to use marijuana first because of its easy availability and would try other drugs regardless[8].

Marijuana use may increase the risk of adverse cardiovascular outcomes, such as tachycardia, myocardial infarction, and stroke[3]. Biological evidence shows that marijuana has detrimental effects on vascular resistance and coronary microcirculation, lowers blood pressure, and increases heart rate, which puts more stress on the heart[2,8]. Cardiovascular health risks associated with marijuana use are specifically concerning for older medical marijuana users as this treatment may worsen pre-existing cardiovascular illness.

Due to a widespread knowledge of the harms associated with smoking tobacco, there is interest in understanding the risks associated with smoking marijuana. The combustion of organic materials produces very similar chemical profiles; therefore, the toxicants in smoke from marijuana and tobacco are similar in many respects[23]. The health effects from smoke inhalation is closely related to the dose and the frequency of use. For example, the typical Canadian cigarette smoker smokes an average of 15 cigarettes per day. In general, levels of exposure are substantially lower among marijuana users, although chronic marijuana smokers may nevertheless present direct health risks. Marijuana smokers also inhale unfiltered smoke more deeply and for a prolonged duration of time, at a higher combustion temperature, and smoke to a shorter butt length compared to cigarette smokers[24]. This smoking pattern contributes to a five times greater carboxyhaemoglobin concentration, four times greater amount of tar inhaled, and one third more tar retained in the lower airway than cigarette smokers[25].

Studies have consistently shown that marijuana smokers report a higher frequency of cough and sputum production, wheezing, and bronchitis compared with non-smokers as a result of airway inflammation and infection[26]. In addition, some literature reports the presence of lung cancer among

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marijuana smokers, as well as bullous lung disease and emphysema[23,27]. It is important to note that research examining the long term health effects of marijuana use on the lungs remains limited as it is difficult to infer a cause-effect relationship as marijuana users often smoke marijuana in combination with tobacco, or are tobacco smokers as well[27]. Additionally, the time lag between marijuana use and disease outcome is long, which makes research more difficult[22].

A major concern resulting from marijuana use is the impairment of skills required to operate a motor vehicle[3]. Marijuana use increases the risk of a motor vehicle collision by approximately 2-fold[28]. Evidence has found that after marijuana use, drivers lose control and compensate by driving at reduced speeds as well as lane weaving increases, cognitive function is impaired and is reduced with increasing task complexity, and reaction times are slower[28]. However, roadside tests detecting marijuana intoxication have low reliability[29]. Evidence shows that two-thirds of non-medical users had ever driven under the influence of marijuana and 41% had done so more than 15 times[30].

Additional harms associated with marijuana is that use by pregnant mothers is harmful to the baby through in-utero exposure, and marijuana use while breast feeding a baby may also pose negative health risks through exposure in the breast milk[3]. Furthermore, possible harmful drug interactions can occur when using marijuana in combination with other medications[2,3].

Lastly, it is important to note that most of the risks and harms associated with marijuana use occur in those who are frequent, regular, and heavy marijuana users. Harms resulting from marijuana use

increase with a higher frequency, increased amounts, and an early age of initiation of using marijuana[31]. The majority of marijuana users in the general population use marijuana infrequently and are, therefore, less likely to suffer from marijuana's negative health effects[32]. However, medical users seem to use more marijuana more often than recreational users, which suggests that greater attention should be directed at the medical marijuana population[33].

1.5 Marijuana Use in Canada among the General Population

Currently, marijuana is the most commonly used illegal drug by Canadians[34]. According to the 2012 Canadian Alcohol and Drug Use Monitoring Survey, 41.5% of Canadians have reported using marijuana at least once in their lifetime[34]. The prevalence of past-year marijuana use among Canadians aged 15 years and older was 10.2% in 2012[34]. Past-year marijuana use rates have remained fairly consistent at around 10% since 2008[34]. In addition, 6.4% of Canadians reported using marijuana in the past 30 days[35]. Frequency of marijuana use reported in the past 3 months was 8%, with 2.2% reporting using it less than monthly, 1.7% using it monthly, 2% using it weekly, and 2.1% using it daily[35]. Overall, the province of British Columbia had the highest prevalence of past year marijuana use (13.8%)[34].

The prevalence of past year marijuana use among youth (20.3%) continues to be higher than that of adults (8.4%)[34]. In addition, the Ontario Student Drug Use and Health Survey found that in 2013, approximately 3% of grade 7-12 students surveyed use cannabis daily and approximately 12% reported smoking 4 or more joints in the past month[36].

1.6 Medical Marijuana Use in Canada

Legal medical marijuana users have documented approval to use medical marijuana from a healthcare practitioner. However, others report using marijuana for medical purposes without having legal documentation for approval. For example, the 2011 Canadian Alcohol and Drug Use Monitoring Survey (CADUMS) found that 17.7% of Canadians who used marijuana reported doing so for medical purposes[34].

The most recent estimate from 2013 claimed there were approximately 40,000 Canadian licensed medical marijuana users that year[37]. In addition, 3 million medical marijuana plants were cultivated and it is estimated that the medical marijuana market in Canada alone will increase to about $1.3 billion by 2024[37]. The majority of Canadians with a medical marijuana license reside in British Columbia, accounting for nearly half of all licensed medical users in Canada, followed by Ontario at about 30%[37]. As of 2012, Health Canada reported that 28,115 Canadians had an authorization to possess dried marijuana. Of those with authorization, 18,063 Canadians had a personal-use production licence, 3,405 Canadians had a designated person production licence, and 5,283 Canadians accessed marijuana from authorized companies by Health Canada[37].

1.7 Patterns of Medical Marijuana Use

Evidence shows that the majority of medical marijuana users administer marijuana daily and multiple times within each day, with average consumption ranging from 17 to 28 grams per week[13,15,38]. In addition, most medical users identified four or less puffs as a single dose and some others reported using one joint as a single dose[15]. Patterns of medical marijuana use are similar across medical

conditions and symptoms[13]. For example, those using marijuana to relieve pain and others using marijuana to control nausea use marijuana in similar frequencies and amounts.

In the general population, marijuana users tend to be younger, male, and with higher reported levels of alcohol, tobacco, and other drug use[14]. Many marijuana users, both medical and non-medical, report mixing marijuana with tobacco[15]. The majority of medical marijuana users have used marijuana for non-medical purposes prior to therapeutic use[13,38]. Additionally, one study of medical marijuana users found that they had a higher income and were more likely to have completed high school compared to the general Canadian population[13].

1.8 Canadian Regulations on Marijuana

Marijuana is classified as an illegal drug under the Canadian Controlled Drugs and Substances Act[39]. Growing marijuana is punishable by the law of up to seven years imprisonment, possessing marijuana up to five years imprisonment, and distributing and selling marijuana up to life imprisonment[39]. Although marijuana is illegal for the general Canadian population, the Canadian courts ruled that there must be access to a legal source of medical marijuana to treat patients suffering from medical illnesses. The Canadian government had concerns regarding the consequences of allowing access to a legal source of medical marijuana as there was an absence of strong evidence of marijuana's safety and efficacy[40]. In addition, the introduction of medical marijuana laws has been previously associated with a higher prevalence of marijuana use among the general public, although this has been debated[41,42]. On the other hand, having a medical marijuana law is also associated with reduced alcohol, illicit substance, and prescription drug use[43].

In 2001, Health Canada granted access to marijuana for medical purposes to Canadians under the

Marihuana Medical Access Regulations (MMAR). Those who were licenced through Health Canada had

three options for obtaining a legal supply of dried marijuana: 1) access Health Canada's supply of dried

marijuana; 2) apply for a personal-use production licence; or 3) designate someone to cultivate on

their behalf with a designated-person production licence[44]. However, several years into the program,

few Canadians had obtained MMAR approval and many reported obtaining their supply of medical

marijuana through illegal sources, suggesting that substantial obstacles with MMAR were present[38].

Some of the problems with the MMAR included, lack of information, product quality concerns, and a

confusing application process.

In response to concerns of efficacy, and concerns from stakeholders that the MMAR system was open

to abuse, the Government of Canada introduced the Marihuana for Medical Purposes Regulations

(MMPR) as of April 1, 2014. Currently, the only legal way to access marijuana for medical purposes is

through commercial Health Canada licensed producers under the new MMPR. Individuals who are

legally allowed to use medical marijuana must have a prescription from an authorized healthcare

practitioner and be registered to order and receive dried medical marijuana from a Health Canada

licensed producer[44].

The MMAR was criticized for having substantial barriers for patients becoming authorized through

Health Canada. For example, a Canadian study revealed that those who identified anxiety or

depression as the main condition for using medical marijuana were less likely to be legally authorized

to use marijuana for medical purposes by Health Canada under the MMAR compared to those with

multiple sclerosis and gastro-intestinal conditions[13]. On the other hand, the new MMPR regulation may

result in easier access to medical marijuana as physicians have control over who can use medical

marijuana and physicians may be more flexible with who they give prescriptions to[10]. The concern has

been raised that the MMPR may be overly flexible allowing Canadians to be able to claim they need

marijuana for medical purposes when in reality they want to use marijuana for recreational purposes

only[10]. The MMPR is similar to California's medical marijuana regulation where virtually anyone can get

a prescription to use marijuana[10]. In addition, illegal community-based dispensaries continue to be

provide marijuana to authorized and unauthorized users[45,46].

As of July 8, 2015, the Canadian federal courts decided that medical marijuana users have the right to

use marijuana oils, extractions, and edible marijuana products and that licensed producers may

produce and sell these forms of marijuana[47]. A major advantage of having marijuana extracts available

to medical users are that these products have a higher potency and may be more beneficial to users

who require higher concentrations of marijuana for relief of symptoms. Extracts can also be used in

certain types of vapourizers, for consuming marijuana in food, for drinking, and in sprays. However, the

higher concentrations of cannabinoids in extracts may also increase the risk of some side effects,

including mental illness, although this is debateable[48].

Furthermore, there are currently three synthetic cannabinoid products available in Canadian

pharmacies through a prescription for medical use. Marinol®, also known by its generic name

dronabinol, contains a synthetic THC in pill form; Cesamet® contains another synthetic derivative of THC in pill form known as nabilone; and Sativex® is an oral spray containing equal proportions of THC and CBD known as nabiximol[9].

1.8.1 International Regulations on Marijuana

Medical marijuana laws have been implemented in a number of other countries in addition to Canada. Marijuana laws in the US are individually governed by each state. There are 24 states, including the District of Columbia, with medical marijuana laws and 11 states with CBD- specific medical marijuana laws[49,50]. In particular, Minnesota's medical marijuana legislation allows patients with one of the qualifying conditions to use marijuana, but marijuana is only available in non-smokeable forms[51]. In the Netherlands, since September 1, 2003, medical marijuana has been obtainable through pharmacies and is produced under the control of the Dutch government[52]. Additionally, Germany, Italy, and Finland allow prescriptions for medical marijuana and import their medical marijuana from the Dutch government[52]. The broader legal context of marijuana use, including decriminalization and legalization, also differs by country and may have implications for patterns of use and accessibility of medical marijuana.

1.9 Modes of Delivery

1.9.1 Smoking

Smoking marijuana is the act of inhaling and exhaling smoke that was produced through combustion of marijuana plant material. Marijuana can be smoked in hand-rolled cigarettes (i.e., joints), blunts (i.e., cigars that have been emptied of tobacco and refilled with a mixture of marijuana and tobacco), in

pipes, or in water pipes (i.e., bongs)[1]. Smoking marijuana results in the fastest onset of action in approximately seven minutes, with higher blood concentrations of cannabinoids compared to other modes of delivery, which may contribute to its popularity[3,24]. In a survey conducted by Hazekamp, medical marijuana smokers reported requiring around three grams of marijuana per day and requiring a higher number of intakes for an effect compared to those who used oral administration[24].

1.9.2 Other: Oral, Oro-mucosal, Topical, and Rectal Administration

Marijuana can be consumed orally in edibles. Popular edibles include cookies and other baked goods, or as tea[3]. Oral administration results in a slower onset of action and lower peak blood levels of cannabinoids compared to inhalation; however, oral use of marijuana requires the fewest number of intakes[3]. The oral route of administration avoids possible negative respiratory health risks associated with smoking marijuana, as absorption from consuming marijuana is primarily through the stomach and intestines. Similarly, oro-mucosal administration of marijuana is less harmful than smoking. During oro-mucosal administration, marijuana is absorbed across the mucous lining in the mouth and is most commonly used as sprays, such as the marijuana product nabiximols (Sativex®), or alcohol extractions called tinctures. Onset of action occurs much slower in oro-mucosal administration compared to inhalation as the peak blood concentration typically occurs within 2 to 4 hours after use and oro-mucosal administration requires the highest number of intakes[3,24]. Less widely used modes of delivery for marijuana are topically and rectally. Limited research has focused on topical administration of marijuana and there are no clinical studies on the use of topicals for therapeutic purposes[3].

1.9.3 Vapourization

Vapourizing marijuana is similar to smoking; however, the main difference is that marijuana is heated

without combustion, thus the user inhales vapour instead of smoke[26]. Time for onset of action and

blood concentrations obtained through vapourization are comparable to those obtained by smoking

marijuana[53]. In addition, it has been reported that using pure THC in a vapourizer may have a faster

onset of effects than with herbal marijuana[24]. Vapourizing requires similar amounts and number of

intakes of marijuana as smoking[24]. However, it is difficult to quantify the amount and frequency of use

with vapourizers as there is no standard for measurement at this time.

Vapourizing marijuana is a possible harm reduction approach, which addresses some of the negative

health consequences resulting from smoking marijuana. When vapourizing at the proper temperature,

marijuana is not burned, therefore, harmful by-products like tar, carbon monoxide, and carbon dioxide

are not released during vapourization as they are in smoking. Five studies show that vapourization of

marijuana is less harmful and reduces respiratory effects compared to smoking. In 2009, Pomahacova

analyzed chemical constituents produced by vapourized and smoked marijuana, specifically comparing

the ratio of cannabinoids to unwanted by-products in vapourized versus smoked marijuana. The

volcano vapourizer obtained a higher cannabinoid to by-product ratio at 200°C and 230°C than

smoking, thus showing vapourization provides a cleaner method of marijuana administration

compared to smoking[54]. A separate study surveyed current marijuana users and found that

respondents who vapourized marijuana reported fewer respiratory symptoms such as cough, phlegm,

and tightness in the chest compared to participants who did not vapourize[26]. In 2010, a case study of

four marijuana smokers with at least two respiratory symptoms used a vapourizer to administer

marijuana for one month. All four participants reported improved respiratory symptoms in addition to a modest improvement in lung function measurements while using the vapourizer[55]. Furthermore, a similar study with 20 participants, measured respiratory symptoms through self-report and spirometry testing and found significant improvements with the use of vapourization compared to smoking marijuana[56]. An inpatient pilot study conducted by Abrams examined 18 healthy marijuana users over six days. Carbon monoxide levels were substantially reduced via vapourization compared to smoking marijuana with no adverse events observed during vapourization[53]. However, vapourization of marijuana still has health risks associated with its use. A recent study has revealed that the chemical, ammonia, is produced at toxic levels when marijuana is heated for vapourization[57].

Furthermore, there are two studies that provide emissions evidence of vapourized marijuana obtaining similar levels or even greater levels of cannabinoids compared to smoked marijuana. In 2004, Gieringer used high-performance liquid chromatography (HPLC) and gas chromatography–mass spectrometry (GC-MS) to analyze the vapour produced by the vapourization machine called the Volcano. This study found that the Volcano delivered equivalent amounts of THC and cannabinoids to that of marijuana cigarettes. Gieringer's study concluded that vaping marijuana can theoretically deliver therapeutic doses of cannabinoids for symptom relief[58]. The previously discussed study conducted by Pomahacova in 2009, also showed that at 200°C, the Volcano vapourizer produced higher levels of cannabinoids compared to smoked marijuana[54].

Additionally, two biological studies provide evidence that vapourized marijuana obtains similar levels of cannabinoids compared to smoking marijuana. In 2006, Hazekamp examined the pulmonary uptake

of THC in vapour compared to smoke. Vapourization of marijuana obtained comparable pulmonic

uptake of THC as smoking[25]. Furthermore, the Abrams pilot study among current marijuana users

found that the peak plasma concentrations of THC after inhalation of vapourized marijuana were

similar to those of smoked marijuana. Moreover, the participants reported similar feelings of euphoria

during vapourizing and smoking marijuana[53].

Overall, research evidence supports vapourization of marijuana as a less harmful alternative to

smoking marijuana and that comparable levels of cannabinoids are produced by vapourization and

smoking marijuana for therapeutic effectiveness. Thus, vapourizing marijuana is a potential harm

reduction approach, which addresses some of the negative health consequences resulting from

smoking marijuana.

1.9.4 Modes of Delivery among Medical Marijuana users

Most medical marijuana users have tried multiple modes of delivery for various symptom relief;

however, smoking predominates as the most common mode of delivery. There are two Canadian and

four International surveys that examined the diverse modes of delivery for marijuana used by medical

marijuana users. In a Canadian survey conducted by Ware in 2003, preferred modes of delivery among

medical marijuana users were 34% joints, 18% skin patches, 16% inhalers, 13% sublingual spray, 8%

pipes, and one subject indicated that a rectal suppository would be preferred[15]. A more recent

Canadian survey showed that among medical users, 96% smoke, 50% consume edibles, about 10% use

a vapourizer, another 10% ingest a tincture, and only 17 respondents reported using synthetic

pharmaceuticals[38].

Studies conducted outside of Canada have found similar patterns regarding modes of delivery used by

medical marijuana users. For example, an Australian survey found 91% of medical users have tried

smoking marijuana, 49% had consumed marijuana in edibles, 8% used vapourizers, four people had

used tinctures, and one participant had used it topically[12]. Ware conducted a survey in the UK and

found that 82% of medical users smoked marijuana, 43% consumed marijuana in edibles, 28%

consumed marijuana as tea, 2% used a sublingual spray, and 12% used other modes of marijuana

delivery[19]. In the US, a survey of medical users who were in the process of becoming licensed found

that most participants preferred inhaled marijuana and that most have not tried edibles[59]. An

International cross sectional survey among medical users predominately from the US, Germany,

France, Canada, The Netherlands, and Spain, found that overall 91.6% had ever smoked, 49.8% had

used a vapourizer, 87.4% have consumed it in food, 35.4% consumed it in tea, 5% used it topically, and

the fewest number of participants tried synthetic marijuana[24].

1.9.5 Perceptions of Modes of Delivery

Two Canadian studies have investigated perceptions regarding the modes of delivery for marijuana.

The first is a Canadian survey of medical marijuana users who reported enjoying smoking marijuana

and claim that smoking has advantages over other modes of delivery[14]. Participants stated that

smoking has a more immediate and effective relief of symptoms, a lower dose is required for effect, it

is easy to do, and that the euphoria from smoking is felt throughout one's body and head combined[14].

Some participants stated some disadvantages of smoking marijuana including worrying about the

respiratory side effects, social aspects, and the smell[14]. Medical marijuana users in this study reported

that edibles do not provide the same euphoria and are more expensive than smoking as well as it

makes the user feel lazy[14]. Some advantages that were reported include that edibles provide a longer lasting effect and there is no worrying about the smell. Tea is another form of oral administration that marijuana users reported using and its effects are perceived to occur faster than when consuming edibles[14].

The second Canadian study interviewed experienced marijuana users, who used marijuana medically and/or recreationally. Participants who preferred smoking joints stated that it is the most convenient and easiest mode of delivery to use, provides the best control over dosage, less potent, cleaner and tastes better than pipes, is the least stigmatizing, and most social method[30]. Although less marijuana users preferred smoking marijuana through a pipe compared to smoking a joint, those who did prefer using a pipe stated it was smoother, more efficient, economical, and gives off fewer contaminants than smoking a joint[30]. Only six percent of participants suggested non-smoking methods to administer marijuana. However, some participants acknowledged the harms associated with smoking as they mentioned ways to reduce these harms such as, avoid breath-holding prior to exhaling and mixing the drug with tobacco[30].

International studies also reveal that the popularity of smoking seems to result from its immediate onset of effect, ease of titration, and cost-effectiveness[12,24]. Marijuana users who smoke also report high satisfaction in regards to preparation and intake[24]. However, non-smoking methods are perceived as healthier options for administering marijuana [12,24]. Marijuana users reported that edibles are tasty when cooked in a recipe, less obvious than smoking, can be done virtually anywhere, has long lasting effects, and a slow onset, which some participants liked[12,24]. Other participants claimed difficulties with

dose titration and preparation and disliked edibles for their slow onset and expensive cost[12,24,59].

Medical marijuana users who use synthetic methods of administration report that the standardized

medicine is easy to prepare and administer[24]. However, users report low dose satisfaction, short

duration of effects, and multiple negative side effects[24].

Vapourizing is perceived as similar to smoking as users report ease of dose titration and fast onset of

action[24]. The difference between vapourizing and smoking marijuana occurs with the perceived side

effects as vapourization is reported to have the least negative side effects compared to all other

methods of marijuana administration[24,60]. Vaping has also been reported to taste better, have no

smoke smell, and is more discreet than smoking. In addition, a study found that participants reported

their vapourizer experiences as satisfying or very satisfying and that 98% of those respondents

indicated that they intended to continue using a vapourizer[60]. Regarding the disadvantages of using a

vaporizer, users reported that vapourizers are inconvenient, can be difficult to use and setup, and the

purchase cost is high[60]. For example, in one study participants who use a vapourizer cited spending a

mean cost of $251, which ranged from $45 to $700, to purchase a vapourizer[60]. In addition, only one

vapourizer is currently approved by Health Canada, called the Volcano, and it comes with a price tag of

about $600[3].

1.10 Forms of Marijuana

Marijuana is commonly used in the form of a dried herb, but can also been used as hash (i.e.,

marijuana resin), oil, butter (i.e., to cook with), butane extract (e.g., shatter), alcohol extract (i.e.,

tincture), carbon dioxide (CO_2) extract, raw juice, spray (e.g., Sativex/nabiximols), or synthetic marijuana created in a lab setting for pharmaceutical purposes (e.g., Marinol®/dronabinol and Cesamet®/nabilone)[3,24]. Dried herb can be converted into these other forms of marijuana. Extracts, such as butane, alcohol, and carbon dioxide, are in the form of a wax and have higher THC concentrations compared to traditional dried herb forms of marijuana[48]. Anecdotal evidence suggests that extracts can contain THC concentrations of approximately 70% to 90%, whereas dried herb ranges between 3% and 6%. However, other estimates suggest that the concentrations of THC in extracts are closer to 20% to 25%[61]. Spray and synthetic marijuana forms can be purchased from pharmacies. The form of marijuana used has implications for which modes of delivery can be used; for example, those who use dried herb can smoke or use certain vapourizers to administer dried marijuana.

1.11 Novel Technique for Using Marijuana

Dabbing is a novel technique for using marijuana that has recently become more popular[48]. The term, dabbing, refers to the method where a "dab" of marijuana extract is placed on a pre-heated glass or titanium rod, called a nail[48]. The extract is then vaporized very quickly, allowing the user to inhale the vapors to feel its effects. The process of dabbing can be dangerous as pre-heating the nail requires that fire is in close proximity to butane, which can cause an explosion, and inhalation of combustion by-products can occur if the nail is heated to high temperatures[48]. Although there may be additional harms associated with dabbing, there is only one scientific paper that examines the use of dabbing.

1.12 Canadians' Perceptions of Marijuana

Views on marijuana are more supportive, as it is now well tolerated and widely accessible[30]. Canadians

no longer believe that marijuana use is isolated to a specific sub-set of criminals[62]. A qualitative study

with focus groups found that in 2002 the general Canadian population favoured decriminalization and

even legalization of marijuana[63]. Canadians also indicated strong support for the medical use of

marijuana in that study[63]. A survey that also included semi-structured interviews reported that the

majority of marijuana users criticized the current Canadian laws against marijuana, calling the penalties

harsh and excessive[64]. Marijuana users in this study favoured a change of law that would treat

marijuana the same as alcohol and tobacco; arguing that marijuana was the same or even less harmful

when compared to alcohol and tobacco[64]. The perceptions and opinions of the Canadian public may

impact who uses medical marijuana as a treatment option as well as ways and patterns of using

marijuana.

The majority of Canadians do not perceive marijuana as dangerous and believe that marijuana use has

low levels of risk or harm[62,65]. In a survey of adults, Canadians were more likely to perceive marijuana

as harmless than adults in Sweden or Finland[27]. In addition, the Canadian Council of Motor Transport

Administrators (CCMTA) reported that only 68% of people agreed that marijuana impairs driving[66].

Canadian youth also seem confused about the effects of marijuana. The Canadian Centre on Substance

Abuse (CCSA) conducted a survey, which found that many youth regard marijuana as natural, safe,

non-addictive, and do not consider marijuana a drug[67]. Youth in the study reported perceived positive

effects of marijuana more often than negative effects[67].

A survey among Canadian adults found that participants reported some concern regarding the negative health risks associated with smoking marijuana[14]. Some participants stated that they worried about the respiratory side effects, including the lungs and throat, and mentioned ways to reduce these harms such as, avoid breath-holding prior to exhaling and mixing the drug with tobacco[14,30].

Marijuana users themselves believe that if marijuana use is under control and is not interfering with one's responsibilities, then using marijuana is not at all problematic[62]. Marijuana users reported that using marijuana too frequently or consuming excessive quantities is the only way marijuana could cause health problems[62]. Some marijuana users describe their marijuana use as "normal" and that using marijuana contributes positive and beneficial aspects to their life, without mentioning explicitly what these aspects are[62].

1.12.1 Stigma and Support

Although using marijuana is widely prevalent and accepted, there is still a stigma experienced by some users, which may be a potential barrier to the use of medical marijuana[30]. Stigmatization can come from a variety of sources including family, friends, co-workers, bosses, neighbours, and even healthcare professionals. Studies show that 60-70% of non-medical marijuana users report hiding their use from certain people, most notably parents and other family members[30,68]. The reasons that were given for hiding their marijuana use were respect for the feelings of nonusers and to avoid social stigma, but some felt guilty because hiding it had distanced them from others[30].

Stereotypes persist regarding marijuana's association with criminality and as a gateway for the use of other drugs[68]. Also, terms like "pothead" and "druggie" are demeaning and non-medical users believe these labels have resulted in some status loss or social disapproval. In most cases, however, negative reactions from others were reported to be minor and appeared to stem from concern about the individual's inappropriate use of marijuana, such as while driving or before work[62].

Individuals who have chosen to use medical marijuana as therapy also report feeling similar stigma as non-medical users for their choice. In a recent Canadian study, medical marijuana users reported feeling stigma primarily from family members and close friends[69]. Types of stigma felt were others' beliefs that they are using a recreational drug for pleasure and just for fun, being a criminal, and vulnerabilities related to illnesses and disabilities[69].

In a Canadian study of HIV/AIDS patients, the majority of physicians supported the patients' decision to use medical marijuana for relief of symptoms[38]. However, a few patients reported that their physician refused to sign their application for a federal authorization to use marijuana medically due to the physician's fear of repercussions from the Canadian Medical Association if they were to sign application forms[38]. Physician support for using medical marijuana may vary depending on the patient's condition(s) and the physician's training. In fact, physicians, nurses, and other healthcare professionals are requesting more information about how and when to prescribe medical marijuana[50].

2.0 STUDY RATIONALE

More than 40,000 Canadians are estimated to be approved to access medical marijuana legally[34,37] and the number of approved medical marijuana users in Canada is expected to increase to 500,000 or more[10]. Most medical users administer marijuana daily and for long durations throughout their lifetime, making medical marijuana a public health concern. As Canadian medical marijuana regulations continue to change, it is important to examine medical marijuana users' current trends regarding patterns of use and modes of delivery. The modes of delivery among medical users—whether marijuana is smoked, consumed, or vapourized—may have important implications for potential therapeutic efficacy as well as health risks. Although smoking remains the most common mode of delivery for marijuana, anecdotal evidence suggests that the use of alternative and innovative modes of delivery is on the rise. The current study addresses this research gap by collecting prevalence data for use of novel modes of delivery, such as dabbing. In addition, given recent increases in the popularity of vapourizing nicotine through electronic cigarettes, the present study examined the use of vapourizers as a mode of delivery for marijuana. New areas of research were explored, such as examining the prevalence of different forms of marijuana used by approved medical marijuana users. During the study period, Canada had restrictions on the use and sale of medical marijuana to only dried herb, which may have had implications for the mode of delivery used as dried herb is most easily smoked. The scientific literature claims that smoking marijuana has some negative side effects and possible long term consequences, which could be prevented through the use of less harmful modes of delivery. Overall, understanding how and why current medical marijuana users select modes of delivery, forms of marijuana, and sources of obtaining marijuana may have implications for the outcomes of current and future marijuana policies.

2.1 Research Questions

The present study examined modes of delivery used by approved adult Canadian medical marijuana users. The study addressed five primary research questions:

1. What is the prevalence of different modes of delivery among approved medical marijuana users?

2. What are approved medical marijuana users' perceptions about different modes of delivery and what is important to them when selecting a mode of delivery?

3. What is the prevalence of different forms of marijuana used by medical marijuana users?

4. Are there differences in the reasons for using different main forms of marijuana?

5. What are approved medical marijuana users' prevalence and perceptions of different sources for obtaining medical marijuana?

3.0 METHODS

3.1 Study Participants

An online cross-sectional survey was conducted from April 29 until June 8, 2015. Eligible participants were Canadians that were at least 18 years of age, used medical marijuana in the past 30 days, were approved to use medical marijuana, and had access to email. *Medical marijuana* users were defined as those who reported using marijuana "for health reasons (i.e., for relief of health symptoms)". *Approved* medical marijuana users were defined as those who reported that they were currently "approved to possess marijuana for health reasons in Canada".

The online survey underwent cognitive interviewing with approved medical marijuana users (n=3)[70]. The cognitive interviewing was conducted at the University of Waterloo and the interview protocol used is in **Appendix A**. Furthermore, the survey was pre-tested to ensure there were no issues with programming (n=8, average time to completion= 48 minutes).

A convenience sample of participants was recruited through Health Canada approved licensed producers. An email was sent to all 18 Health Canada licensed producers listed on Health Canada's website asking if they would be willing to invite their clients to partake in our study. Nine Health Canada licensed producers were willing to help recruit participants and two Health Canada licensed producers were not registering people yet. Although there was limited information regarding licensed producers, it seemed as though the licensed producers who helped with recruitment consisted of varying numbers of clients and were located across Canada. See **Appendix B** for a list of licensed producers who contributed to recruitment for the study. The Health Canada licensed producers who

helped with recruitment sent their clients an email invitation to email marijuanasurvey@uwaterloo.ca

for a password to complete our medical marijuana survey. Individual passwords that could only be

used one time were given to interested participants via email. In addition, one Health Canada licensed

producer invited their clients to complete our survey through social media (i.e., twitter). Participants

who completed the survey were given $10.00 from their choice of an interac e-transfer or an e-gift

card from either Starbucks, Indigo/Chapters, Amazon.ca, iTunes, or Cineplex as a thank you for

completing the survey. The only personally identifying information that was collected from participants

was an email address used to send their electronic gift card and at no point was the email in the same

file as the responses. All of the information provided by participants was kept strictly confidential.

3.3 Survey Measures

The cross-sectional survey included measures for demographic information, patterns of marijuana use,

marijuana use behaviours, reasons for use, modes of delivery, vapourizer use, and sources used for

obtaining marijuana. Several previously developed questions were used, adapted, or modified for use

in the current survey[12,24,26,34,71]. A copy of the survey including all measures and their sources can be

found in **Appendix C**.

3.3.1 Screening Questions

Prior to the start of the survey, participants were provided with the statement: "In this survey, when

we use the term marijuana, we mean marijuana in any form including hashish, hash oil, synthetics, or

other marijuana derivatives (e.g., edibles, extracts). Also, when we use the phrase 'marijuana for

health reasons', we mean the use of marijuana for relief of health symptoms, also known as "medical

marijuana". This statement is meant to clarify the term marijuana as well as the phrase used to

describe marijuana use for medical purposes to reduce any confusion.

Before participants began the survey, four questions were asked to ensure eligibility. Participants were

asked to "please enter your age" and responses were provided in the space available. Participants

were asked, "In the PAST 30 DAYS, have you used marijuana?" with responses 'Yes', 'No', 'Don't know',

and 'Refuse to answer'. Participants were asked, "In the PAST 30 DAYS, have you used marijuana…"

with responses 'For health reasons only (i.e., for relief of health symptoms)', 'For recreational purposes

only (i.e., to get high, to be social)', 'For both health and recreational purposes?', 'Don't know', and

'Refuse to answer'. Lastly, participants were asked, "Are you CURRENTLY approved to possess

marijuana for health reasons in Canada?" with responses 'Yes', 'No', 'Don't know', and 'Refuse to

answer'. Eligible participants were 18 years of age or older, responded 'yes' to using marijuana in the

past 30 days, used marijuana 'for health reasons only (i.e., for relief of health symptoms) or 'for both

health and recreational purposes', and responded yes to being an approved medical marijuana user in

Canada.

3.3.2 Demographic Information

Demographic information was collected in the survey and included age, gender (1=male, 2=female),

region (1= Atlantic: New Brunswick, Newfoundland & Labrador, Nova Scotia, Prince Edward Island; 2=

Quebec; 3=Prairies: Alberta, Manitoba, Saskatchewan; 4= British Columbia; 5= Ontario and Northern:

Ontario, Northwest Territories, Nunavut), ethnicity (1=white, 0= Mixed/Other/Missing), education

(0=low: grade school, some high school, completed high school; 1= moderate: technical/trade school

or community college and some university, no degree; 2= high: completed university degree and masters, PhD or other post-graduate degree), income (0=low: less than $20,000 and $20,000 to $40,000; 1=middle: $40,001 to $60,000 and $60,001 to $80,000; 2=high: $80,001 to $100,000 and more than $100,000), and cigarette smoking status (0=not at all, 1=occasionally, 2=daily).

3.3.3 Medical Reasons for Marijuana Use

Medical reasons for marijuana use were examined including, the main medical reason marijuana was used for (1=pain relief: chronic pain and fibromyalgia; 2=mental health: anxiety or nerves, depression, ADHD, bipolar, PTSD; 3=central nervous system: multiple sclerosis and spinal cord injury and epilepsy; 4=side effects: nausea or vomiting and lack of appetite or weight loss; 5=other: other, glaucoma, cancer, insomnia). In addition, participants were asked if they have a life threatening medical condition with a prognosis of less than one year and if they have any respiratory illnesses (e.g., asthma, COPD, lung cancer).

3.3.4 Side Effects of Medical Marijuana Use

Self-reported respiratory symptoms were examined using six previously adapted questions[26]. Participants who responded 'yes' or 'sometimes' to each of the six questions received a 1 and those who responded no received a 0. A sum of all six questions was used to assess participants' level of respiratory symptoms. Moreover, participants were asked, "What effects have you ever experienced from using marijuana for health reasons?" and selected responses from a list of side effects. After stating, "the next question asks about SMOKING marijuana, as a joint, blunt, in a pipe, bong, waterpipe, etc." participants were asked to report their perceived harm from smoking marijuana

(0=low: not at all harmful to their health; 1=moderate: a little or somewhat harmful to their health;

2=high: very or extremely harmful to their health).

3.3.5 Patterns of Medical Marijuana Use

Participants were asked about their frequency of marijuana use in the past three months with

response options including 'Every day', 'Almost every day', 'At least once a week', 'At least once a

month', 'Less than once a month', 'Don't know', and 'Refuse to answer'. Participants were asked "In

the past 30 days, on average, on how many of these days did you use marijuana (for any reason)?" and

"In the past 30 days, on average, on the days that you used marijuana (for any reason), how many

times per day did you use it?" Furthermore, how much marijuana participants used was assessed by

first asking participants whether it is easier to say how much marijuana they use per day, per week, or

per month. Participants were then asked to report on average, how many grams of marijuana they use

per day, per week, or per month. The use of marijuana combined with tobacco was examined as well

as the amount of marijuana that was used for recreational purposes.

3.3.6 Prevalence of Modes of Delivery

Ever, *Current* (i.e., past 30 day use), *Preferred* modes of delivery, and percentage of use for multiple

modes of delivery were examined in the present survey. An example of a mode of delivery prevalence

question is, "Have you EVER tried or used marijuana in the following ways?" with a list to select as

many as apply consisting of 'Smoking a joint', 'Smoking a blunt', 'Smoking a pipe', 'Smoking a bong or

waterpipe', 'Using a vapourizer', 'Eating in foods or baked goods (e.g., cookies, candy)', 'Drinking (e.g.,

tea)', 'Taking a pill (e.g., Marinol®/ dronabinol or Cesamet® / nabilone)', 'Using a spray (e.g., Sativex/nabiximols)', 'Other (please specify)', 'Don't know', or 'Refuse to answer'.

3.3.7 Perceptions and Personal Importance of Factors by Mode of Delivery

Perceptions of modes of delivery were examined by asking participants to rate 12 factors on a scale from 1 to 5 for the modes of delivery 'smoking', 'using a vapourizer', and 'eating in foods', separately. Additionally, participants were asked to rate the importance of reasons for selecting modes of delivery on a scale from 1 to 5 by answering, "How important are each of the factors to you in your choice of how to use marijuana". The 12 factors to be rated in both questions include: duration of effect (i.e., how long it lasts), time to onset of effect (i.e., how quickly the effects occur), the amount of marijuana needed for effect, ease of use, ability to find correct dose, symptom relief, number of side effects, type of "high", level of harm, accessibility (i.e., how easy it is to get), cost (i.e., affordability), and stigma (i.e., what other people think). Each of these measures were analyzed independently.

3.3.8 Forms of Medical Marijuana

Participants reported *Ever*, *Current*, and *Main* forms of marijuana used. The list of responses included: 'Dried herb', 'Marijuana resin (i.e. hash, kief, trichomes)', 'Butter (i.e., to cook with)', 'Oil', 'Alcohol extract (i.e., tincture)', 'Butane extract (i.e., shatter, wax, dabs)', 'Carbon dioxide (CO_2) extract', 'Raw juice', 'Prescription marijuana (e.g., Marinol®/ dronabinol, Cesamet® / nabilone, Sativex/nabiximols)', 'Other (please specify)', 'Don't know', and 'Refuse to answer'. Participants were also asked, "Why do you mainly use [fill in selected option from *Main* form] form of marijuana?" and selected the reasons they use their specific *Main* form that applied.

3.3.9 Novel Techniques for Using Medical Marijuana

The technique of dabbing marijuana was assessed by asking participants, 'Have you EVER heard of

DABBING marijuana?' and 'Have you EVER tried DABBING marijuana?'.

3.3.10 Cost

Participants were asked to report the average cost of marijuana and provide the percentage that was

covered.

3.3.11 Vapourizers

All participants were asked whether they were aware of vapourizers for marijuana. Among participants

who were aware of vapourizers, they were also asked for their perceptions about acceptability and

harm of vapourizers. Participants who reported using a vapourizer were asked for their patterns of use

(i.e., form, frequency, and type) as well as reasons for use. Among those participants who had not *Ever*

tried a vapourizer with marijuana, the barriers of using a vapourizer were assessed as well as their

interest level for future vapourizer use.

3.3.12 Sources for Obtaining Marijuana

Accessibility of marijuana for medical purposes was investigated by asking participants to report *Ever*,

Main, and *Preferred* sources used to access medical marijuana. Furthermore, participants were asked

to rank the sources for obtaining marijuana 'from a Health Canada licensed producer', 'grow it

yourself', and 'from another non-licensed source (e.g., friends, family, dealer)' on eight factors, which

include cost, time to obtain, accessibility (i.e., how easy it is to get), safety standards, quality (i.e., look, feel, smell), potency, symptom relief, and stigma (i.e., negative thoughts from other people), separately.

3.3.13 Trap Question

All participants were required to answer a trap question in order to ensure participants were engaged and were putting a sufficient level of thought into answering the survey questions. The inclusion of a trap question in online surveys has been highlighted as a good practise to measure validity of participants answers (ESOMAR/GRBN. March 2015. Guideline for Online Sample Quality). The trap question asked was, "What month are you completing this survey in?" and participants selected a month from a list, which also included "Don't know" and "Refuse to answer" options. Participants who answered the trap question wrong were deleted from the analysis.

3.4 Analysis

The analysis examined five primary hypotheses:

Hypothesis 1— Prevalence of Modes of Delivery: We hypothesize that smoking will be the most common *Ever*, *Current*, and *Preferred* mode of delivery. To test this hypothesis, frequencies were calculated.

Hypothesis 2 – Perceptions of Modes of Delivery: We hypothesize that there will be significant differences in the perceptions of the three modes of delivery: smoking, using a vapourizer, and eating

in food. Specifically, we hypothesize that participants will perceive smoking as having a faster time to onset of effect, more accessible, and a better type of "high"; using a vapourizer will be easier to use and have less side effects; and eating in foods will require a higher amount of marijuana for effect and have a longer duration of effect. We hypothesize that perceived cost will not differ between smoking, using a vapourizer, and eating in food. An ANOVA was used to examine differences in perceptions of the three modes of delivery.

Hypothesis 3 – Prevalence of Forms of Medical Marijuana: We hypothesize that the most common *Ever*, *Current*, and *Main* form of marijuana will be dried herb. To test this hypothesis, frequencies were calculated.

Hypothesis 4 – Reasons for Using a *Main* Form: We hypothesize that those who use dried herb as their *Main* form will be more likely to report the reasons: more accessible, easy to find the correct dose, and effects occur faster than those who use alternative *Main* forms. We hypothesize that those who use alternative *Main* forms will be more likely to report the reasons: more potent, effects last longer, and less side effects than those who use dried herb as their *Main* form. We also hypothesize that there will be no difference between reasons for using dried herb or alternative forms for affordability or quality. A bivariate Pearson chi-square test was used to examine reasons for choosing to use a *Main* form of marijuana.

Hypothesis 5 – Comparison of *Main* Sources for Obtaining Medical Marijuana: We hypothesize that there will be significant differences between obtaining marijuana from Health Canada licensed

producers compared to grow it yourself and non-licensed sources. Specifically, we hypothesize that

participants will be more likely to report that obtaining marijuana from Health Canada licensed

producers has high costs, long wait times for receiving their marijuana, high safety standards, is more

accessible, and low stigma (i.e., what other people think). An ANOVA was conducted to compare

differences between three *Main* sources for obtaining medical marijuana.

Overall, a final sample of 364 participants were included in the analyses. Although a total of 400

participants completed the survey, participants with incorrect or missing information for age (n=1),

gender (n=8), and the trap question (n=27) were excluded. A total of 555 participants were provided a

password to access the survey; however, six of those participants were not eligible and 113 did not

complete the survey. Thus, the survey's completion rate (COMR) was calculated to be 79.4% using The

American Association for Public Opinion Research standards (The American Association for Public

Opinion Research. 2015. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for

Surveys. 8th edition. AAPOR).

All analyses were conducted using SPSS, Version 22 (IBM, Illinois). Descriptive statistics (means,

standard deviation, and proportions) are reported for all primary outcomes and covariates. In addition

to the primary hypotheses tests described above, logistic regression models examined correlates for a

total of four outcomes: 1) *Current* modes of delivery (0=smoked only, 1=alternative), 2) *Main* Form of

marijuana (0=alternative, 1=dried herb), 3) *Current* use of vapourizers (0= non-current use of a

vapourizer, 1=current use of a vapourizer), and 4) *Main* source (0=other source, 1=Health Canada

licensed producer). The following set of covariates were "forced" into each model: age, gender,

ethnicity, education, total personal income, main medical reason, perception of harm of smoking, and

respiratory symptoms with the addition of smoking status included as a covariate for the first logistic

regression model. For the purposes of models, participants from Northern regions (n=1) were grouped

with Ontario due to limited numbers as Ontario had the largest sample. Odds ratios (OR) and 95%

confidence intervals (95% CI) are reported for all models. List-wise deletion was used in the case of

missing data for each logistic regression model. The study received approval from the Office of

Research Ethics at the University of Waterloo.

3.4.2 Power Calculation

A power calculation is presented for the total sample (N=364). A sample size of 364 provides 80%

power to detect a difference of 13.5% for prevalence of modes of delivery between sub-groups (e.g.,

25.0% vs. 38.5%) with equivalent sample sizes (e.g., 182 in each group) for a 2-sided t-test, where

α=.05.

4.0 RESULTS

4.1 Sample

Table 1 shows sample characteristics. As Table 1 indicates, more than half of the sample was male,

approximately 75% was white, more than half were low income, and approximately half lived in

Ontario.

Table 1: Sample Characteristics (N=364)

Characteristics	Sample
	Mean (SD)
Age (years)	40.8 (12.6)
	Range: 18-71
	% (n)
Gender	
Male	57.7 (210)
Female	42.3 (154)
Ethnicity	
White only	74.7 (272)
Mixed/Other/Missing	25.3 (92)
Education	
Low	29.1 (106)
Moderate	46.7 (170)
High	22.0 (80)
Not reported	2.2 (8)
Income	
Low	58.5 (213)
Middle	18.1 (66)
High	14.0 (51)
Not reported	9.4 (34)
Region	
Ontario	50.3 (183)
British Columbia	15.1 (55)
Atlantic	13.2 (48)
Prairies	13.0 (47)
Quebec	4.1 (15)
Northern	3.8 (14)
Missing	0.5 (2)
Cigarette smoking status	
Not at all	58.5 (213)
Occasionally	16.2 (59)
Daily	19.2 (70)
Missing	6.1 (22)

Licensed Producer		
Bedrocan Canada Inc	24.7	(90)
MariCann Inc	20.3	(74)
Broken Coast Cannabis	12.4	(45)
Whistler Medical	12.1	(44)
MedReleaf Corp	6.6	(24)
Peace Naturals Project Inc.	4.1	(15)
Tilray	4.1	(15)
CanniMed Ltd	3.6	(13)
Delta 9 Bio Tech Inc	3.6	(13)
Tweed	3.3	(12)
Aphria	3.0	(11)
Mettrum Ltd	2.7	(10)
CannaFarms Ltd	1.6	(6)
Organigram	1.4	(5)
In The Zone Produce Ltd	1.1	(4)
Missing	5.5	(20)

4.2 Medical Reasons for Marijuana Use

Table 2 lists the main medical reasons that participants reported treating with medical marijuana. Pain relief was the most common medical reason treated by medical marijuana as shown in Table 2.

In addition, participants were asked whether they were using medical marijuana to treat a life threatening condition with a prognosis of less than one year. Overall, 5.2% (n=19) reported treating a life threatening condition with medical marijuana, whereas 85.4% (n=311) did not have a life threatening condition, 4.1% (n=15) didn't know, and 5.2% (n=19) refused to answer.

Participants also reported whether they had a respiratory illness and a total of 13.7% (n=50) of participants reported having a respiratory illness (e.g., asthma, COPD, lung cancer), 74.5% (n=271) did not have a respiratory illness, 7.7% (n=28) reported not knowing, and 4.1% (n=15) refused to answer.

Table 2: Main Medical Reasons Treated with Medical Marijuana (N=364)

Main Medical Reason	% (n)
Pain Relief	
Chronic pain	42.3 (154)
Fibromyalgia	2.5 (9)
Mental Health	
Anxiety or nerves	7.4 (27)
Depression	3.8 (14)
ADHD	1.4 (5)
Bipolar	0.3 (1)
PTSD	2.2 (8)
Central Nervous System	
Multiple sclerosis or spinal cord injury	5.8 (21)
Epilepsy	4.1 (15)
Side Effects	
Nausea or vomiting	1.9 (7)
Lack of appetite or weight loss	1.1 (4)
Other	
Other	4.1 (15)
Glaucoma	0.5 (2)
Cancer	1.4 (5)
Insomnia	6.3 (23)
Don't know	8.5 (31)
Refuse to answer	6.3 (23)

4.3 Side Effects of Medical Marijuana Use

Participants were asked to report whether they experienced any of six respiratory symptoms. In total, 38.7% (n=141) of participants did not have any respiratory symptoms, 16.2% (n=59) experienced one respiratory symptom, 16.5% (n=60) experienced two respiratory symptoms, 11.6% (n=42) experienced three respiratory symptoms, 10.4% (n=38) reported experiencing four respiratory symptoms, 4.7% (n=17) reported experiencing five respiratory symptoms, and 1.9% (n=7) reported experiencing all six respiratory symptoms.

Perception of harm from smoking marijuana was also examined. Among those who had ever tried

smoking, 21.9% (n=59) perceived the harm from smoking marijuana as *Low*, 65.1% (n=176) perceived

the harm from smoking marijuana as *Moderate*, and 13.0% (n=35) perceived the harm from smoking

marijuana as *High*.

Table 3 shows side effects experienced by participants. The most common side effect reported was

feeling high, followed by increased appetite and dry mouth.

Table 3: Effects of Medical Marijuana Use (N=364)

Effects	% (n)
Feeling high	59.3 (216)
Increased appetite	56.3 (205)
Dry mouth	51.1 (186)
Drowsiness or laziness	47.5 (173)
Confused or forgetful thinking	23.4 (85)
Feeling quiet or disconnected	20.9 (76)
Anxiety	14.0 (51)
Increased heart rate or palpitations	12.4 (45)
Dehydration	9.9 (36)
Loss of appetite	8.8 (32)
Headache	8.2 (30)
Loss of balance	8.2 (30)
Paranoia or hallucinations	6.3 (23)
Sweating	6.0 (22)
Slurred speech	5.8 (21)
None	5.2 (19)
Blurred vision	4.9 (18)
Nausea	4.9 (18)
Shaking	4.7 (17)
Weakness	3.6 (13)
Other	2.2 (8)
Don't know	4.4 (16)
Refuse to answer	4.1 (15)

4.4 Patterns of Medical Marijuana Use

Patterns of medical marijuana use, including amount and frequency, are shown in Table 4. Additionally, participants were asked about their recreational use of marijuana. Overall, 86.3% (n=314) of participants reported using marijuana for health purposes only and 13.7% (n=50) of participants reported using marijuana for both health and recreational purposes. Among those who reported using marijuana for both medical and recreational purposes, the average amount of use for recreational purposes was 30.7%.

Table 4: Patterns of Medical Marijuana Use (N=364)

Characteristic	Mean (SD)
Amount (g/day)	1.8 (1.6)
	Range (0.1 – 10.5)

	% (n)
Past 3 month frequency	
Less than once a month	3.3 (12)
At least once a month	6.5 (24)
At least once a week	10.2 (37)
Almost every day	21.2 (77)
Every day	55.8 (203)
Don't know/Refuse to answer	3.0 (11)
Number of times per day*	
Once	15.9 (58)
Twice	18.1 (66)
3 times	24.5 (89)
4-5 times	21.7 (79)
More than 5 times	18.1 (66)
Don't know/Refuse to answer	1.7 (6)
Mixing tobacco with marijuana	
Never	70.3 (256)
Sometimes	15.4 (56)
Often	5.5 (20)
Always	2.0 (7)
Don't know/Refuse to answer	6.8 (25)

*Number of times per day represents the average number of times that medical marijuana was used per day on the days that medical marijuana was used in the past 30 days.

4.5 Prevalence of Modes of Delivery

Table 5 shows the prevalence of *Ever*, *Current*, and *Preferred* modes of delivery. The most common *Ever* mode of delivery tried was smoking a joint, whereas using a spray was the least common *Ever* mode of delivery tried. Participants (n=295) reported *Ever* use of a mean of 5.4 (SD=2.2) modes of delivery, which ranged from 1 to 10 modes (not shown in the table).

Table 5 also shows the most common *Current* and *Preferred* mode of delivery was a vapourizer. Participants (n=294) reported *Current* use of a mean of 2.4 (SD=1.3) modes of delivery with a range from 1 to 7 modes. Among those who reported *Current* use of more than one mode of delivery, the mode of delivery used most often was smoking a joint 53.1% (SD=36.8) of the time, followed by 52.4% (SD=36.4) using a vapourizer, 43.5% (SD=39.6) other, 36.1% (SD=31.4) smoking a bong or waterpipe, 31.6% (SD=31.8) smoking a pipe, 26.4% (SD=25.8) taking a pill, 25.0% (SD=29.3) eating in foods or baked goods, 22.6% (SD=29.0) drinking, 20.0% (SD=10.8) using a spray, and 13.5% (SD=13.4) smoking a blunt.

Table 5: Prevalence of Modes of Delivery (N=364)

Mode	Ever Use % (n)	Current Use % (n)	Preferred % (n)
Smoked modes			
Smoking a joint	74.2 (270)	47.0 (171)	23.1 (84)
Smoking a pipe	61.3 (223)	25.8 (94)	4.9 (18)
Smoking a bong/waterpipe	53.6 (195)	21.4 (78)	8.5 (31)
Smoking a blunt	38.7 (141)	4.7 (17)	1.1 (4)
At least one smoked	**77.2 (281)**	**58.8 (214)**	**37.6 (137)**
Alternative modes			
Using a vapourizer	65.9 (240)	52.7 (192)	28.3 (103)
Eating in foods	64.1 (234)	31.0 (113)	7.1 (26)
Drinking	29.9 (109)	5.5 (20)	1.6 (6)
Taking a pill	28.6 (104)	3.3 (12)	0.8 (3)
Using a spray	8.2 (30)	1.1 (4)	0.3 (1)
Other	10.4 (38)	8.0 (29)	4.7 (17)
At least one alternative	**76.1 (277)**	**63.7 (232)**	**42.9 (156)**
Don't know	9.6 (35)	9.6 (35)	10.4 (38)
Refuse to answer	9.6 (35)	9.9 (36)	9.9 (36)

A logistic regression model (see Appendix D: Table 12) was fitted to examine factors associated with *Current* modes of delivery where 1=exclusive use of an alternative mode (n=51) and 0=use of at least one smoked mode (n=199) (x^2= 76.39, p<0.001, Nagelkerke's R^2= 0.41). Significant differences were found for education: participants with a high level of education had an increased odds of currently using an alternative mode of delivery than those with a low level of education (OR=4.92, 95%CI: 1.44-16.84, p=0.01) and those with a moderate level of education (OR=5.00, 95%CI: 1.43-16.67, p=0.01), whereas participants with low and moderate levels of education did not differ (OR=1.40, 95%CI: 0.44-4.36, p=0.59). Those who use medical marijuana mainly for other reasons had an increased odds of using alternative modes of delivery compared to pain relief, mental health illnesses, and central nervous system illnesses (OR=3.41, 95%CI: 1.08-10.70, p=0.04, OR=9.09, 95%CI: 1.96-33.33, p=0.01, and OR=16.67, 95%CI: 2.04-100.00, p=0.01, respectively) and those who use medical marijuana for

relief of side effects had an increased odds of using alternative modes of delivery compared to mental health illnesses and central nervous system illnesses (OR=8.91, 95%CI: 1.05-75.72, p=0.05 and OR=17.54, 95%CI: 1.33-231.28, p=0.03, respectively). Participants who perceived the harm from smoking marijuana as high had an increased odds of currently using alternative modes of delivery than those who perceived the harm from smoking marijuana as low (OR=16.90, 95%CI: 3.88-73.62, p<0.01) or moderate (OR=16.67, 95%CI: 2.13-100.00, p<0.01); however, those who perceived the harm from smoking marijuana as low or moderate did not significantly differ (OR=2.80, 95%CI: 0.85-9.18, p=0.09). Those who reported having a lower number of respiratory symptoms had a higher odds of currently using alternative modes of delivery (OR= 1.61, 95%CI: 1.16-2.17, p<0.01). Those who reported a cigarette smoking status of not at all or occasionally had higher odds of using alternative modes of delivery compared to daily smokers (OR=6.25, 95%CI: 1.56-25.00, p=0.01 and OR=6.23, 95%CI: 0.38-23.83, p=0.01, respectively), but did not differ compared to each other (OR=0.48, 95%CI: 0.87-2.65, p=0.40). Current use of smoked versus alternative modes of delivery did not differ by gender, age, ethnicity, income, or region.

4.6 Perceptions of Modes of Delivery

Participants were asked to rate three modes of delivery—smoking, using a vapourizer, and eating in food—along 12 different factors, using a scale ranging from 1 to 5 for each factor. Figure 1 (and Appendix D: Table 13) show the mean rating by mode of delivery for each of the 12 factors. ANOVA models were run to test for differences in the mean rating between the three modes for each of the 12 factors. As indicated by the superscript letters in Figure 1, time to onset of effect was rated as significantly faster for smoking, followed by using a vapourizer and then eating in food. Smoking was

rated as significantly lower cost and more accessible than using a vapourizer or eating in food.

However, using a vapourizer and eating in food was rated as having a lower level of perceived harm

than smoking. Using a vapourizer was rated as easiest to use and the number of side effects was rated

significantly lower for using a vapourizer compared to smoking or eating in food. Eating in foods was

rated as producing the worst high, most stigma, was the hardest to find a correct dose, but had the

longest duration of effect. Lastly, perceptions of symptom relief did not differ by mode. The ANOVA

output for perceptions of modes of delivery by factor is presented in Appendix D: Table 14.

Figure 1. Rating of Factors by Modes of Delivery (n=342)
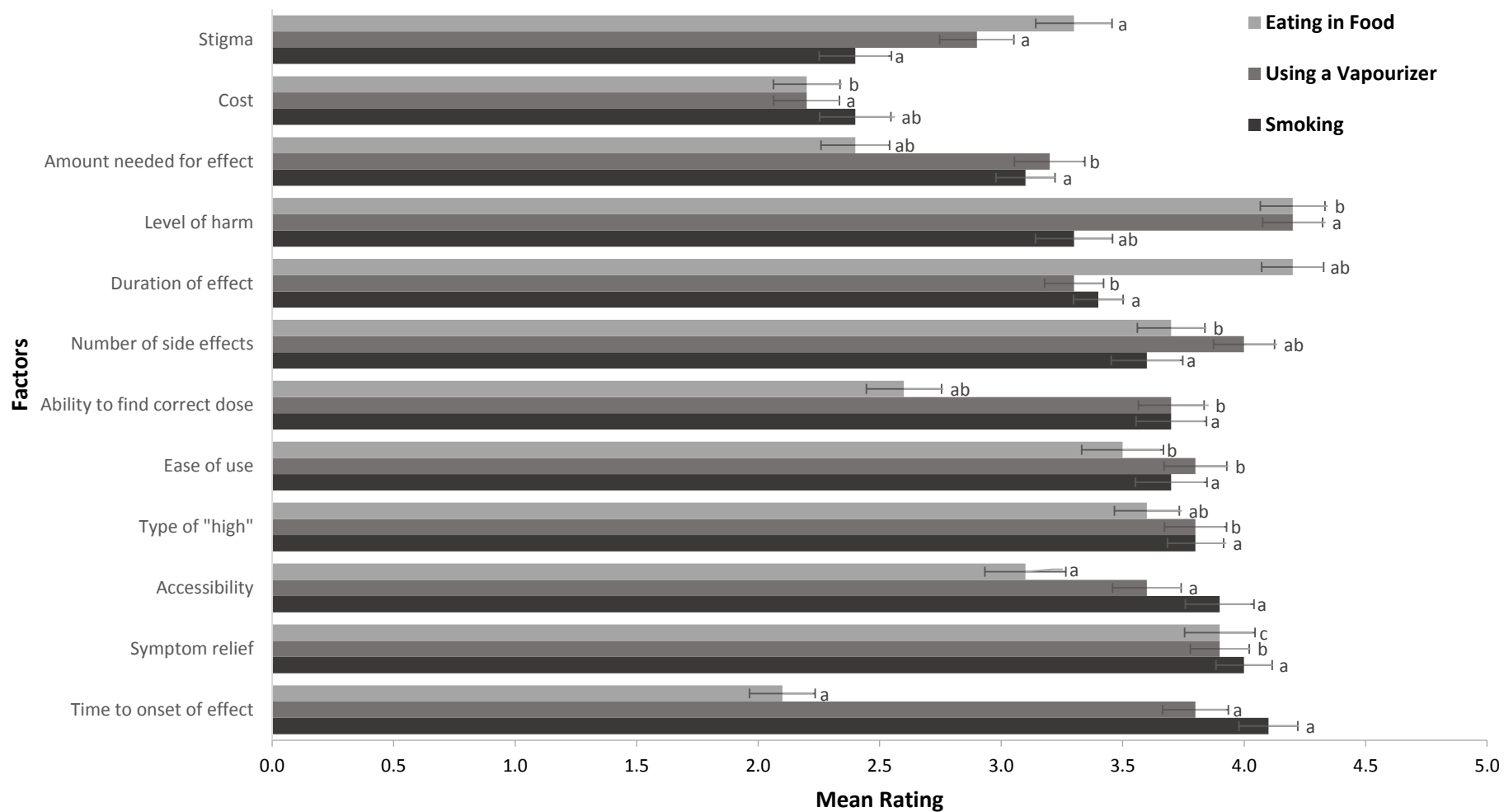
*Rating was completed on a scale from 1 to 5, where 1 represented the least desired effect and 5 represented the most desired effect.

a,b,c Means with the same letter are significantly different at a p<0.05 tested using an ANOVA.

4.7 Personal Importance of Factors by Mode of Delivery

Participants were asked to rate the importance of each factor in their choice of how to use marijuana.

Table 6 shows the mean rating of importance provided for each factor. Symptom relief was rated as

the most important factor when selecting mode of delivery, followed by cost, whereas the least

important factor was stigma.

Table 6: Rating of Importance for Factors for Selecting Modes of Delivery (N=364)*

Factors	Rating of Importance Mean (SD)
Symptom relief	4.5 (0.9)
Cost	4.2 (1.0)
Duration of effect	4.1 (1.0)
Accessibility	4.0 (1.1)
Amount needed for effect	4.0 (1.1)
Time to onset of effect	4.0 (1.1)
Ability to find correct dose	4.0 (1.1)
Ease of use	3.9 (1.1)
Type of "high"	3.8 (1.2)
Number of side effects	3.7 (1.3)
Level of harm	3.6 (1.4)
Stigma	2.6 (1.4)

*Rating was completed on a scale from 1 to 5, where 1 represented not important at all and 5 represented extremely important.

4.8 Prevalence of Forms of Medical Marijuana

Participants reported their *Ever*, *Current*, and *Main* use of different forms of marijuana. Table 7 shows

the prevalence of *Ever*, *Current*, and *Main* forms of marijuana and indicates that dried herb was the

most prevalent form used overall. Participants (n=300) reported *Ever* using a mean of 3.9 (SD=2.0)

forms of marijuana and *Current* use of 1.8 (SD=1.1) forms of marijuana (n=299). Participants were

asked whether they would use the form, extracts, if they were available and 77.3% (n=279) of

participants reported yes and 22.7% (n=82) reported no.

Table 7: Prevalence of Forms of Medical Marijuana (N=364)

Form	Ever Use % (n)	Current Use % (n)	Main % (n)
Dried herb	79.7 (290)	75.0 (273)	67.6 (246)
Alternative Forms			
Butter	51.6 (188)	20.0 (73)	3.0 (11)
Marijuana resin	56.9 (207)	15.1 (55)	1.6 (6)
Oil	46.2 (168)	10.4 (38)	1.4 (5)
Prescription marijuana	32.1 (117)	10.2 (37)	4.1 (15)
Butane extract	21.2 (77)	8.0 (29)	1.6 (6)
Alcohol extract	23.1 (84)	3.8 (14)	1.1 (4)
Raw juice	5.8 (21)	0.8 (3)	0.0
CO_2 extract	7.7 (17)	0.3 (1)	0.3 (1)
Other	3.6 (13)	2.7 (10)	1.1 (4)
Don't know	11.0 (40)	11.3 (41)	11.3 (41)
Refuse to answer	6.6 (24)	6.6 (24)	6.6 (24)
Missing	0.0	0.0	0.3 (1)

A logistic regression model (Appendix D: Table 15) was fitted to examine factors associated with the *Main* form of marijuana where 1=*Main* use of dried herb (n=208) and 0=*Main* use of alternative forms (n=39) (x^2= 20.71, p=0.30, Nagelkerke's R^2=0.14). Participants who perceived the harm of smoking marijuana as high had a significantly higher odds of using alternative forms as their *Main* form of marijuana compared to those who perceived the harm from smoking as low (OR=5.88, 95%CI: 1.59-20.00, p<0.01) or moderate (OR=3.58, 95%CI: 1.37- 9.09, p<0.01), but those who perceived the harm from smoking as low and moderate did not differ. Significant differences were not found for age, gender, ethnicity, education, income, region, main medical reason, or respiratory symptoms. Although age was not significantly different, a trend occurred in which older people had an increased odds of using alternative forms of marijuana (OR=1.03, p=0.09).

4.9 Reasons for Using a Main Form

Participants reported their reasons for choosing to use a specific *Main* form of marijuana. Table 8 shows reported reasons for using a *Main* form among all participants (i.e., overall), among those who reported using dried herb as their *Main* form of marijuana (as shown in Table 7), and among those who reported using an alternative form (e.g., butter, marijuana resin, oil, butane extract, alcohol extract, CO_2 extract, prescription marijuana, other—as shown in Table 7) as their *Main* form of marijuana. Overall, the most common reason for choosing to use a specific *Main* form of marijuana was that it is easy to use, followed by more accessible and best symptom relief. A chi-square test was used to examine differences in frequencies of reasons for using a *Main* form of marijuana comparing participants who used dried herb to those who used alternative forms. Participants reported that dried herb was significantly more accessible than alternative forms, which was the most common reason for using dried herb as their *Main* form of marijuana. On the other hand, participants reported that alternative forms of marijuana had effects that last significantly longer, have significantly less side effects, had significantly higher quality, and were significantly less harmful than dried herb. No differences were observed for the remaining reasons for use. The chi-square test output for reasons for using a *Main* form between dried herb and alternative forms is shown in Appendix D: Table 16.

Table 8: Reasons for Using a Main Form Overall (n=300) and Between Dried Herb (n=246) and Alternative Forms (n=52)

Reasons	Overall	Dried Herb Form	Alternative Form
	% (n)	% (n)	% (n)
Easy to use	63.3 (190)	65.0 (160)	57.7 (30)
More accessible	60.7 (182)	66.7 (164)	34.6 (18)*
Best symptom relief	46.3 (139)	45.5 (112)	51.9 (27)
Easy to find dose	45.3 (136)	45.9 (113)	44.2 (23)
Effects occur faster	43.0 (129)	45.1 (111)	34.6 (18)
Uses less marijuana	32.7 (98)	34.6 (85)	25.0 (13)
Effects last longer	31.0 (93)	24.8 (61)	59.6 (31)*
More affordable	30.3 (91)	31.3 (77)	26.9 (14)
Less side effects	28.0 (84)	24.4 (60)	46.2 (24)*
Provides the best high	27.3 (82)	26.8 (66)	28.8 (15)
Higher quality	21.0 (63)	18.7 (46)	32.7 (17)*
More potent	18.3 (55)	16.7 (41)	26.9 (14)
Less harmful	18.0 (54)	11.8 (29)	46.2 (24)*
Recommended to me	18.0 (54)	16.7 (41)	25.0 (13)
Other	2.7 (8)	1.6 (4)	7.7 (4)*
Don't know	1.3 (4)	0.8 (2)	3.8 (2)
Refuse to answer	0.3 (1)	0.0	1.9 (1)

*Significantly different at $p<0.05$ using a Pearson chi-square test.

4.10 Novel Techniques for Using Medical Marijuana

The knowledge and use of the novel technique for using marijuana, dabbing, was examined. Overall, 34.6% (n=126) of participants were aware of dabbing, 53.6% (n=195) were not aware of dabbing, 3.3% (n=12) didn't know, and 8.5% (n=31) refused to answer. Among those who were aware of dabbing (n=126), 46.0% (n=58) had ever tried dabbing, 52.4% (n=66) had not ever tried dabbing, and 1.6% (n=2) reported that they didn't know whether they had tried dabbing.

4.11 Cost

Participants were asked to report the average cost to purchase marijuana and the percentage of the cost that was covered. The mean cost of medical marijuana reported by participants was $91.8

(SD=87.2) per week and ranged from $1.25 to $500.00 per week. The cost to purchase medical

marijuana was not at all covered (i.e., 0% coverage) for 85.4% (n=311) of participants, 10.7% (n=39) of

participants reported limited or partial cost coverage (i.e., 1% - 50%), and 3.9% (n=14) of participants

reported more comprehensive coverage (i.e., more than 50%).

4.12 Vapourizer Use

Prevalence of *Ever* and *Current* use of a vapourizer use was examined in the survey. Overall, 77.2%

(n=281) of participants were aware of vapourizing or vaping prior to the study, 11.5% (n=42) of

participants were not aware of vapourizing or vaping before the study, 3.3% (n=12) of participants

didn't know, and 8.0% (n=29) of participants refused to answer. Participants were asked whether they

had ever used a vapourizer and among those who had ever tried a vapourizer (n=240), 28.3% (n=68)

used a vapourizer every day during the past 30 days, 18.3% (n=44) used a vapourizer almost every day

over the past 30 days, 14.2% (n=34) used a vapourizer at least once a week in the past 30 days, 19.2%

(n=46) used a vapourizer at least once in the last 30 days, and 20.0% (n=48) of participants did not use

a vapourizer at all in the past 30 days.

A logistic regression model (Appendix D: Table 17) was fitted to examine factors associated with the

Current use of vapourizers where 1=*Current* use of a vapourizer (n=165) and 0=no *Current* use of a

vapourizer (n=85) (x^2= 48.28, p<0.001, Nagelkerke's R^2= 0.24). Males (OR=2.46, 95%CI: 1.30-4.76,

p<0.01), younger age (OR=1.03, 95%CI: 1.00-1.05, p=0.05), white ethnicity (OR=2.52, 95%CI: 1.03-6.19,

p=0.04), and those with less respiratory symptoms (OR=1.28, 95%CI: 1.05-1.56, p=0.01) reported a

higher odds of *Current* use of vapourizers. In addition, significant differences were found between

regions (p=0.02): participants from the Prairie Provinces (OR=5.69, 95%CI: 1.50-21.50, p=0.01) and from Ontario and Northern regions (OR=5.29, 95%CI: 1.73-16.19, p<0.01) had a higher odds of currently using a vapourizer than those from Atlantic Provinces. Education, income, main medical reason, and perceived harm of smoking did not significantly differ.

Participants were asked about *Ever* and *Current* forms of marijuana used in a vapourizer as well as the *Ever* and *Current* type of vapourizer used. Table 9 shows patterns of *Ever* and *Current* use of vapourizers. As Table 9 shows, the most common form of marijuana used in a vapourizer was dried herb and the majority of participants used a portable type of vapourizer.

Table 9: Patterns of Vapourizer Use Among Ever (n=240) and Current (n=192) Vapourizer Users

Characteristic	Ever Use	Current Use
	% (n)	% (n)
Form of marijuana vapourized		
Dried herb	97.5 (234)	95.8 (184)
Marijuana resin	19.6 (47)	13.0 (25)
Butane extract	18.8 (45)	10.9 (21)
Oil	14.6 (35)	7.3 (14)
Alcohol extract	1.7 (4)	0.5 (1)
Carbon dioxide (CO_2) extract	1.7 (4)	0.0
Other	0.8 (2)	0.0
Don't know	0.4 (1)	0.0
Refuse to answer	0.0	0.0
Type of vapourizer used		
Portable vapourizer	72.5 (174)	67.2 (129)
Stationary vapourizer	59.2 (142)	41.7 (80)
E-cigarette or vape pen	32.9 (79)	19.3 (37)
Hand made	0.8 (2)	0.0
Other	0.4 (1)	0.0
Don't know	0.8 (2)	0.5 (1)
Refuse to answer	0.0	0.0

4.13 Perceptions of Vapourizer Use

Participants who reported *Current* use of a vapourizer were asked to report their reasons for choosing to use a vapourizer. Additionally, participants who were aware of vapourizing, but reported not *Ever* trying a vapourizer were asked to report their main reason for choosing not to use a vapourizer and whether they would be willing to use a vapourizer in the future. Table 10 shows participants reported reasons and willingness to use a vapourizer.

Table 10: Reasons, Barriers, and Willingness to Try a Vapourizer

Characteristic	% (n)
Reasons for using a vapourizer (n=192)	
Less harmful to me than smoking marijuana	79.7 (153)
It doesn't smell as much as smoking marijuana	71.4 (137)
Easy to use	58.9 (113)
Uses less marijuana	56.8 (109)
Less harmful to people around me than smoking	51.0 (98)
Less side effects	40.1 (77)
Easy to find the correct dose	39.6 (76)
Provides the best symptom relief	34.4 (66)
Effects occur faster	27.1 (52)
Effects last longer	23.4 (45)
Provides the best high	20.8 (40)
More affordable	16.7 (32)
More accessible	15.6 (30)
Other people I know use a vapourizer too	11.5 (22)
It's fun to use	11.5 (22)
Other	9.4 (18)
Reasons for not using a vapourizer (n=41)	
I'm not interested	26.8 (11)
Less affordable	19.5 (8)
Difficult to use	9.8 (4)
Less accessible	7.3 (3)
Other	17.1 (7)
Don't know	7.3 (3)
Willingness to try a vapourizer in the future (n=41)	
Yes	73.2 (30)
No	26.8 (11)

Participants who were aware of vapourization were asked about their perceptions regarding acceptability and harm of vapourizing. Table 11 shows participants reported perceptions of vapourization.

Table 11: Perceptions of Vapourization among those Aware of Vapourization (n=279)

Perceptions	% (n)	
Relative Acceptability of Vapourizers		
Less acceptable than smoking	5.4	(15)
As acceptable as smoking	27.2	(76)
More acceptable than smoking	59.1	(165)
Don't know	0.4	(1)
Refuse to answer	7.9	(22)
Harm of Vapourizing		
Not at all harmful	48.0	(134)
A little or somewhat harmful	38.7	(108)
Very or Extremely harmful	0.7	(2)
Don't know	12.2	(34)
Refuse	0.4	(1)
Relative Harm of Vapourizing		
Less harmful than smoking	82.8	(231)
As harmful as smoking	6.5	(18)
More harmful than smoking	1.1	(3)
Don't know	8.9	(25)
Refuse to answer	0.7	(2)

4.14 Sources for Obtaining Medical Marijuana

Participants were asked which *Ever*, *Main*, and *Preferred* sources they had used for obtaining medical marijuana. Table 11 shows prevalence estimates of *Ever*, *Main*, and *Preferred* sources for obtaining medical marijuana. The most common *Ever*, *Main*, and *Preferred* source for obtaining medical marijuana was through a Health Canada licensed producer. To examine the *Main* sources for obtaining medical marijuana, a logistic regression model (Appendix D: Table 18) was fitted to examine factors associated with the *Main* source for obtaining medical marijuana where 1=Health Canada licensed

producer (n=193) and 0=other source (n=53) (x^2=19.57, p=0.39, Nagelkerke's R^2=0 .12). Participants who reported having fewer respiratory symptoms had an increased odds of obtaining medical marijuana from a Health Canada licensed producer as their *Main* source than any other source (OR=1.30, 95%CI; 1.05-1.59, p=0.02). No significant differences were found for gender, age, ethnicity, education, income, region, main medical reason, and perceived harm of smoking marijuana.

Table 12: Prevalence of Ever, Main, and Preferred Sources for Obtaining Medical Marijuana (N=364)

Sources	Ever		Main		Preferred	
	%	(n)	%	(n)	%	(n)
Licensed producer	76.6	(279)	64.6	(235)	43.7	(159)
Dispensary or club	31.9	(116)	13.5	(49)	16.2	(59)
Non-licensed source	47.8	(174)	6.0	(22)	3.6	(13)
Grow it yourself	19.2	(70)	3.8	(14)	23.4	(85)
Another licenced source	9.6	(35)	3.3	(12)	3.8	(14)
Other	0.5	(2)	0.3	(1)	1.1	(4)
Don't know	1.9	(7)	3.8	(14)	6.0	(22)
Refuse to answer	7.4	(27)	4.7	(17)	2.2	(8)

Participants ranked three sources for obtaining medical marijuana – licensed producer, grow it yourself, and non-licensed source- along eight different factors. Figure 2 (and Appendix D: Table 19) shows the mean rank comparison of the three sources for obtaining medical marijuana for each of the eight factors. Appendix D: Table 20 shows the comparison of *Main* sources for obtaining medical marijuana ANOVA output.

Figure 2. Comparison of Ranked Factors for Main Sources for Obtaining Medical Marijuana (N=364)†
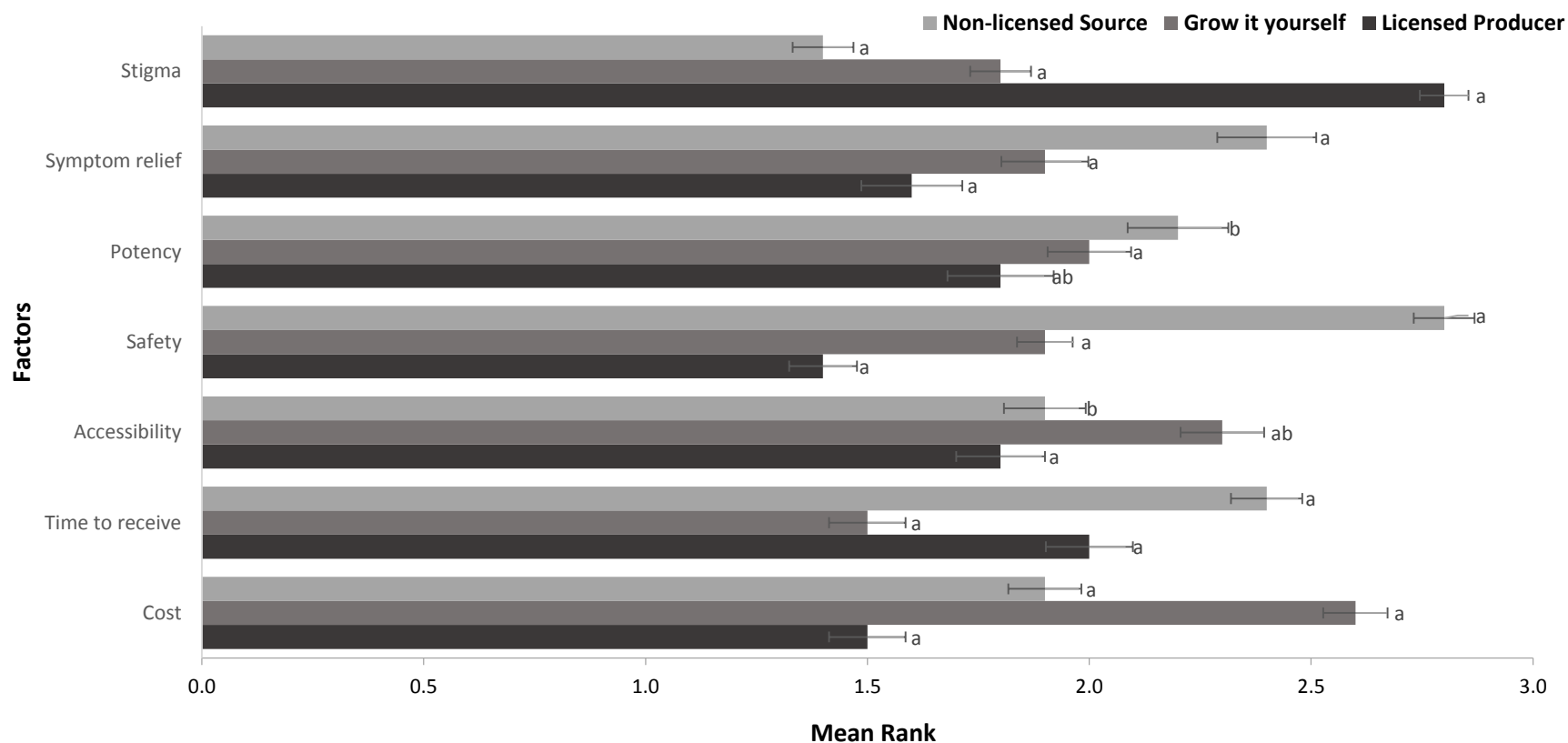
†Ranking was completed, where 1 represents the factor ranked as most/high/best, 2 represents moderate/middle, and 3 represents the factor ranked least/low/worst (e.g., for the factor cost: 1=most expensive, 2=moderately expensive, and 3=least expensive).
a,b,c Means with the same letter are significantly different at a p<0.05 tested using an ANOVA.

5.0 DISCUSSION

The current study is among the first to examine patterns of use and perceptions among medical

marijuana users in Canada after the introduction of the Marihuana for Medical Purposes Regulations

(MMPR). The findings provide an opportunity to assess changes in the way medical marijuana is

accessed and used in Canada.

5.1 Medical Reasons for Marijuana Use

The present study indicates that individuals reporting use of marijuana for medical reasons use it to

treat a wide range of medical conditions and symptoms, consistent with previous findings[12-14,19,24,33,43].

The MMPR decentralized the process for medical marijuana approval in Canada. Unlike the previous

regulatory framework, where Health Canada acted as the principal approving body of medical

marijuana use, physicians now act in this capacity[10,44]. The new framework (i.e., MMPR) provides

greater discretion to individual physicians in terms of the medical conditions for which marijuana can

be prescribed eliminating some of the barriers to accessing medical marijuana that were present

through the previous regulatory regime. Previously under the MMAR, patients with certain conditions

were more likely to be approved (e.g., multiple sclerosis and gastrointestinal illness) compared to

patients with conditions such as anxiety and depression[13]. Pain was the most commonly reported

medical condition treated with marijuana in the current study; these findings are consistent with

national and international research [12-14,19,24,33,43]. The current study suggests that the use of medical

marijuana to mainly treat mental health symptoms may have increased under the MMPR compared to

during the MMAR (15% vs. 9%)[13].

Interestingly, approximately 9% of participants in the present study reported not knowing their main

medical reason for medical marijuana use. It is unclear whether these participants are using marijuana

to treat multiple conditions and, therefore, could not determine a singular, chief complaint.

Alternatively, these participants may be using marijuana primarily for recreational purposes and,

therefore, did not have a main medical reason. It can be difficult to separate medical and recreational

use of marijuana as the distinction is unclear in some cases, particularly with respect to mental health:

medical users may benefit from feeling high, which is generally associated with recreational use; on the

other hand, recreational users may be unaware that they are self-medicating an underlying medical

condition with marijuana. In the current study, 14% of participants reported using marijuana for both

health and recreational purposes. Among those who reported using marijuana for both health and

recreational purposes, on average, one third of their use was recreational. Two previous Canadian

studies reported that the majority of users had used marijuana recreationally prior to use for approved

medical reasons; however, there is no other data regarding concurrent recreational use among medical

users[15,43].

5.2 Side Effects of Medical Marijuana Use

Similar to most medications, marijuana use has secondary effects. The most common secondary effect

reported by participants in the current study was feeling high, followed by increased appetite and dry

mouth, which is consistent with previous investigations of medical marijuana[15,21,24]. In the present

study, 5% of participants reported feeling no secondary effects resulting from marijuana use. In

previous work, much higher proportions of participants (e.g., 25% and 71%) reported feeling no

adverse effects compared to the current study[15,20]. The variation in reporting effects between studies

may be due to various reasons including differences in the wording of the questions or the

participants' perceptions of the questions asked. The current study asked participants to report the

effects experienced resulting from marijuana use without any indication whether the effects were

negative or positive, whereas past research explicitly asked participants to report adverse effects.

Whether certain secondary effects resulting from marijuana use are negative or positive may be

subjective and may depend on the context. For example, AIDS patients would associate increased

appetite as a positive effect since AIDS patients lose weight at a relatively fast rate, whereas a patient

with another condition may associate an increased appetite as a negative effect. The prevalence of any

serious secondary effects was low (e.g., 6% paranoia and hallucinations), consistent with past

research[15,20]. However, it is likely that there is a sample bias given that users who have experienced

serious side effects are unlikely to continue using medical marijuana and would not have been eligible

for the survey.

5.3 Patterns of Medical Marijuana Use

The majority of participants reported frequent, long-term, daily use of marijuana, with little indication

that patterns of use have changed since the MMPR came into effect[12,13,19,24,33,38]. However, daily use of

marijuana for medical purposes was less common in the current study compared to two previous

Canadian studies (56% vs. 83% and 94%)[38,43]. In addition, patterns of use reported in the current study

were similar to international studies[12,19,24,59] with the exception that daily use was less common in the

current study compared to a study conducted in the US in 2007 (56% vs. 90%, respectively)[59]. Overall,

patterns of use seem to have remained stable over time and internationally among medical marijuana

users.

One study comparing the medical use of marijuana to recreational use found that medical use tends to be more frequent and for longer periods of time and recreational users reported using marijuana rarely[15]. Alternatively, the current study examined recreational use of marijuana among those who were medical users and found similar frequencies of use for only medical users compared to medical users who also use marijuana recreationally. Thus, there may be some differences in patterns of marijuana use; however, again, it is difficult to separate medical and recreational use of marijuana.

Most participants reported never mixing their marijuana with tobacco (~70%) while 23% reported some level of mixing. Similar findings for mixing tobacco with marijuana were reported by HIV/AIDS patients in a Canadian study conducted in 2007[38]; however, a Canadian study conducted in 2003 in Nova Scotia with pain patients reported much higher estimates (~47%) of mixing than the current study[15]. Mixing tobacco with marijuana is generally more common in Europe than in North America[12,24,43]. Additionally, there is evidence to suggest that mixing tobacco with marijuana can have implications on the physiological effects of marijuana[24]. One study found that mixing tobacco with marijuana may release more THC from marijuana when smoked; thus, some medical users may benefit from mixing marijuana with tobacco in terms of symptom relief[72].

5.4 Prevalence of Modes of Delivery

The current findings suggest a possible shift in the popularity of modes of delivery from smoking to alternative modes. Although smoking a joint was the mode of delivery most commonly tried, approximately two thirds of participants reported trying a vapourizer and eating marijuana in foods. Contrary to our hypothesis, using a vapourizer was the most common mode of delivery currently used

and it was the most preferred by participants compared to smoking a joint and eating in foods. Overall,

more participants reported current use of alternative modes and preferred alternative modes

compared to smoking. It is interesting that alternative modes of delivery were more popular than

smoking even though the MMPR restricts the use and sale of medical marijuana to only dried herb,

which is most easily smoked.

Results from the present study demonstrate that the use of alternative modes of delivery is increasing.

Previous studies have all found that smoking is the most commonly used and most preferred mode, in

contrast to the current findings[12,15,17,19,33,38,43]. Among past studies that examined vapourizer use, the

prevalence of using a vapourizer was generally low, falling between 8% and 20%[12,33,38]. Alternatively,

one Canadian study conducted in 2007 found that 52% used a vapourizer, which is a similar estimate to

the current study; however, that same study reported a higher proportion of participants smoked

(88%) and ate (72%) their medical marijuana compared to vapourizing[43]. Inconsistent with the current

results, other Canadian studies also reported that eating in foods was the second most commonly used

mode of delivery, even more common than using a vapourizer[12,33,38,43]. Although medical marijuana

users reported trying and concurrently using multiple modes of delivery, vapourizing was the most

popular mode of delivery used, more so than smoking a joint. Overall, the findings indicate a

substantial increase in the use of vapourizers among approved medical marijuana users.

More than one quarter of participants that were aware of vapourizers used a vapourizer every day

during the past 30 days. Although past research regarding frequency of using a vapourizer is limited, an

international study that included Canadians also found that participants reported using a vapourizer

daily[24]. The popularity of vapourizers for using marijuana may have been influenced by the recent

increase in awareness and use of electronic cigarettes, which vapourize nicotine[73]. Most of the

participants who used a vapourizer reported using a portable type of vapourizer, which is similar to an

e-cigarette. The present findings are inconsistent with the type of vapourizer reported by two previous

studies that found the type of vapourizer most commonly used was the Volcano, a non-portable

vapourizer[24,60]. The findings suggest that e-cigarettes may have revitalized vapourizing technology with

respect to the marijuana market.

Using a vapourizer instead of smoking marijuana could prevent some of the negative respiratory health

consequences associated with smoking. Findings from the current study adds to previous literature by

showing current use of alternative modes of delivery and current use of a vapourizer were both

associated with fewer respiratory symptoms[26,55,56]. A previous study exclusively examined vapourizing

and found that participants using a vapourizer had significantly less respiratory symptoms compared to

smoking[26]. Overall, the majority of participants in the current study reported having at least one or

more respiratory symptoms (e.g., cough, phlegm, shortness of breath, etc.) and approximately 14% of

participants reported having a respiratory illness (e.g., asthma, COPD, lung cancer). Participants in the

current study had a higher prevalence of respiratory illness than the general Canadian population (14%

vs. 9%)[74]. However, the direction of this association is unclear from the current study's data: individuals

with respiratory illnesses or respiratory symptoms from other conditions may be more likely to use

marijuana, or chronic smoke inhalation from marijuana could cause or exacerbate respiratory

symptoms.

The present study found that current use of alternative modes was associated with a greater

perception of harm from smoking and with being more highly educated. Possibly, these populations of

users are also more aware of ways to reduce the negative health risks of marijuana use and have the

resources available to do so. Participants most commonly perceived a moderate harm from smoking

marijuana; however, just over one fifth of participants perceived smoking marijuana as not at all

harmful. Although the majority of participants understood that smoking marijuana may result in some

negative health consequences, the results demonstrate that there were some participants who did not

perceive smoking marijuana as harmful at all. Asking participants their perceptions of harm from

smoking is complicated as attitudes toward smoking marijuana can depend on the context and in

which ways it is used[68]. For example, participants in the current study who use marijuana only for

medical reasons may perceive no harm from smoking marijuana because they gain medical benefits,

but may perceive regular recreational smoking of marijuana as very harmful. In addition, previous

research states that concerns surrounding smoking marijuana are mainly due to the substance's illegal

status and to a lesser extent, the negative health effects[12,68]. Most of the participants in the current

study seem to be aware of possible negative health implications resulting from smoking marijuana.

5.6 Perceptions and Personal Importance of Factors by Modes of Delivery

The way in which medical marijuana users perceive the modes of delivery has implications for which

modes they use. Participants perceived smoking and vapourizing as fairly similar on the 12 factors.

However, smoking was reported to be perceived as having the highest level of harm and vapourizing

having the least side effects. The findings suggest that most medical marijuana users that report using

a vapourizer do so because they are aware and understand that using a vapourizer can reduce negative

health consequences that are associated with smoking. More than 80% of participants reported that vapourizing is less harmful than smoking and almost half of the participants said vapourizing is not at all harmful. The perception among medical marijuana users that vapourizers are a more acceptable mode of delivery with a lower risk of harm compared to smoking is most likely the reason for its popularity. General concerns about smoking-related health consequences were also noted by participants in previous research[12,24]. The perceptions and concerns among medical marijuana users surrounding the harm from smoking is warranted based on many previous research findings[23-27]. Health Canada also recommends that medical marijuana users can vapourize as an alternative to smoking marijuana for some health advantages[3]. Currently, it is unclear to what extent vapourizers are being recommended to approved medical users by physicians, health authorities, and licensed producers due to a gap in the existing knowledge base.

Another reason participants reported that they use a vapourizer was that vapourizing doesn't smell as much as smoking marijuana. Because using a vapourizer doesn't smell, it may be less obvious to other people that marijuana is being used, which may reduce possible associated social stigma. Different international jurisdictions, such as Australia and the US, have reported similar reasons for vapourizing citing efficacy, reliability, and safety reasons as well as preferences in taste, smell, perceived effect, and perceived health benefits[12,60].

The study identified additional factors that may determine choice of mode of delivery. First, smoking was perceived to have the fastest time to onset of effect followed by vapourizing with the second fastest time to onset. However, past scientific data reported using a vapourizer and smoking obtained

the same blood cannabinoid concentration levels at the same time[53]. After assessing the scientific literature available, Health Canada stated that absorption may even occur somewhat faster with a vapourizer compared to smoking[3]. Thus, the sample of medical marijuana users in the present study have different perceptions of the time to onset of effect compared to biological outcomes.

Second, it was not surprising that smoking was perceived to be the most accessible mode of delivery. Due to the MMPR in Canada, dried herb was the only form available at the time the survey was conducted, and it is easiest to smoke dried herb, thus making smoking more accessible to medical users. Interestingly, although smoking was perceived to be the most accessible mode of delivery, the most common mode used was a vapourizer suggesting that accessibility was not a large enough barrier to prevent approved medical marijuana users from using a vapourizer. To our knowledge, there has been no other research that examined accessibility of modes of delivery to compare the current results with.

Eating marijuana in foods was the mode perceived to have the least desired effects compared to both smoking and using a vapourizer, including the slowest time to onset of effect, worst high, most stigma, hardest to find correct dose, hardest to use, and least accessible. However, eating in foods was perceived to have the longest duration of effect, consistent with the evidence that oral administration of marijuana results in a longer duration of effects[3,24,59]. The longer lasting effect from eating can reduce the need for frequent dosing; however, longer durations can also be unfavourable if the user overdoses and prolongs the undesired effect[24,59]. Additionally, pre-made edibles could not be legally

purchased in Canada under the MMPR at the time the study was conducted, meaning edibles had to

be baked by hand. Baking edibles takes greater effort and time to prepare compared to other modes.

In addition to asking participants their perceptions about the modes of delivery, we asked which

factors were important when selecting which modes of delivery to use. The importance placed on each

of the 12 perceived factors has implications for which modes of delivery medical marijuana users select

to use. Symptom relief was rated as the most important factor when deciding which mode of delivery

to use suggesting that approved medical users would use the mode that relieves their symptoms the

best. However, participants' perceptions of the modes didn't differ on symptom relief indicating that

each mode of delivery – smoking, using a vapourizer, and eating in foods – provides similar relief of

symptoms. Therefore, medical marijuana users may select any mode of delivery to relieve their

symptoms.

Participants rated cost as the second most important factor when selecting which mode of delivery to

use, indicating that medical marijuana users would prefer to use an inexpensive mode. Eating in foods

and using a vapourizer were both perceived as the most expensive modes and smoking was perceived

as the least expensive mode. It is interesting that using a vapourizer was the most popular mode of

delivery used even though it was perceived as expensive and cost was rated as the second most

important factor when selecting which mode to use. Furthermore, the most common reasons for not

trying a vapourizer were 'not interested', followed by 'not affordable'. Previous studies have also cited

cost as a reason for not using a vapourizer[60,75]. For example, one study reported a mean cost of

approximately $250 to purchase a vapourizer[60]. Cost may be important to medical marijuana users as

cost coverage for medical marijuana use in general is low in Canada[76]. Additionally, most users are

chronically ill and, therefore, rely on disability or unemployment income, generally placing them in a

low socioeconomic stratum. Using a vapourizer may not be an option for medical users who have a low

income and cannot afford it. Although, medical users still seem to be interested in using a vapourizer

as three quarters of the participants who had not tried a vapourizer reported that they would be

willing to try a vapourizer in the future. Overall, these findings indicate that cost and accessibility may

be the largest perceived barriers to using a vapourizer; however, most approved medical marijuana

users continue to use and want to use a vapourizer.

5.7 Forms of Marijuana

During the study period under the MMPR, approved medical users could only receive dried medical

marijuana from a licensed producer within the legal limits[44]. Therefore, not surprisingly, dried herb was

the most prevalent form of marijuana tried and currently being used, which is in agreement with our

hypothesis. Participants most commonly reported that a reason for using dried herb was that dried

herb was significantly more accessible than alternative forms. Therefore, approved medical marijuana

users seem to be using dried herb mainly due to its ready accessibility. A 2001 Canadian survey among

pain patients using medical marijuana examined dried herb and oil forms of marijuana and also found

that dried herb was the form most commonly used even before the MMPR was introduced[15]. The use

of marijuana for medical purposes was established in Canada in 2001 indicating that since the

introduction of Canadian medical marijuana laws, dried herb has been the most popular form of

medical marijuana. However, it is interesting to note that participants from the current study were

trying and using multiple forms of marijuana, including oil and extracts, even though alternative forms

were illegal to use at the time.

However, as of June 11, 2015, immediately after the survey was completed, medical use of alternative

forms of marijuana became legal as a result of a court decision made against the federal government.

On July 8, 2015, Health Canada announced that alternative forms of medical marijuana can legally be

produced and sold by licensed producers[47]. Health Canada revised the medical marijuana regulation

expanding the legal forms of marijuana to oil, buds, and leaves in addition to dried marijuana[47]. The

findings from the current study support media coverage stating that approved medical marijuana users

supported this change in regulation: over three quarters of participants reported that they would use

extracts if they were available. Additionally, participants reported that alternative forms of marijuana

had effects that last significantly longer, have significantly less side effects, had significantly higher

quality, and were significantly less harmful than dried herb.

Alternative forms of marijuana, such as oils and extracts, generally have higher concentrations of

cannabinoids, which may have implications for how long effects last and dosing intervals. However,

opponents are worried about an increase in the use of highly concentrated extracts leading to an

increase in overdoses[48]. Additionally, alternative forms of marijuana allow the use of alternative modes

of delivery, such as oral administration and some types of vapourizers, which have a lower risk for

negative health consequences in comparison to smoking. Allowing the use of alternative forms and

thus, alternative modes of delivery, may result in reduced respiratory illness and symptoms among

approved medical marijuana users. The current study found that participants were more likely to use

alternative forms of marijuana if they perceived the harm from smoking as high. Those who believe smoking is harmful to their health may be more likely to use alternative forms in alternative modes instead of smoking dried herb. To date, no other research has examined reasons for choosing forms of marijuana. With the predicted increase in the use of alternative forms of marijuana resulting from the revision to regulation, future research should continue to monitor trends regarding the use of alternative forms of marijuana.

5.8 Novel Techniques for Using Medical Marijuana

Dabbing is a novel technique used for administering marijuana and anecdotal evidence suggests that it is a fairly popular technique used by medical marijuana users. It is important to note that little research has assessed dabbing; therefore, benefits and harms of the technique are not well known. The current study found that approximately 35% of participants were aware of dabbing and of those, nearly half had tried dabbing. The findings provide evidence that dabbing is relatively well-known. The use of dabbing may increase in popularity as a result of the revised regulation allowing alternative forms of marijuana to be used, such as extracts, which are required for dabbing. Only one other study conducted by Loflin in the US examined dabbing and reported that the most common reasons for preferring dabbing were that it requires fewer intakes for an effect, the effect is stronger, and the "high" better[48]. Dabbing may have implications for symptom relief and dosing as users may not need to use marijuana as often with better symptom relief. The current study is the only data available that reports prevalence estimates of dabbing, therefore, future research should examine the use of dabbing and further investigate reasons for dabbing as well as benefits and harms of the technique.

5.9 Cost

Currently, in Canada, the government does not cover the cost of medical marijuana with the exception

of veterans. There is one case where a student, Jonathan Zaid, with assistance from Bedrocan,

successfully requested the addition of medical marijuana to the existing list of medications and

associated therapies covered by the University of Waterloo's student insurance plan[76]. However, other

approved medical marijuana users very rarely receive any coverage of medical marijuana costs through

health insurance in Canada[76]. Previous research states that medical users have trouble affording

medical marijuana and some people even stop taking medical marijuana because they cannot afford to

take it[12,43]. The current study found that the mean cost participants spent on medical marijuana was

nearly $100 per week. The majority of participants had no coverage at all and only about 4% of

participants had over 50% of the cost covered. The cost of medical marijuana was estimated in a

Canadian study from 2007 as approximately $60 per week, which is a lower estimate than the current

study[38]. The estimates of cost may differ as the current study was conducted 7 years later with a

different medical marijuana regulation (i.e., MMPR) in place. Under the MMPR, marijuana can only be

purchased from one source, licensed producers, potentially influencing an increase in the price to

purchase medical marijuana.

5.10 Sources for Obtaining Medical Marijuana

Approved Canadian medical marijuana users could only legally access marijuana from licensed

producers at the time of the survey's completion due to MMPR restrictions. The MMPR restriction may

have influenced how medical marijuana users obtain marijuana resulting in a shift toward licensed

producers. Participants in the current study reported that the most often used, and preferred, source

for obtaining medical marijuana was through licensed producers. Licensed producers and non-licensed sources were ranked as the most accessible; however unlike the latter, licensed producers were reported to be the safest, provided the most potent marijuana, provided the best symptom relief, and was the least stigmatizing source. Licensed producers were ranked as a favourable source for obtaining medical marijuana by this sample of approved users. The current sample was recruited through licensed producers, therefore, satisfaction with licensed producers may be over-represented as those using other sources may have negative opinions about licensed producers and may have been excluded from completing the survey.

Assuming no selection bias in our study population, the findings indicate a possible change in trends and perceptions regarding sources used for obtaining medical marijuana. Earlier studies showed that medical marijuana users commonly obtained marijuana from friends and family, dispensaries or clubs, and growing it themselves and obtaining marijuana from a licensed producer was the least common source[24,38]. Furthermore, past research states that medical marijuana users (both approved and non-approved) were not satisfied with licensed producers due to concerns regarding the safety and quality of the marijuana produced[38]. From the results found in the current study, it seems as though medical marijuana users were more satisfied with licensed producers through the MMPR than previously, through the MMAR. The change in regulation led to increases in the number of licensed producers as previously, under the MMAR, there was only one licensed producer for Health Canada. The most recent count of approved licensed producers in Canada is now at 25[44]. Possibly, the increase in number of licensed producers serving approved medical marijuana users' needs has increased accessibility as

well as product options (i.e., competition between multiple companies may be beneficial for medical marijuana users).

The current study examined whether specific characteristics were associated with mainly using licensed producers as the source for obtaining medical marijuana. Participants who reported less respiratory symptoms were more likely to obtain medical marijuana from licensed producers than from any other source. It may be that users obtaining marijuana through licensed producers have been exposed to more paperwork and websites containing health information regarding medical marijuana and thus, were more likely to partake in harm reduction strategies that reduce respiratory symptoms. However, there is currently no evidence to support this finding.

The current study also indicates alternative sources, other than licensed producers, have previously been used and continue to be used even though licensed producers are the only legal source for obtaining medical marijuana. Some of the participants preferred to grow their own marijuana (23%) or use dispensaries or clubs (16%); however, overall, participants ranked growing marijuana and using non-licensed sources as less favourable than using a licensed producer. Participants ranked growing marijuana as the source that takes most amount of time and was the least accessible and was ranked in the middle for safety, symptom relief, and level of stigma. Non-licensed sources (i.e., dispensaries or clubs) were ranked by participants as the most accessible (tied with licensed producers), took the least amount of time to receive, least safe, worst symptom relief, and the most stigmatizing.

Evidence from a previous Canadian study also found that medical marijuana users perceived disadvantages for growing their own marijuana and using non-licensed sources[38]. This previous study reported concerns from medical users regarding growing their own marijuana, such as its illegality, possible crop failure, and it requires a lot of work[38]. Consistent with past research, the most negative perceptions were associated with non-licensed sources. Concerns about safety, quality, availability, and stress regarding illegality were mentioned in the previous study[38]. Thus, there are drawbacks to using alternative sources for obtaining marijuana and the current study suggests that medical users want a legal, regulated system, such as licensed producers, to access marijuana.

Although this study shows that most approved medical users preferred using licensed producers, there is an ongoing court case challenging the right that medical marijuana users should be able to obtain marijuana from other sources in addition to licensed producers. In fact, Vancouver just recently approved a licensing system allowing medical marijuana dispensaries and clubs to remain open against the federal government's regulations[77]. The new system includes an annual licensing fee of $30,000 and a restriction of 300 metres from schools, community centres, and other dispensaries or clubs[77]. There are already approximately 100 dispensaries and clubs in Vancouver and this number is expected to increase with the new system[77]. It is also expected that an increase in medical marijuana users obtaining marijuana from dispensaries and clubs will result. It is important to note that this new system for allowing dispensaries and clubs in Vancouver does not include the requirement of safety standards and is not supported by Health Canada[77]. Participants in the current study preferred a regulated system to ensure quality and safety of the marijuana. Additionally, opponents argue that allowing dispensaries and clubs will result in more children having access to marijuana[77]. Although

unlikely, if dispensaries became legal all over Canada, a change in where the majority of approved

medical marijuana users obtain marijuana from might occur. In the meantime, approved medical users

appear to be satisfied with obtaining marijuana from licensed producers.

5.11 Strengths and Limitations

The current study has a number of strengths and limitations. First, a convenience sample was recruited

through licensed producers as probability sampling was not feasible. Therefore, approved medical

marijuana users who were not registered with one of the licensed producers who assisted with

recruitment may not have been included in the survey, though there is no reason to believe the

approved users from other licensed producers not included in the current sample would differ from

those included. Approved medical marijuana users who were not registered with a licensed producer

at all may have also been excluded from taking part in the survey, which may have inflated the

prevalence of using licensed producers as the source for obtaining marijuana. Those who use

marijuana for health reasons, but were not approved were not eligible to complete the survey;

however, there was no way to validate that each participant was in fact approved. A large proportion

of Canadians report using medical marijuana, but are not approved, therefore, this sub-population of

users were not included in the results[34]. To our knowledge, information regarding differences between

non-approved and approved medical users is not available, thus possible implications from excluding

this sub-population from the sample are unclear. Individuals without internet access could not

complete the survey; however, as of 2012, 83% of Canadians aged 16 or over had internet access for

personal use, thus only a small proportion would be excluded on that basis[78]. Participants were given

$10 as a thank you, which typically improves response rates among lower income groups. It is unclear

how many people were reached through email and, therefore, a response rate calculation was not possible. However, approximately 79.4% of interested participants attempted the survey.

Comparing the current study to estimates of the general population who use marijuana shows that approved medical users may be similar on some characteristics. For example, the use of marijuana tends to be more prevalent among males compared to females in both the general public and among approved medical users[34]. However, the use of marijuana in general appears to be higher among youth than that of adults, which differs from the current study as youth were not included in the study[34]. Additionally, it would be expected that the prevalence of marijuana use among approved medical users may consist of a different age group compared to marijuana use in the general population as older adults are possibly more likely to be ill. Additionally, in 2013, under the MMAR, Health Canada released information showing that the majority of Canadians with medical marijuana approval resided in British Columbia, accounting for nearly half of all licensed medical users in Canada, followed by Ontario at about 30%[37]. Therefore, the current sample may have potentially under represented British Columbia residents and over represented Ontario residents. The current study revealed similar patterns of marijuana use compared to past studies including reporting amount, frequencies, and reasons for use[12-14,19,24,33,38,43]. However, currently, there is no way to know how representative the present study's sample is of the entire population of approved Canadian medical marijuana users since demographic information of approved users is not available.

Second, the survey was cross-sectional; thus, a temporal order could not be established. For example, results from the survey could not conclude whether using a vapourizer results in reduced respiratory symptoms or whether those with less respiratory symptoms use a vapourizer.

Third, the survey relied on self-report, which may contribute to a social desirability bias where participants do not answer truthfully and instead answer how they believe others in society would want them to answer. For example, social desirability may have led to the under representation of recreational use of marijuana. To address this limitation, participants were assured that their responses were strictly confidentiality given the sensitivity of the types of questions asked. In addition, online surveys are typically subject to lower levels of social desirability bias compared to face-to-face surveys, given the greater anonymity[79].

Strengths of the study included a systematic recruitment of a large sample of approved medical marijuana users from across Canada. This is one of the first studies to exclusively examine approved Canadian medical marijuana users, which is important as this is the population most directly impacted by changes to medical marijuana regulation. The timeliness of the data was also a major strength as it was important to assess the possible implications of the MMPR, which to our knowledge had not been examined until the current study. Additionally, the survey was pre-tested using cognitive interviewing to ensure that the questions asked were phrased in a way that participants would clearly know what was being asked[70]. Cognitive interviewing helps to legitimize that the results from this study are accurate[70]. Lastly, a wide range of outcomes were examined, which included some measures that have

not been studied previously (e.g., personal importance of factors by mode of delivery). Overall, the current study adds important knowledge to the existing medical marijuana research available.

5.12 Conclusions

This study presents a general picture of the current state of medical marijuana use among approved users in Canada. The findings indicated that approved users have tried multiple modes of delivery, but using a vapourizer was the most commonly used and most preferred mode. Vapourizers have the potential to substitute smoking and thus, reduce negative health impacts associated with smoking marijuana. To increase the use of vapourizers among approved medical users even further, the current study's findings suggest that vapourizers need to be more accessible and less expensive. Additionally, the study found that alternative forms of marijuana were favoured; however, dried herb was used more often due to its easy accessibility within the MMPR. Accessibility of alternative forms may no longer be a barrier to use as a revision to the regulation is now allowing licensed producers to produce and sell alternative forms of marijuana. Monitoring forms of marijuana being used by medical users as well as tracking possible overdoses may be beneficial as alternative forms generally have higher concentrations of cannabinoids. A Quebec Cannabis registry has been created in order to track patient use information as well as monitor patient safety and will result in a database of useful information for researchers[80]. This type of registry would be useful for monitoring the implications resulting from ongoing regulation changes for medical marijuana use in Canada. However, the current study is the most recent data examining prevalence, patterns of use, and reported perceptions among approved medical marijuana users in Canada. Therefore, this study could be useful for informing current and future medical marijuana policies that are continuously being revised and adapted.

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Future studies in the area of approved medical marijuana research could consider the length of time it takes to contact and arrange recruitment with licensed producers. This is a highly motivated population, thus, qualitative methods for research could be done fairly easily in order to capture more information from approved medical users. Additionally, while respecting confidentiality and anonymity a way to validate participants' approval to use medical marijuana would have been beneficial for strengthening the methodological rigour of the current study. Suggestions for future areas of interest include examining perceptions of the modes of delivery that participants had used before compared to their perceptions of all modes as this may have influenced which modes they select to use as well as differences in prevalence of modes by licensed producer as licensed producers may be providing different information regarding modes of delivery to their clients.

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APPENDIX A

Cognitive interviewing protocol

INTRODUCTION

"In the questions that follow, we want to find out more about what you think about marijuana. We are NOT interested in finding out if you are correct or incorrect. We want to make sure that we are asking the questions in ways that you and other people clearly understand. Sometimes, it will seem like we are asking the same question over and over again. Please be patient with us. We do not doubt what you tell us. We just need to double-check that the questions are working like we think they are.

For some of the questions, I will ask you how you arrived at your answer. Again, this is not because we do not believe you. It will be like my asking you to tell me how many windows you have in your house by closing your eyes, visualizing your house, and your telling me how you go from room to room of your house in order to count the windows there. As an exercise, let's try that now. Please close your eyes, and tell me how many windows are in your house, by taking me from room to room."

[response]

"Thanks. Now, when we ask you a question and give you some possible responses from which to choose your response, I would like you to do the same thing. You can tell me your understanding of the question and take me through your thoughts as you decide on the response that is best for you."

[NOTE: The interviewer will use a semi-structured interview protocol, using the following types of probes, as appropriate to the questionnaire items and interview responses.]

ISSUES THAT CAUSE RESPONSE ERROR & EXAMPLE COGNITIVE PROBES

1. INSTRUCTIONS: Look for problems with any introductions, instructions, or explanations from the respondents' point of view

- **COMPLICATED, CONFLICTING OR INACCURATE** instructions, introductions, or explanations
➢ **EX. PROBE:** At the end of a long intro, but before the question itself: *Before I get to the actual question, tell me what this introduction is telling you.*

2. CLARITY: Identify problems related to communicating the intent or meaning of the question to the respondent.

- **WORDING:** question is lengthy, awkward, ungrammatical, or contains complicated syntax
➢ **EX. PROBE:** *Can you tell me in your own words what that question was asking?*

- **TECHNICAL TERMS** are undefined, unclear, or complex
➢ **EX. PROBE:** *What does the word [term] mean to you as it's used in this question?*

- **VAGUE:** there are multiple ways to interpret the question or to decide what is to be included or excluded
  - ➢ **EX. PROBE:** *Tell me what you were thinking when I asked you about [topic]*

- **REFERENCE PERIODS:** are missing, not well specified, or in conflict
  - ➢ **EX. PROBE:** 1) *Can you remember what time period this question is asking about?* OR 2) *You said [answer]. What time period does that cover?*

3. ASSUMPTIONS: Determine whether there are problems with assumptions made or the underlying logic.

- **INAPPROPRIATE ASSUMPTIONS** are made about the respondent or about his/her living situation.
  - ➢ **EX. PROBE:** 1) *How well does that question apply to you?* OR 2) *Can you tell me more about that?*

- **ASSUMES CONSTANT BEHAVIOR** or experience for situations that vary
  - ➢ **EX. PROBE:** *Would you say that mostly stays the same or does it vary or depend?*

- **DOUBLE-BARRELED:** Contains more than one implicit question
  - ➢ **EX. PROBE:** *Tell me more about your opinions on that.*

4. KNOWLEDGE/MEMORY: Check whether respondents are likely to or not know or have trouble remembering information

- **KNOWLEDGE MAY NOT EXIST:** respondent is unlikely to know the answer to a factual question.
  - ➢ **EX. PROBE:** *How much would you say you know about [topic]?*

- **ATTITUDE MAY NOT EXIST**: Respondent is unlikely to have formed an attitudes being asked about
  - ➢ **EX. PROBE:** *How much thought would you say you've given to this?*

- **RECALL FAILURE:** Respondent may not remember the information asked for
  - ➢ **EX. PROBE:** 1) *How easy or difficult is it to remember [topic]?* OR 2) *You said [answer]. How sure are you of that?*

- **COMPUTATION PROBLEM:** The question requires a difficult mental calculation
  - ➢ **EX. PROBE:** *How did you come up with that answer?*

5. SENSITIVITY/BIAS: Assess questions for sensitive nature or wording and for bias

- **SENSITIVE CONTENT (GENERAL):** the question asks about a topic that is embarrassing, very private, or that involves illegal behavior
  - ➢ **EX. PROBE:** 1) *Is it okay to talk about this in a survey, or is it uncomfortable?* OR 2) *In general, how do you feel about this question?*

- **SENSITIVE WORDING (SPECIFIC):** given that the general topic is sensitive, the wording
➢ **EX. PROBE:** *The question uses the word [term]. Does that sound okay to you, or would you choose something different?*

- **SOCIALLY ACCEPTABLE:** a socially desirable response is implied by the question
➢ **EX. PROBE:** 1) *How did you come up with that answer?* OR 2) *Do all the possible answers seem okay, or did it seem like there's one that's supposed to be the right answer?*

6. RESPONSE CATEGORIES: Assess the adequacy of the range of options

- **OPEN-ENDED QUESTION:** Is inappropriate or difficult to answer without categories to guide
➢ **EX. PROBE:** *Was it easy or difficult to decide what answer to give?*

- **MISMATCH:** question does not match response categories
➢ **EX. PROBE:** 1) *How easy or hard was it to find your answer on that list?* OR 2*) You said [answer]. How well does that apply to you?*

- **TECHNICAL TERMS:** are undefined, unclear, or complex
➢ **EX. PROBE:** *In this list, what does [term] mean to you?*

- **VAGUE**: responses categories are subject to multiple interpretations
➢ **EX. PROBE:** *Tell me what you were thinking when I asked about [topic]?*

- **OVERLAPPING:** categories are not mutually exclusive
➢ **EX. PROBE:** 1) *How easy or hard was it to find your answer?* OR 2*) Tell me why you chose [answer] instead of some other answer on the list.*

- **MISSING:** some eligible responses are not included
➢ **EX. PROBE:** *How easy or hard was it to choose an answer?*

- **ILLOGICAL ORDER:** order not intuitive
➢ **EX. PROBE:** *How was it for you to go through that list? Did that cause any difficulties?*

INTERVIEW INFORMATION

ID#	
	ENTER DATE (dd/mm/yy) |___|___|/ |___|___|/ |___|___|
RECORD SEX AS OBSERVED	☐ Female$_1$ ☐ Male$_2$
A. How old are you now?	**ENTER NUMBER** |_____|_____|
B. What is the highest level of formal education that you have completed?	☐ Elementary$_1$ ☐ Middle school completed$_2$ ☐ Technical school or High School (completed) $_3$ ☐ University (incomplete)$_4$ ☐ University degree (complete)$_5$ ☐ Post-graduate$_6$ ☐ Other$_7$ *(specify)*_____
Start time:	
End time:	

QUESTIONNAIRE ITEMS TO BE TESTED

[NOTE: The following questionnaire items are the ones that will be evaluated using the kinds of probes above. In some cases, specific probes have been suggested below.]

Introduction

The following questions are about your use of marijuana.

When we use the term marijuana, we mean marijuana in any form including hashish, hash oil, synthetics, or other marijuana derivatives (e.g., edibles, extracts).

Also, when we use the phrase 'marijuana for health reasons', we mean the use of marijuana for relief of health symptoms, also known as "medical marijuana".

- **Probe**: Before I get to the actual question, tell me what this introduction is telling you.
- o Can you explain in your own words what 'marijuana for health reasons' means?

Eligibility

Are you **CURRENTLY** approved for an "*Authorization to Possess Marihuana for Medical Purposes*" in Canada? (select only one)
1. Yes
2. No
3. Don't know
4. Refuse to answer
Note: only eligible if answer is yes [1]

- **Probe**: What does the word *approved* mean to you as it's used in this question?

Marijuana Behaviours

In the PAST 30 DAYS, on average, on how many of these days did you use marijuana (for any reason)?
(if you refuse to answer this question, please enter 00)

_____ [00-30 limit]

- **Probe:** Was it easy or difficult to decide what answer to give?

ONLY IF REC USER AS WELL:
Approximately, how much of your marijuana use is recreational (i.e., to get high, to be social)?
1. 0% - I only use marijuana for health reasons
2. 25%
3. 50%
4. 75%

5. 100% - I only use marijuana for recreation reasons
6. Don't know
Refuse to answer

- **Probe:** How did you come up with that answer?

You selected more than one way of using marijuana in the past 30 days.
We would like to know how much marijuana you use each way.
Please enter the percentage of use for each in the boxes below (e.g. 50% smoking a joint, 50% eating in foods or baked goods).

_____ (numerical: 0-100 and show %)

- **Probe:** How did you come up with that answer? Was it easy or difficult to decide what answer to give?

Perception of Modes

The next questions ask about three ways of using marijuana in more detail: smoking marijuana, using a vapourizer, and eating marijuana in foods.

Compared to other ways of using marijuana, please rate [**SMOKING/ USING A VAPOURIZER/ EATING IN FOODS**] on the following factors:

	1 Very short	2	3	4	5 Very long	Don't know
Duration of effect (i.e., how long it lasts)	□	□	□	□	□	□

	1 Very slow	2	3	4	5 Very quick	Don't know
Time to onset of effect (i.e., how quickly the effects occur)						

	1 Very low	2	3	4	5 Very high	Don't know
The amount of marijuana needed for effect						

	1	2	3	4	5 Very easy	Don't know

	1	2	3	4	5	Don't know
	Very difficult					
Ease of use						

	1	2	3	4	5	Don't know
	Very difficult				Very easy	
Ability to find correct dose						

	1	2	3	4	5	Don't know
	Very bad				Very good	
Symptom relief						

	1	2	3	4	5	Don't know
	No side effects				Many side effects	
Number of side effects						

	1	2	3	4	5	Don't know
	Very bad				Very good	
Type of "high"						

	1	2	3	4	5	Don't know
	Very low				Very high	
Level of harm						

	1	2	3	4	5	Don't know
	Very difficult				Very easy	
Accessibility (i.e., how easy it is to get)						

	1	2	3	4	5	Don't know

	Very low			Very high	
Cost (i.e., affordability)					

	1 No stigma	2	3	4	5 A lot of stigma	Don't know
Stigma (i.e., what other people think)						

- **Probe:** What does type of high mean to you?
- **Probe:** Can you tell me in your own words what the level of harm question was asking you?
- **Probe:** Why did you choose that response for accessible? Can you take me through your thinking process?
- **Probe:** What does the term stigma mean to you?
- **Probe:** How was it for you to go through that list? Did that cause any difficulties?

Forms of Marijuana

Marijuana comes in many forms.
Which form(s) of marijuana have you EVER used or tried? (select all that apply)
1. Dried herb
2. Hash (i.e., marijuana resin)
3. Butter (i.e., to cook with)
4. Oil
5. Alcohol extract (i.e., tincture)
6. Butane extract (i.e., shatter, wax)
7. Carbon dioxide (CO_2) extract
8. Raw juice
9. Synthetic marijuana (e.g., Marinol®/dronabinol, Cesamet®/nabilone, Sativex/nabiximol)
10.   Other (please specify)
11.   Don't know
12.   Refuse to answer

- **Probe: Do the options in the list make sense to you?**

Programmer note: only ask if Form_cu=1-10
Why do you currently use that form(s) of marijuana? (select all that apply)
1. Effects last longer
2. Effects occur faster
3. Uses less marijuana
4. Easy to use
5. Easy to find the correct dose
6. Provides the best symptom relief
7. Less side effects

8. Provides the best high
9. Less harmful
10.   More accessible (i.e., easy to get)
11.   More affordable
12.   More potent
13.   Higher quality
14.   Other (please specify):
15.   Don't know
Refuse to answer

- **Probe:** Did you have any difficulties understanding any of these options? Do any of the options seem to not make sense or fit with the question?

Do you usually use a specific strain(s) of marijuana? (select only one)
1. Yes
2. No
3. Don't know
4. Not applicable
Refuse to answer

- Probe: What does *strain* mean to you?

Do you know the tetrahydrocannabinol (THC), cannabidiol (CBD), or cannabinol (CBN) levels of the strain you use?
1. Yes
2. No
3. Refuse to answer

- **Probe:** Tell me what you were thinking when I asked about THC, CBD, and CBN.

What are the tetrahydrocannabinol (THC), cannabidiol (CBD), or cannabinol (CBN) levels of the strain you use?
Please specify in the boxes below:
_____ THC
_____CBD
_____CBN

- **Probe:** Was it easy or difficult to decide what answer to give? Were you able to give the answer you wanted to?

Sources

Which of the following ways have you **EVER** obtained marijuana for health reasons? (select all that apply)
1. From a Health Canada licensed producer
2. Grow it yourself
3. From a dispensary or club
4. From another source through a designated-person production licence
5. From a source without a license (e.g., friends, family, dealer)

6. Other (please specify):
7. Don't know
8. Refuse to answer

- **Probe:** How was it for you to go through that list? Did that cause any difficulties?

Stigma

Please select the option you agree with:

1. Society **STRONGLY DISAPPROVES** of medical marijuana
2. Society **DISAPPROVES** of medical marijuana
3. Neither **DISAPPROVES** or **APPROVES** of medical marijuana
4. Society **APPROVES** of medical marijuana
5. Society **STRONGLY APPROVES** of medical marijuana
6. Don't know
7. Refuse to answer

Please select the option you agree with:

1. Society **STRONGLY DISAPPROVES** of recreational marijuana use
2. Society **DISAPPROVES** of recreational marijuana use
3. Neither **DISAPPROVES** nor **APPROVES** of recreational marijuana use
4. Society **APPROVES** of recreational marijuana use
5. Society **STRONGLY APPROVES** of recreational marijuana use
6. Don't know
7. Refuse to answer

Please select the option you agree with:

Medical marijuana is…

1. Not at all harmful to my health
2. A little harmful to my health
3. Somewhat harmful to my health
4. Very harmful to my health
5. Extremely harmful to my health
6. Don't know
7. Refuse to answer

Please select the option you agree with:

Medical marijuana is…

1. Not at all addictive
2. A little addictive
3. Somewhat addictive
4. Very addictive
5. Extremely addictive
6. Don't know
7. Refuse to answer

Please select the option you agree with:

Medical marijuana is…

1. Definitely not a drug
2. Not a drug
3. Possibly a drug
4. A drug
5. Definitely a drug
6. Don't know
7. Refuse to answer

Medical marijuana is natural and is therefore…

1. **A LOT LESS** harmful than other forms of medication
2. **A LITTLE LESS** harmful than other forms of medication
3. **AS** harmful **AS** other forms of medication
4. **A LITTLE MORE** harmful than other forms of medication
5. **A LOT MORE** harmful than other forms of medication
6. Don't know
7. Refuse to answer

Please select the option you agree with:

SMOKING marijuana is…

1. Not at all harmful to my health
2. A little harmful to my health
3. Somewhat harmful to my health
4. Very harmful to my health
5. Extremely harmful to my health
6. Don't know
Refuse to answer

- **Probe:** What does harm mean to you?
- **Probe:** What does addiction mean to you?
- **Probe:** Do all the possible answers seem okay, or did it seem like there's one that's supposed to be the right answer?

Vapourizer

Please select the option you agree with:

VAPOURIZING marijuana is…

1. **A LOT LESS** acceptable than **SMOKING** marijuana
2. **A LITTLE LESS** acceptable than **SMOKING** marijuana
3. **AS** acceptable **AS SMOKING** marijuana
4. **A LITTLE MORE** acceptable than **SMOKING** marijuana
5. **A LOT MORE** acceptable than **SMOKING** marijuana
6. Don't know
7. Refuse to answer

Please select the option you agree with:

VAPOURIZING marijuana is…

1. Not at all harmful to my health
2. A little harmful to my health
3. Somewhat harmful to my health
4. Very harmful to my health
5. Extremely harmful to my health
6. Don't know
7. Refuse to answer

Please select the option you agree with:

VAPOURIZING marijuana is…

1. **A LOT LESS** harmful than **SMOKING** marijuana
2. **A LITTLE LESS** harmful than **SMOKING** marijuana
3. **AS** harmful **AS SMOKING** marijuana
4. **A LITTLE MORE** harmful than **SMOKING** marijuana
5. **A LOT MORE** harmful than **SMOKING** marijuana
6. Don't know
7. Refuse to answer

- **Probe:** Do all the possible answers seem okay, or did it seem like there's one that's supposed to be the right answer?

INTERVIEWER DEBRIEFING

Interviewer Answer:

1. (IATMO) During the interview, was the atmosphere at the interview site:
   1. Extremely chaotic and noisy; disruptive to interview
   2. Some noise and interruptions, but interview went reasonably well
   3. Very quiet and calm; ideal for interview

2. (IWHERE) Where did the interview take place?
   _____

3. (IHEAR) Were any other people in the same room or near enough to overhear the interview?
   1. Yes,
          3a. (IWHO) Who were the people?
          _____

   2. No

4. (IIMPAIR) Did the respondent have any of the following impairments making it difficult to respond?
   0. The respondent had no difficulty responding

   1. Mentally handicapped
   2. Hard of hearing/hearing impaired
   3. Poor eyesight/vision impaired
   4. Speech impediment
   5. Poor language abilities
   6. Under the influence of alcohol or drugs
   7. Some other impairment: _____

5. (IVOCAB) How would you describe the respondent's vocabulary (the variety of words the respondent used to describe his/her thoughts)?
   1. Below average
   2. Average
   3. Above average

6. (IACT) In general, how did the respondent act toward you during the interview?
   1. Not at all attentive
   2. Somewhat attentive
   3. Very attentive

7. (IQUESTION) How much difficulty do you think the respondent had in understanding most of the questions?
   1. A lot of difficulty
   2. Some difficulty
   3. No difficulty

APPENDIX B

Licensed producers

1. Aphria
2. Bedrocan Canada Inc.
3. Broken Coast Cannabis Ltd.
4. CanniMed Ltd.
5. MariCann Inc.
6. MedReleaf Corp.
7. RedeCan Pharm
8. The Peace Naturals Project Inc
9. Whistler Medical Marijuana Corp.

APPENDIX C

Survey

<table>
<tr><td colspan="2" style="background-color:yellow"><h1 align="center">SCREENER</h1></td></tr>
<tr><td colspan="2">Welcome and thank you for your interest in this medical marijuana study.

Before you begin, please answer a few short questions to ensure that you are eligible to participate.</td></tr>
<tr><td colspan="2">In this survey, when we use the term **marijuana**, we mean marijuana in any form including hashish, hash oil, synthetics, or other marijuana derivatives (e.g., edibles, extracts).

Also, when we use the phrase '**marijuana for health reasons**', we mean the use of marijuana for relief of health symptoms, also known as "medical marijuana".</td></tr>
<tr><td>**Age**
Age</td><td>Please enter your age: _____[1-99 limit]

Note: Only eligible if 18 years old or older</td></tr>
<tr><td>**Past 30 day use**
Past_30_day_use</td><td>In the **PAST 30 DAYS**, have you used marijuana?
   1. Yes
   2. No
   3. Don't know
   4. Refuse to answer

Note: only eligible if answer is yes [1]</td></tr>
<tr><td>**Past 30 day Med Use**
Med_30_day_use</td><td>In the **PAST 30 DAYS**, have you used marijuana (select only one)
   1. For health reasons only (i.e., for relief of health symptoms),
   2. For recreational purposes only (i.e., to get high, to be social), or
   3. For both health and recreational purposes?
   4. Don't know
   5. Refuse to answer

Note: only eligible if answer is medical [1 or 3]</td></tr>
<tr><td>**License current**
License_cu</td><td>Are you **CURRENTLY** approved to possess marijuana for health reasons in Canada? (select only one)
   1. Yes
   2. No
   3. Don't know
   4. Refuse to answer

Note: only eligible if answer is yes [1]</td></tr>
<tr><td colspan="2">IF Ineligible: Unfortunately, you are not eligible for this survey. Thank you for your time. [Show this message after all questions then TERMINATE and block IP address if possible].

IF eligible: [continue]</td></tr>
</table>

INTRODUCTION & CONSENT

Thank you.

Please read the following information carefully. Once you have read the study details and agree to them, you can begin the survey.

- You are being asked to participate in a research study about your opinions on medical marijuana. The goal of the survey is to increase our understanding of Canada's policies on medical marijuana. The survey is being conducted by Professor David Hammond in the School of Public Health at the University of Waterloo, Canada.

- You will be asked questions about marijuana use, beliefs about marijuana, ways of using marijuana, and some background information.

- All of the information you provide in this study will be kept strictly confidential. Your identity and participation will not be disclosed to any outside group, including licensed medical marijuana providers, law enforcement, or government agencies unless required by law.

- We will use your email address to send you $10 in appreciation of your time. Your email address will be stored in a different location than your survey answers and will be permanently deleted from all files immediately upon conclusion of the study.

- The survey data will be retained for a minimum of 2 years and will be safely disposed of according to University of Waterloo policy; however, only the researchers directly associated with the study will have access to survey data.

- Computer IP addresses will not be collected for security purposes.

- The survey takes approximately 30 minutes to complete.

- You must be 18 years of age or older to participate in this study.

- Participation is voluntary and you may decline to answer particular questions if you wish.

- You may only complete the survey once.

- In appreciation of your time, you will receive $10, payable from your choice of an Interac e-transfer or an e-gift card from either Starbucks, Indigo/Chapters, Amazon.ca, iTunes, or Cineplex. The amount received is taxable. It is your responsibility to report this amount for income tax purposes.

- The information provided in the surveys will be used in a thesis study as well as in other research papers by Dr. Hammond.
- This survey uses surveygizmo, which is a United States of America company. Consequently, USA authorities under provisions of the PATRIOT Act may access this survey data. If you prefer not to submit your data through surveygizmo, please do not participate in the study.

- You are free to choose whether or not to participate in this study, and you can choose to stop being a part of it at any time without penalty. If you choose to withdraw from the survey, you must click through the entire survey until the final screen in order to receive payment.

- This study has been reviewed by and has received ethics clearance through a University of Waterloo Research Ethics Committee. If you have any comments or concerns resulting from your involvement in this study, please contact the Chief Ethics Officer, Office of Research Ethics at 519-888-4567 ext. 36005 or maureen.nummelin@uwaterloo.ca.

- If you have any questions about the study you can contact Dr. David Hammond of the University of Waterloo at 519-888-4567 ext. 36462 or dhammond@uwaterloo.ca.

Based on the information you received, do you agree to take part in this research study being conducted by Dr. David Hammond of the University of Waterloo?
   1. Yes
   2. No

IF YES: [continue]
IF NO: Thank you for your time. [TERMINATE] Thank you.

We are interested in your experiences and attitudes regarding marijuana.

We understand that we are asking for sensitive information, so please keep in mind that your answers are completely confidential, and you will not be able to be identified. Please answer honestly and to the best of your ability – this is essential if the survey results are to be accurate.

PATTERNS OF USE

FREQUENCY	

Past 3 month use
Freq_3mnth
	In the **PAST 3 MONTHS**, on average, how often did you use marijuana (for any reason)? (select only one)
	    1. Every day
	    2. Almost every day
	    3. At least once a week
	    4. At least once a month
	    5. Less than once a month
	    6. Don't know
	    7. Refuse to answer

Past 30 day use Freq_30day	In the **PAST 30 DAYS**, on average, on how many of these days did you use marijuana (for any reason)? (if you refuse to answer this question, please enter 00) _____[00-30 limit]

Number of times per day
Times_day
	In the **PAST 30 DAYS,** on average, on the days that you used marijuana (for any reason), how many times per day did you use it?
	    1. Once
	    2. Twice
	    3. 3 times
	    4. 4-5 times
	    5. More than 5 times
	    6. Don't know
	    7. Refuse to answer

AMOUNT	

Amount
Amount_unit
	The next questions ask about the amount of marijuana you use (for any reason).
	
	Is it easier for you to say how much marijuana you use…
	    1. Per day,
	    2. Per week, or
	    3. Per month?
	    4. Don't know
	    5. Refuse to answer

Amount Amount_G	Programmer note: if amount_unit=1 use "day", if amount_unit=2,4,5 use "week", if amount_unit=3 use "month" On average, how many **GRAMS** of marijuana do you use each [**DAY/WEEK/MONTH**]? (If you don't know or refuse to answer, please enter 00) If less than 1 gram, please enter to one decimal place (e.g., 0.5) grams per [day, week, month]_____[00-200]

COST	
The next questions ask about the cost of marijuana.	
Cost Frequency Cost_freq	How often do you purchase marijuana? 1. Less than once every 3 months 2. Once every 2-3 months 3. Once a month 4. Once every 2-3 weeks 5. Once a week 6. More than once a week 7. Don't know 8. Refuse to answer
Cost Estimate Cost_est_week/mnth	Programmer note: if Cost_freq=4,5,6,7,8 use "week", Cost_freq=1,2,3 use "month". Please estimate how much money you spend on marijuana each [**WEEK/MONTH**]. (If you don't know or refuse to answer, enter 00) $ _____per [week/month] [00-1000]
Cost coverage Cost_cov	What percentage of the cost to purchase marijuana is covered through any type of insurance or plan? _____% [0-100]
Cost coverage Cost_cov_who	Programmer note: if Cost_cov is more than 0 Which of the following covers the cost to purchase marijuana for you? 1. Veterans Affairs 2. Private insurer 3. Public/ government drug plan 4. Other, please specify 5. Don't know 6. Refuse to answer
MARIJUANA BEHAVIOURS	
The following questions ask about further details regarding marijuana use.	
Age of initiation Start_age	How old were you when you first tried marijuana (for any reason)? (If you don't know or refuse to answer, please enter 00) _____[1-99]
Age of Initiation Med Start_age_med	How old were you when you first started using marijuana for health reasons? (If you don't know or refuse to answer, please enter 00) _____[1-99]

Waking Waking_5 Waking_6_30 Waking_31_60 Waking_60_4 Waking_more_4 DK Refuse	How soon after waking do you usually use marijuana (for any reason)? (select only one) 1. Within the first 5 minutes 2. 6-30 minutes 3. 31 – 60 minutes 4. 60 minutes – 4 hours 5. More than 4 hours 6. Don't know 7. Refuse to answer
Length of time for medical use	How long have you been using marijuana for health reasons? (select only one) 1. Less than 1 year
Length	2. 1-2 years 3. 3-5 years 4. 6-10 years 5. More than 10 years 6. Don't know 7. Refuse to answer
Length of med use Future_length	How long do you expect to continue using marijuana for health reasons? (select only one) 1. Less than 3 months 2. 3 -6 months 3. 6 months - 1 year 4. More than 1 year 5. Don't know 6. Refuse to answer
Medical Reasons	Why did you decide to try marijuana for health reasons? (select all that apply) 1. Nothing else relieved my symptoms 2. Read about it 3. Suggested by a friend 4. Suggested by a family member 5. Suggested by a doctor 6. Suggested by another health practitioner 7. Prior use 8. Best treatment option available 9. Other (please specify): 10. Don't know 11. Refuse to answer
Recreational Use Rec_use	Programmer note: only if Med_30_day_use=3 Approximately, how much of your marijuana use is recreational (i.e., to get high, to be social)? 1. 0% - I only use marijuana for health reasons 2. 25% 3. 50% 4. 75% 5. 100% - I only use marijuana for recreation reasons 6. Don't know 7. Refuse to answer

MODE OF DELIVERY	
The next questions ask about different ways you may have used marijuana (for any reason).	

Ever mode
(Mode_ever)
	Have you **EVER** tried or used marijuana in the following ways? (select all that apply)
	   1. Smoking a joint
	   2. Smoking a blunt
	   3. Smoking a pipe
	   4. Smoking a bong or waterpipe
	   5. Using a vapourizer
	   6. Eating in foods or baked goods (e.g., cookies, candy)
	   7. Drinking (e.g., tea)
	   8. Taking a pill (e.g., Marinol®/dronabinol or Cesamet®/nabilone)
	   9. Using a spray (e.g., Sativex/nabiximol)
	   10. Other: [please specify]
	   11. Don't know
	   12. Refuse to answer

Current mode
Mode_cu
	Programmer note: only bring up options selected in Mode_ever and only ask if Mode_ever=1-10.
	Have you used marijuana in the following ways in the **PAST 30 DAYS**? (select all that apply)
	   1. Don't know
	   2. Refuse to answer
	   3. Smoking a joint
	   4. Smoking a blunt
	   5. Smoking a pipe
	   6. Smoking a bong or waterpipe
	   7. Using a vapourizer
	   8. Eating in foods or baked goods (e.g., cookies, candy)
	   9. Drinking (e.g., tea)
	   10. Taking a pill (e.g., Marinol®dronabinol or Cesamet® nabilone)
	   11. Using a spray (e.g., Sativex/nabiximol)
	   12. Other: [insert]

Multiple Modes Mode_multiple	Programmer note: only bring up options selected in Mode_cu and only answer if Mode_cu= 1-10. We would like to know **how much** marijuana you use each way in the past 30 days. Please enter the percentage of use for each in the boxes below (e.g. 50% smoking a joint, 50% eating in foods or baked goods). If you only selected one way of using marijuana, please enter 100%. _____ (numerical: 0-100 and show %)

Preferred Mode
Mode_prefer
	Programmer note: only ask if answered Mode_ever= 1-10.
	
	Which of the following is your most **preferred** way of using marijuana? (select only one)
	    1. Smoking a joint
	    2. Smoking a blunt
	    3. Smoking a pipe
	    4. Smoking a bong or waterpipe
	    5. Using a vapourizer
	    6. Eating in foods or baked goods (e.g., cookies, candy)
	    7. Drinking (e.g., tea)
	    8. Taking a pill (e.g., Marinol®dronabinol or Cesamet® nabilone)
	    9. Using a spray (e.g., Sativex/nabiximol)
	    10. Other: [insert]
	    11. Don't know
	    12. Refuse to answer

Perception of Modes
(Mode_perc)
Smoking_, Vape_, Eat_
	The next questions ask about three ways of using marijuana in more detail:
	
	    1. Smoking marijuana,
	    2. Using a vapourizer, and
	    3. Eating marijuana in foods.

Compared to other ways of using marijuana, please rate [**SMOKING/ USING A VAPOURIZER/ EATING IN FOODS**] on the following factors:

	1 Very short	2	3	4	5 Very long	Don't know	Refuse
Duration of effect (i.e., how long it lasts)	□	□	□	□	□	□	□

	1 Very slow	2	3	4	5 Very quick	Don't know	Refuse
Time to onset of effect (i.e., how quickly the effects occur)							

	1 Very low	2	3	4	5 Very high	Don't know	Refuse
The amount of marijuana needed for effect							

	1 Very difficult	2	3	4	5 Very easy	Don't know	Refuse
Ease of use							

	1 Very difficult	2	3	4	5 Very easy	Don't know	Refuse
Ability to find correct dose							

	1 Very bad	2	3	4	5 Very good	Don't know	Refuse
Symptom relief							

	1 No side effects	2	3	4	5 Many side effects	Don't know	Refuse
Number of side effects							

	1 Very bad	2	3	4	5 Very good	Don't know	Refuse
Type of "high"							

	1 Very low	2	3	4	5 Very high	Don't know	Refuse
Level of harm							

	1 Very difficult	2	3	4	5 Very easy	Don't know	Refuse
Accessibility (i.e., how easy it is to get)							

	1 Very low cost	2	3	4	5 Very high cost	Don't know	Refuse
Cost (i.e., affordability)							

	1 No stigma	2	3	4	5 A lot of stigma	Don't know	Refuse
Stigma (i.e., what other people think)							

Programmer note: randomize order that the 3 ways are asked in and make sure method is very large.

Important factors
(Mode_factors)

HOW IMPORTANT ARE EACH OF THE FACTORS TO YOU in your choice of **how to use** marijuana?

	1 Not at all important	2	3	4	5 Extremely important	Don't know	Refuse
Duration of effect (i.e., how long it lasts)							
Time to onset of effect (i.e., how quickly the effects occur)							
The amount of marijuana needed for effect							
Ease of use							
Ability to find correct dose							
Symptom relief							
Number of side effects							
Type of "high "							

	Level of harm						
	Accessibility (i.e., how easy it is to get)						
	Cost (i.e., affordability)						
	Stigma (i.e., what other people think)						

Dabbing
Dab_aware
	Have you **EVER** heard of **DABBING** marijuana? (select only one)
	   1. Yes
	   2. No
	   3. Don't know
	   4. Refuse to answer						

Dabbing Ever
Dab_ever
	Programmer note: only answer if Dab_aware=1
	Have you **EVER** tried **DABBING** marijuana? (select only one)
	   1. Yes
	   2. No
	   3. Don't know
	   4. Refuse to answer						

FORM

Ever
(Form_ever)
	Marijuana comes in many forms.
	Which form(s) of marijuana have you **EVER** used or tried? (select all that apply)
	   1. Dried herb
	   2. Marijuana resin (i.e., hash, kief, trichomes)
	   3. Butter (i.e., to cook with)
	   4. Oil
	   5. Alcohol extract (i.e., tincture)
	   6. Butane extract (i.e., shatter, wax, dabs)
	   7. Carbon dioxide (CO_2) extract
	   8. Raw juice
	   9. Prescription marijuana (e.g., Marinol®/dronabinol, Cesamet®/nabilone, Sativex/nabiximol)
	  10. Other (please specify)
	  11. Don't know
	  12. Refuse to answer

| Current
Form_cu	Programmer note: only bring up options selected in Form_ever and if answered Form_ever=1-10. In the **PAST 30 DAYS**, what was the **MAIN** form(s) of marijuana that you used? (select only one) 1. Don't know 2. Refuse to answer 3. Dried herb 4. Marijuana resin (i.e., hash, kief, trichomes) 5. Butter (i.e., to cook with) 6. Oil 7. Alcohol extract (i.e., tincture) 8. Butane extract (i.e., shatter, wax, dabs) 9. Carbon dioxide (CO_2) extract 10. Raw juice 11. Prescription marijuana (e.g., Marinol®/ dronabinol, Cesamet® / nabilone, Sativex/nabiximols) 12. Other (please specify)
Current other
Form_cu_other	Programmer note: only bring up options not selected in Form_cu and only if Form_ever=1-10. Have you used any other form(s) of marijuana in the **PAST 30 DAYS**? (select all that apply) 1. No 2. Dried herb 3. Marijuana resin (i.e., hash, kief, trichomes) 4. Butter (i.e., to cook with) 5. Oil 6. Alcohol extract (i.e., tincture) 7. Butane extract (i.e., shatter, wax, dabs) 8. Carbon dioxide (CO2) extract 9. Raw juice 10. Prescription marijuana (e.g., Marinol®/ dronabinol, Cesamet® / nabilone, Sativex/nabiximols) 11. Other (please specify) 12. Don't know 13. Refuse to answer
Reason for form
(Form_reason)	Programmer note: only ask if Form_cu=1-10 Why do you mainly use [fill from Form_current] form of marijuana? (select all that apply) 1. Effects last longer 2. Effects occur faster 3. Uses less marijuana 4. Easy to use 5. Easy to find the correct dose

	6. Provides the best symptom relief
	7. Less side effects
	8. Provides the best high
	9. Less harmful
	10. More accessible (i.e., easy to get)
	11. More affordable
	12. More potent
	13. Higher quality
	14. Recommended to me
	15. Other (please specify):
	16. Don't know
	17. Refuse to answer

Extract availability
Extract_avail
	Programmer note: only ask if Form_cu=1, 2, 3, 8, 9, 10, 11, 12
	Marijuana extracts have high concentrations of cannabinoids due to an extraction process using alcohol, carbon dioxide (CO_2), or butane, and may come in the form of oil, butter, or wax.
	
	Would you try marijuana extracts (e.g., alcohol, butane, carbon dioxide) if they were available to you? (select only one)
	   1. Definitely not
	   2. Probably not
	   3. Maybe
	   4. Probably yes
	   5. Definitely yes
	   6. Don't know
	   7. Refuse to answer

Strains
Strain_YN
	Do you usually use a specific strain(s) of marijuana? (select only one)
	   1. Yes
	   2. No
	   3. Don't know
	   4. Not applicable
	   5. Refuse to answer

Strains Strain_name	Programmer note: only ask if Strain_YN=1 Please specify the strain(s): [open-ended text]

Strains
(Strain_reason)
	Programmer note: only if Strain_YN=1
	Why do you use that specific strain(s) of marijuana? (select all that apply)
	    1. Effects last longer
	    2. Effects occur faster
	    3. Uses less marijuana
	    4. Provides the best symptom relief
	    5. Less side effects
	    6. Provides the best high
	    7. Less harmful
	    8. More accessible (i.e., easy to get)
	    9. More affordable
	    10. More potent
	    11. Higher quality
	    12. Recommended to me
	    13. Tetrahydrocannabinol (THC) levels
	    14. Cannabidiol (CBD) levels

	15. Cannabinol (CBN) levels
	    16. Other (please specify):
	    17. Don't know
	    18. Refuse to answer

Strains
Strain_levels_YN
	Programmer note: only if Strain_YN=1
	Do you know the tetrahydrocannabinol (THC) and cannabidiol (CBD) levels of the main strain you use?
	    1. Yes
	    2. No
	    3. Refuse to answer

Strains
Strain_levels
	Programmer note: if Strain_levels_YN=1 (yes)
	What are the tetrahydrocannabinol (THC) and cannabidiol (CBD) levels of the main strain you use? Please specify in the boxes below:
	    _____THC
	    _____CBD

Strains
Strain_levels_look
	Programmer note: if Strain_levels_YN=1 (yes)
	
	When answering the last question, did you look at your bottle of medical marijuana for this information?
	    1. Yes
	    2. No
	    3. Don't know
	    4. Refuse to answer

Strains Strain_relief	Programmer note: only if Strain_YN=1 How effective is the strain(s) you usually use in alleviating your symptoms… (select only one) 1. Very ineffective 2. Ineffective 3. In the middle 4. Effective 5. Very effective 6. Don't know 7. Refuse to answer
Strains Strain_avail	Programmer note: only if Strain_YN=1 Would you try different strains of marijuana if they were available? (select only one) 1. Definitely not 2. Probably not 3. Maybe 4. Probably yes 5. Definitely yes 6. Don't know 7. Refuse to answer

REASONS FOR USE

The next questions ask about your reasons for using marijuana. Remember that your answers are strictly confidential. Please be as honest as possible.	
Prescription Prescrip_cu	Do you **CURRENTLY** have a medical document to use marijuana from a physician? (select only one) 1. Yes 2. No 3. Don't know 4. Refuse to answer
Prescription Length of Time Prescrip_time_cu	Programmer note: only if Prescrip_cu=1 How long have you had a medical document to use marijuana? (select only one) 1. Less than 1 year 2. 1-2 years 3. 3-5 years 4. 6-10 years 5. More than 10 years 6. Don't know 7. Refuse to answer

Type of license ever (License_type_ever)	Have you **EVER** been approved to possess marijuana for medical purposes under the ... (select all that apply) 1. *Marihuana Medical Access Regulations (MMAR),* issued from June 14, 2001 until March 31, 2014 2. *Marihuana for Medical Purposes Regulations (MMPR),* issued starting April 1, 2014 3. Don't know 4. Refuse to answer
Type of license current License_type_current	Programmer note: only if License_type_ever=1,2 Are you **CURRENTLY** approved to possess marijuana for medical purposes under the ... (select only one) 1. *Marihuana Medical Access Regulations (MMAR),* issued from June 14, 2001 until March 31, 2014 2. *Marihuana for Medical Purposes Regulations (MMPR),* issued starting April 1, 2014 3. Don't know 4. Refuse to answer
Current License Length of Time License_time_cu	Programmer note: only if License_type_current=1,2 In total, how long have you been approved to use medical marijuana in Canada? 1. Less than 1 year 2. 1-2 years 3. 3-5 years 4. 6-10 years 5. More than 10 years 6. Don't know 7. Refuse to answer
Medical conditions Med_conditions	Which of the following condition(s) do you use marijuana for? (select all that apply) 1. Chronic pain (e.g., arthritis, back pain, migraine) 2. Nausea or vomiting 3. Lack of appetite or weight loss 4. Depression 5. Multiple sclerosis or spinal cord injury 6. Epilepsy 7. Anxiety or nerves 8. Glaucoma 9. Insomnia 10. Other (please specify) 11. Don't know 12. Refuse to answer

Medical Conditions
Med_main_condition
	Programmer note: only if Med_conditions=1-10 and only bring up options selected in Med_conditions.
	What is the **MAIN** condition that you use marijuana for? (select only one)
	   1. Chronic pain (e.g., arthritis, back pain, migraine)
	   2. Nausea or vomiting
	   3. Lack of appetite or weight loss
	   4. Depression
	   5. Multiple sclerosis or spinal cord injury
	   6. Epilepsy
	   7. Anxiety or nerves
	   8. Glaucoma
	   9. Insomnia
	   10. Other (please specify)
	   11. Don't know
	   12. Refuse to answer

Life threatening illness
Palliative
	Do you use medical marijuana to treat a life threatening medical condition with a prognosis of less than one year?
	   1. Yes
	   2. No
	   3. Don't know
	   4. Refuse to answer

Smoking Illness
Smoke_Illness
	Do you have any respiratory illnesses (e.g., asthma, COPD, lung cancer)?
	   1. Yes
	   2. No
	   3. Don't know
	   4. Refuse to answer

SIDE EFFECTS

Cough
Cough
	Do you usually have a cough?
	   1. Yes
	   2. Sometimes
	   3. No
	   4. Don't know
	   5. Refuse to answer

Chest wheezy
Chest_wheezy
	Does your chest sound wheezy or whistling other than from colds?
	   1. Yes
	   2. Sometimes
	   3. No
	   4. Don't know
	   5. Refuse to answer

Breath
Breath
	Are you troubled by shortness of breath when hurrying on the level ground or walking up a slight hill?
	    1. Yes
	    2. Sometimes
	    3. No
	    4. Don't know
	    5. Refuse to answer

Walk slow
Walk_slow
	Do you have to walk slower than most people your own age on the level ground because of breathlessness?
	    1. Yes
	    2. Sometimes
	    3. No
	    4. Don't know
	    5. Refuse to answer

Phlegm
Phlegm
	Do you cough up phlegm in the morning?
	    1. Yes
	    2. Sometimes
	    3. No
	    4. Don't know
	    5. Refuse to answer

Chest tightness
Chest_tight
	Do you wake up at night with tightness in your chest?
	    1. Yes
	    2. Sometimes
	    3. No
	    4. Don't know
	    5. Refuse to answer

Side Effects
(Side_effects) It's a check all
	Have you **EVER** experienced any of the following from using marijuana for health reasons? (select all that apply)
	    1. Feeling quiet or disconnected
	    2. Drowsiness or laziness
	    3. Feeling high
	    4. Loss of appetite
	    5. Increased appetite
	    6. Loss of balance
	    7. Weakness
	    8. Confused or forgetful thinking
	    9. Slurred speech
	    10. Dry mouth
	    11. Headache
	    12. Blurred vision
	    13. Shaking
	    14. Sweating
	    15. Dehydration
	    16. Nausea
	    17. Increased heart rate or palpitations
	    18. Anxiety
	    19. Paranoia or hallucinations

	20. Other (please specify): 21. None 22. Don't know 23. Refuse to answer

<table>
<tr><td colspan="2" style="background-color:yellow"><h1 align="center">ACCESSIBILITY</h1></td></tr>
<tr><td colspan="2">The next questions ask about the accessibility of marijuana. As a reminder, all of the information you provide will be kept strictly confidential. Please be as honest as possible.</td></tr>
<tr>
<td>Ever
(Source_ever) check all</td>
<td>Which of the following ways have you EVER obtained marijuana for health reasons? (select all that apply)
  1. From a Health Canada licensed producer
  2. Grow it yourself
  3. From a dispensary or club
  4. From another source through a designated-person production licence
  5. From a source without a license (e.g., friends, family, dealer)
  6. Other (please specify):
  7. Don't know
  8. Refuse to answer</td>
</tr>
<tr>
<td>Main
Source_main</td>
<td>Which of the following is the MAIN way you obtain marijuana for health reasons? (select only one)
  1. From a Health Canada licensed producer
  2. Grow it yourself
  3. From a dispensary or club
  4. From another source through a designated-person production licence
  5. From a source without a license (e.g., friends, family, dealer)
  6. Other (please specify):
  7. Don't know
  8. Refuse to answer</td>
</tr>
<tr>
<td>Preferred
Source_prefer</td>
<td>Which of the following is your most PREFERRED way of obtaining marijuana for health reasons? (select only one)
  1. From a Health Canada licensed producer
  2. Grow it yourself
  3. From a dispensary or club
  4. From another source through a designated-person production licence
  5. From a source without a license (e.g., friends, family, dealer)
  6. Other (please specify):
  7. Don't know
  8. Refuse to answer</td>
</tr>
</table>

| Access Comparison
Source_comp

Source_comp_cost1

Source_comp_cost2

Source_comp_time1

Source_comp_time2

Source_comp_access1 | We would like your opinion on three different ways of obtaining marijuana: **from a Health Canada licensed producer, growing it yourself, and from another unlicensed source (e.g., friends, family, dealer).**

From which of the following sources is medical marijuana **MOST EXPENSIVE**?
    1. From a Health Canada licensed producer
    2. Grow it yourself
    3. From another unlicensed source (e.g., friends, family, dealer)
    4. Don't know
    5. Refuse to answer

From which of the following sources is medical marijuana **LEAST EXPENSIVE**?
    1. From a Health Canada licensed producer
    2. Grow it yourself
    3. From another unlicensed source (e.g., friends, family, dealer)
    4. Don't know
    5. Refuse to answer

From which of the following sources does it take the **MOST AMOUNT OF TIME TO RECEIVE** medical marijuana?
    1. From a Health Canada licensed producer
    2. Grow it yourself
    3. From another unlicensed source (e.g., friends, family, dealer)
    4. Don't know
    5. Refuse to answer

From which of the following sources does it take the **LEAST AMOUNT OF TIME TO RECEIVE** medical marijuana?
    1. From a Health Canada licensed producer
    2. Grow it yourself
    3. From another unlicensed source (e.g., friends, family, dealer
    4. Don't know
    5. Refuse to answer |

Source_comp_access 2	From which of the following sources is obtaining medical marijuana **MOST ACCESSIBLE** (i.e., how easy it is to get)? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer From which of the following sources is obtaining medical marijuana **LEAST ACCESIBLE** (i.e., how easy it is to get)? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_safe1	
	Which of the following sources has the **HIGHEST SAFETY STANDARDS** for medical marijuana? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_safe2	
	Which of the following sources has the **LOWEST SAFETY STANDARDS** for medical marijuana? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer 4. Don't know 5. Refuse to answer
Source_comp_qual1	
	Which of the following sources has the **HIGHEST QUALITY** (i.e., look, feel, smell) of medical marijuana? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_qual2	
	Which of the following sources has the **LOWEST QUALITY** (i.e., look, feel, smell) of medical marijuana? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer 4. Don't know 5. Refuse to answer

Source_comp_potent1	From which of the following sources is medical marijuana the **MOST POTENT**? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_potent2	From which of the following sources is medical marijuana the **LEAST POTENT**? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_relief1	Which of the following sources provides medical marijuana with the **BEST SYMPTOM RELIEF**? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_relief2	Which of the following sources provides medical marijuana with the **WORST SYMPTOM RELIEF**? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_stigma1	From which of the following sources is obtaining medical marijuana associated with the **MOST STIGMA (i.e., negative thoughts from other people)**? 1. From a Health Canada licensed producer 2. Grow it yourself 3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer
Source_comp_stigma2	From which of the following sources is obtaining medical marijuana associated with the **LEAST STIGMA (i.e., negative thoughts from other people)**? 1. From a Health Canada licensed producer 2. Grow it yourself

	3. From another unlicensed source (e.g., friends, family, dealer) 4. Don't know 5. Refuse to answer Programmer note: use logic to only allow answers not selected in the first part to appear and skip next question if selected don't know or refuse to answer.

STIGMA

SUPPORT	
The next questions ask about your experiences with marijuana for health reasons. Please remember there are no right or wrong answers - we are most interested in your thoughts.	
Doctor Doctor	Do you currently have a physician (or general practitioner)? 1. Yes 2. No 3. Don't know 4. Refuse to answer
Recommendation Recom_doc	Did a physician or nurse practitioner ever recommend that you use medical marijuana? (select only one) 1. Yes 2. No 3. Don't know 4. Refuse to answer
Recommendation Recom_altern	Did an alternative health practitioner (e.g., naturopath, chiropractor, homeopath) ever recommend that you use medical marijuana? (select only one) 1. Yes 2. No 3. Don't know 4. Refuse to answer
Support Support_doc_1	Programmer note: if Doctor=1 What is your **PHYSICIAN(S)'S** general attitude towards your marijuana use for health reasons? (select only one) 1. Very Unsupportive 2. Unsupportive 3. Neutral 4. Supportive 5. Very supportive 6. Don't know 7. Refuse to answer

Support
Doctor_refuse
	Has a physician **EVER** refused to give you a medical document to use marijuana for health reasons? (select only one)
	    1. Yes
	    2. No
	    3. Don't know
	    4. Refuse to answer

Support
(Doctor_refuse_reasons)
Check all
	Programmer note: if Doctor_refuse=1
	What was the physician's reason for refusing to give you a medical document to use marijuana for health reasons?
	    1. Advised that you were not yet sick enough to need marijuana
	    2. Feared repercussions from the medical association
	    3. Other (please specify):
	    4. Don't know
	    5. Refuse to answer

Support
Doctor_fee
	Have you **EVER** had to pay any sort of fee for a medical document to use marijuana?
	    1. Yes
	    2. No
	    3. Don't know
	    4. Refuse to answer

Support
Support_family
	What is your **FAMILY'S** general attitude toward your marijuana use for health reasons? (select only one)
	    1. Very Unsupportive
	    2. Unsupportive
	    3. Neutral/ Mixed Support
	    4. Supportive
	    5. Very Supportive
	    6. They do not know I use marijuana
	    7. Other (please specify):
	    8. Don't know
	    9. Refuse to answer

Support
Support_friends
	What are your **FRIENDS'** general attitude towards your marijuana use for health reasons? (select only one)
	    1. Very Unsupportive
	    2. Unsupportive
	    3. Neutral/ Mixed Support
	    4. Supportive
	    5. Very Supportive
	    6. They do not know I use marijuana
	    7. Other (please specify):
	    8. Don't know
	    9. Refuse to answer

Hiding use from friends
Hide_friends
	Do you hide your marijuana use for health reasons from…
	    1. None of your friends
	    2. Some of your friends
	    3. All of your friends
	    4. Refuse to answer

Hiding use from family
Hide_family
	Do you hide your marijuana use for health reasons from…
	   1. None of your family
	   2. Some of your family
	   3. All of your family
	   4. Refuse to answer

Hiding use at work
Hide_work
	Do you hide your marijuana use from…
	   1. None of the people at work
	   2. Some of the people at work
	   3. All of the people at work
	   4. I don't work
	   5. Refuse to answer

Hiding use
(Hide_reasons) Check all
	What are your reasons for hiding your marijuana use? (select all that apply)
	   1. Respect for the feelings of nonusers
	   2. Avoiding judgement
	   3. Setting an example for children
	   4. Fear of legal punishment
	   5. Privacy
	   6. I don't hide my marijuana use
	   7. Other (please specify):
	   8. Don' t know
	   9. Refuse to answer

Concern for med use
Med_use_concern
	Do you fear legal punishment due to your use of marijuana for health reasons?
	   1. Yes
	   2. No
	   3. Don't know
	   4. Refuse to answer

The next questions ask about your beliefs and opinions on marijuana.	

Society approval
Society_med_approval
	Please select the option you agree with:
	   1. Society **STRONGLY DISAPPROVES** of medical marijuana
	   2. Society **DISAPPROVES** of medical marijuana
	   3. Neither **DISAPPROVES** or **APPROVES** of medical marijuana
	   4. Society **APPROVES** of medical marijuana
	   5. Society **STRONGLY APPROVES** of medical marijuana
	   6. Don't know
	   7. Refuse to answer

Society approval
Society_rec_approval
	Please select the option you agree with:
	   1. Society **STRONGLY DISAPPROVES** of recreational marijuana use
	   2. Society **DISAPPROVES** of recreational marijuana use
	   3. Neither **DISAPPROVES** nor **APPROVES** of recreational marijuana use
	   4. Society **APPROVES** of recreational marijuana use
	   5. Society **STRONGLY APPROVES** of recreational marijuana use
	   6. Don't know
	   7. Refuse to answer

Addictive
Perc_addictive
	Please select the option you agree with:
	Medical marijuana is…
	   1. Not at all addictive
	   2. A little addictive
	   3. Somewhat addictive
	   4. Very addictive
	   5. Extremely addictive
	   6. Don't know
	   7. Refuse to answer

SMOKING HEALTH RISK PERCEPTION
The next question asks about **SMOKING** marijuana, as a joint, blunt, in a pipe, bong, waterpipe, etc. Please indicate whether you agree with the following statement.
~~Smoking Harm~~	~~Please select the option you agree with:~~

Smoke_harm	**SMOKING** marijuana is…
	   1. Not at all harmful to my health
	   2. A little harmful to my health
	   3. Somewhat harmful to my health
	   4. Very harmful to my health
	   5. Extremely harmful to my health
	   6. Don't know
	   7. Refuse to answer

VAPOURIZERS

The next questions ask about **VAPOURIZING** or **VAPING** marijuana. **Vapourization** is defined as inhaling the vapour produced by heating marijuana in devices such as an inflatable bag (e.g., Volcano), portable vapourizer (e.g., Launch box, Pax), e-cigarette, or vape pen.

Awareness
Vape_aware
	Had you **EVER** heard of **VAPOURIZING** or **VAPING** marijuana before this study? (select only one)
	   1. Yes
	   2. No
	   3. Don't know
	   4. Refuse to answer

PATTERNS OF USE

Frequency
Vape_freq
	Programmer note: only if mode_ever=5
	In the **PAST 30 DAYS**, how often did you use a **VAPOURIZER** with marijuana (for any reason)? (Select only one)
	   1. Not at all
	   2. At least once in the last 30 days
	   3. At least once a week
	   4. Almost every day
	   5. Every day
	   6. Don't know
	   7. Refuse to answer

Vape form Ever (Vape_form_ever) Check all	Programmer note: only if mode_ever=5
	 Which form(s) of marijuana have you **EVER** used in a **VAPOURIZER**? (select all that apply)
	    1. Dried herb
	    2. Marijuana resin (i.e., hash, kief, trichomes)
	    3. Oil
	    4. Alcohol extract (tincture)
	    5. Butane extract (i.e., shatter, wax, dabs)
	    6. Carbon dioxide (CO_2) extract
	    7. Other (please specify):
	    8. Don't know
	    9. Refuse to answer

Vape Form Current (Vape_form_cu) Check all	Programmer note: only if Vape_freq=2,3,4,5 and if Vape_form_ever=1,2,3,4,5,6,7.
	 In the **PAST 30 DAYS**, which form(s) of marijuana did you use in a **VAPOURIZER**? (select all that apply)
	    1. Dried herb
	    2. Marijuana resin (i.e., hash, kief, trichomes)
	    3. Oil
	    4. Alcohol extract (tincture)
	    5. Butane extract (i.e., shatter, wax, dabs)
	    6. Carbon dioxide (CO_2) extract
	    7. Other (please specify):
	    8. Don't know
	    9. Refuse to answer

Type Ever use (Type_ever) Check all	Programmer note: only if mode_ever=5
	
	 Which type(s) of **VAPOURIZER(S)** have you **EVER** tried? (Select all that apply)
	
	    1. Stationary vapourizer (e.g., Volcano, Extreme Q)
	    2. Portable vapourizer (e.g., Magic Flight Launch Box, Pax)
	    3. E-cigarette or vape pen
	    4. Made my own
	    5. Other (please specify):
	    6. Don't know
	    7. Refuse to answer

Type Current use (Type_cu) Check all	Programmer note: only if Vape_freq=2,3,4,5 and if Type_ever=1,2,3,4,5, pipe from Type_ever. In the **PAST 30 DAYS**, which type(s) of **VAPOURIZER(S)** did you use? 1. Stationary vapourizer (e.g., Volcano, Extreme Q) 2. Portable vapourizer (e.g., Magic Flight Launch Box, Pax) 3. E-cigarette or vape pen 4. Made my own 5. Other (please specify): 6. Don't know 7. Refuse to answer
REASONS	
Reasons for Current use (Vape_reasons_cu) Check all	Programmer note: only if Vape_freq=2,3,4,5 Why do you **CURRENTLY** use a **VAPOURIZER**? (select all that apply) 1. Effects last longer 2. Effects occur faster 3. Uses less marijuana 4. Easy to use 5. Easy to find the correct dose 6. Provides the best symptom relief 7. Less side effects 8. Provides the best high 9. It might be less harmful to me than smoking marijuana 10. It might be less harmful to people around me than smoking marijuana 11. More accessible (i.e., easy to get) 12. More affordable 13. Other people I know use a vapourizer too 14. It's fun to use 15. It doesn't smell as much as smoking marijuana 16. Other (please specify): 17. Don't know 18. Refuse to answer

Reasons for NOT using Vape_abst	Programmer note: if vape_aware=1 and mode_ever=1-4, 6-12 What is the **MAIN** reason why you **DO NOT** use a **VAPOURIZER**? (select only one) 1. Effects don't last long 2. Effects occur too slowly 3. Uses more marijuana 4. Difficult to use 5. Difficult to find the correct dose 6. Doesn't provide the best symptom relief 7. More side effects 8. Doesn't provide the best high 9. It's harmful 10. Less accessible (i.e., difficult to get) 11. Less affordable 12. I'm concerned about what people might think 13. I'm not interested 14. Other (please specify): 15. Don't know 16. Refuse to answer

Vape Acceptability
Vape_accept
	Programmer note: only if Vape_aware=1
	Please select the option you agree with:
	VAPOURIZING marijuana is…
	  1. **A LOT LESS** acceptable than **SMOKING** marijuana
	  2. **A LITTLE LESS** acceptable than **SMOKING** marijuana
	  3. **AS** acceptable **AS SMOKING** marijuana
	  4. **A LITTLE MORE** acceptable than **SMOKING** marijuana
	  5. **A LOT MORE** acceptable than **SMOKING** marijuana
	  6. Don't know
	  7. Refuse to answer

Vapourizer Harm
Vape_harm_1
	Programmer note: only if Vape_aware=1
	VAPOURIZING marijuana is…
	  1. Not at all harmful to my health
	  2. A little harmful to my health
	  3. Somewhat harmful to my health
	  4. Very harmful to my health
	  5. Extremely harmful to my health
	  6. Don't know
	  7. Refuse to answer

Vape Harm compared to smoke Vape_harm_2	Programmer note: only if Vape_aware=1 **VAPOURIZING** marijuana is… 1. **A LOT LESS** harmful than **SMOKING** marijuana 2. **A LITTLE LESS** harmful than **SMOKING** marijuana 3. **AS** harmful **AS SMOKING** marijuana 4. **A LITTLE MORE** harmful than **SMOKING** marijuana 5. **A LOT MORE** harmful than **SMOKING** marijuana 6. Don't know 7. Refuse to answer
WILLINGNESS TO TRY/USE A VAPOURIZER	
Future Vape Vape_future	Programmer note: only if vape_aware=1 and mode_ever=1-4, 6-12 In the future, do you think you might try **VAPOURIZING** marijuana? 1. Definitely not 2. Probably not 3. Maybe 4. Probably yes 5. Definitely yes 6. Don't know 7. Refuse to answer

TOBACCO USE

The next questions are about **TOBACCO** and nicotine use.	
Tobacco 100 cigs Tob_100cigs	Have you smoked at least 100 cigarettes in your life? 1. Yes 2. No 3. Don't know 4. Refuse to answer
Tobacco Frequency Tob_freq	At the present time, do you smoke cigarettes not at all, occasionally, or daily? 1. Not at all 2. Occasionally 3. Daily 4. Don't know 5. Refuse to answer
Tobacco Tob_mj	When you use marijuana, do you mix it with tobacco? 1. Never 2. Sometimes 3. Often 4. Always 5. Don't know 6. Refuse to answer

E-cigarette ever use Ecig_ever	Have you **EVER** used an e-cigarette or a vapourized nicotine product (e.g., electronic cigarette), even one or two times? 1. Yes 2. No 3. Don't know 4. Refuse to answer
E-cigarette current use Ecig_cu	Programmer Note: Ask only if Ecig_ever =1 In the **PAST 30 DAYS**, how often did you vapourize nicotine? 1. Not at all 2. Less than once a month 3. At least once a month 4. At least once a week 5. Almost every day 6. Every day 7. Don't know 8. Refuse to answer

DEMOGRAPHICS

	The last few questions ask about your background.
Trap Trap	What month are you completing this survey in? 1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Don't know 14. Refuse to answer
Gender Gender	Are you… 1. Male 2. Female 3. Refuse to answer

Province
Province
	What province or territory do you live in?
	    1. Alberta
	    2. British Columbia
	    3. Manitoba
	    4. New Brunswick
	    5. Newfoundland & Labrador
	    6. Nova Scotia
	    7. Northwest Territories
	    8. Nunavut
	    9. Ontario
	    10. Prince Edward Island
	    11. Quebec
	    12. Saskatchewan
	    13. Yukon
	    14. Refuse to answer

Ethnicity/ **Race** (Race – check all)	People in Canada come from many racial and cultural groups. Do you self-identify as… (Select all that apply) 1. White 2. South Asian (e.g., East Indian, Pakistani, Sri Lankan) 3. Chinese 4. Black 5. Filipino 6. Latin American 7. Arab 8. Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian) 9. West Asian (e.g., Iranian, Afghan) 10. Korean 11. Japanese 12. Aboriginal (e.g., First Nations, Métis, Inuk/Inuit) 13. Other (please specify): ___[open-ended text] 14. Don't know 15. Refuse to answer

Level of education
 	
Education
	What is the highest level of formal education that you have completed?
	    1. Grade school
	    2. Some high school
	    3. Completed high school
	    4. Technical/trade school or community college
	    5. Some university, no degree
	    6. Completed university degree
	    7. Masters, PhD or other post-graduate degree
	    8. Don't know
	    9. Refuse to answer

Employment status Occup	Which of the following best describes your main employment status over the **PAST 12 MONTHS**? 1. Employed full-time 2. Employed part-time 3. Attending school full-time 4. Attending school part-time 5. Homemaker 6. Retired 7. Unemployed, able to work 8. Unemployed, unable to work 9. Other (please specify): ___[open-ended text] 10. Don't know 11. Refuse to answer

Income
Income
	What is your best estimate of your **TOTAL PERSONAL INCOME** before taxes and other deductions, from all sources, such as savings, pensions, rent and unemployment insurance as well as wages, received in the past 12 months?
	    1. Less than $20,000
	    2. $20,000 to $40,000
	    3. $40,001 to $60,000
	    4. $60,001 to $80,000
	    5. $80,001 to $100,000
	    6. More than $100,000
	    7. Don't know
	    8. Refuse to answer

Survey
(Survey- check all)
	How did you find out about this survey? (select all that apply)
	    1. Health Canada-licensed marijuana producer
	    2. Medical marijuana club
	    3. Medical marijuana clinic
	    4. Marijuana dispensary
	    5. Friend
	    6. Family member
	    7. Online
	    8. Social media
	    9. Other (please specify):
	    10. Don't know
	    11. Refuse to answer

Survey Producer (Survey_producer – check all)	Which Health Canada licensed marijuana producer do you order your medical marijuana from? As a reminder, we will not inform any group, including licensed producers about your participation in this survey and your answers will be kept strictly confidential. (select all that apply) 1. Aphria 2. Bedrocan Canada Inc. 3. Broken Coast Cannabis Ltd. 4. Canna Farms Ltd. 5. CanniMed Ltd. 6. Delta 9 Bio-Tech Inc. 7. In The Zone Produce Ltd. 8. MariCann Inc. 9. MedReleaf Corp. 10. Mettrum Ltd. 11. OrganiGram Inc. 12. The Peace Naturals Project Inc. 13. Tilray 14. Tweed Inc. 15. Whistler Medical Marijuana Corp 16. Don't know 17. Refuse to answer

E-TRANSFER QUESTIONNAIRE TEXT

Gift card Gift_card	You're finished! Thanks again for your help. How would you like to receive your $10.00? Choose one of the options below and we'll send you the electronic payment or gift card within 2 business days. 1. Interac e-transfer 2. Starbucks e-gift card 3. iTunes e-gift card 4. Cineplex e-gift card 5. Indigo/Chapters e-gift card 6. Amazon.ca e-gift card 7. I do not wish to receive any payment
Etransfer	*Programmer note: If giftcard=1, ask:* To receive the Interac e-transfer, you must have online banking at a participating Canadian financial institution. Please confirm that you bank at one of the following institutions: Bank of Canada BMO CIBC DC Bank ING Prospera Credit Union RBC Royal Bank Scotiabank TD Canada Trust 1 Yes 2 No: please select an e-gift card from the next screen *[Programmer note: if select no (etransfer=2), please return to previous screen (giftcard) without option 1]*

Gift_card_2	How would you like to receive your $10.00? Choose one of the options below and we'll send you the electronic payment or gift card within 2 business days. 1. Starbucks e-gift card 2. iTunes e-gift card 3. Cineplex e-gift card 4. Indigo/Chapters e-gift card 5. Amazon.ca e-gift card 6. I do not wish to receive any payment
Password	*Programmer note: If etransfer=1, ask:* **You will need a password to accept the $10 payment**. The password is "**marijuana**".

That's all the questions we have for you today.

Thank you for participating in our study – we appreciate your help.

As a reminder, this study is confidential and has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Committee. If you have any comments or concerns resulting from your involvement please contact either the Chief Ethics Office, Office of Research Ethics, at 519-888-4567, ext. 36005 or maureen.nummelin@uwaterloo.ca, or Professor David Hammond at 519-888-4567, ext. 36462 or dhammond@uwaterloo.ca.

If you would like any further information about the study, including a copy of our findings when they become available, please contact Dr. David Hammond at 519-888-4567 ext. 36462 or dhammond@uwaterloo.ca.

We really appreciate your participation and hope that this has been an interesting experience for you.

APPENDIX D

Table 13: Current Mode of Delivery Logistic Regression Model Output (n=250) (C-statistic=0.83)

Covariates	OR	95% CI	P-value
Gender	1.49	0.64-3.45	0.36
Age	1.03	1.00-1.06	0.08
Ethnicity	2.09	0.60-7.33	0.25
Education			**0.01**
Low vs. Moderate	1.40	0.44-4.36	0.59
Low vs. High	**4.92**	**1.44-16.84**	**0.01**
High vs. Moderate	**0.20**	**0.06-0.70**	**0.01**
Income			0.15
Low vs. Middle	0.35	0.12-1.02	0.06
Low vs. High	0.58	0.19-1.76	0.34
High vs. Middle	1.73	0.57-5.28	0.34
Region			0.46
Atlantic vs. Quebec	1.01	0.04-24.61	0.99
Atlantic vs. Prairies	1.19	0.14-10.46	0.88
Atlantic vs. British Columbia	1.01	0.13-8.05	1.00
Atlantic vs. Ontario and Northern	2.32	0.34-15.79	0.39
Main Medical Reason			**0.02**
Pain Relief vs. Mental Health	0.38	0.12-1.24	0.11
Pain Relief vs. Central Nervous System	0.20	0.03-1.26	0.09
Pain Relief vs. Side Effects	3.41	0.50-23.43	0.21
Pain Relief vs. Other	**3.41**	**1.08-10.70**	**0.04**
Other vs. Mental Health	**0.11**	**0.03-0.51**	**0.01**
Other vs. Central Nervous System	**0.06**	**0.01-0.49**	**0.01**
Other vs. Side Effects	1.00	0.13-7.81	0.10
Mental Health vs. Central Nervous System	0.51	0.06-4.04	0.52
Mental Health vs. Side Effects	**8.91**	**1.05-75.72**	**0.05**
Central Nervous System vs. Side Effects	**17.54**	**1.33-231.28**	**0.03**
Perception of smoking harm			**<0.01**
Low vs. Middle	2.80	0.85-9.18	0.09
Low vs. High	**16.90**	**3.88-73.62**	**<0.01**
High vs. Middle	**0.06**	**0.01-0.47**	**<0.01**
Respiratory Symptoms	**0.62**	**0.46-0.86**	**<0.01**
Smoking Status			**0.03**
Not at all vs. Occasionally	0.48	0.87-2.65	0.40

Not at all vs. Daily	0.16	0.04-0.64	0.01
Daily vs. Occasionally	6.23	0.38-23.83	0.01

The first category listed is the reference category for each.

Table 14: Rating of Factors by Mode of Delivery (n= 342)*

Factors	Smoking Mean (SD)	Using a Vapourizer Mean (SD)	Eating in Food Mean (SD)
Time to onset of effect	4.1 (1.0)[a]	3.8 (1.1)[a]	2.1 (1.2)[a]
Symptom relief	4.0 (0.9)[a]	3.9 (1.0)[b]	3.9 (1.2)[c]
Accessibility	3.9 (1.2)[a]	3.6 (1.2)[a]	3.1 (1.4)[a]
Type of "high"	3.8 (1.0)[a]	3.8 (1.0)[b]	3.6 (1.1)[ab]
Ease of use	3.7 (1.2)[a]	3.8 (1.1)[b]	3.5 (1.4)[b]
Ability to find correct dose	3.7 (1.2)[a]	3.7 (1.2)[b]	2.6 (1.3)[ab]
Number of side effects	3.6 (1.2)[a]	4.0 (1.1)[ab]	3.7 (1.2)[b]
Duration of effect	3.4 (0.9)[a]	3.3 (1.0)[b]	4.2 (1.0)[ab]
Level of harm	3.3 (1.3)[ab]	4.2 (1.0)[a]	4.2 (1.1)[b]
Amount needed for effect	3.1 (1.0)[a]	3.2 (1.2)[b]	2.4 (1.2)[ab]
Cost	2.4 (1.2)[ab]	2.2 (1.2)[a]	2.2 (1.1)[b]
Stigma	2.4 (1.3)[a]	2.9 (1.3)[a]	3.3 (1.3)[a]

*Rating was completed on a scale from 1 to 5, where 1 represented the least desired effect and 5 represented the most desired effect.

[a,b,c] Means with the same letter are significantly different at a $p<0.05$ tested using an ANOVA.

Table 15: Rating of Factors by Mode of Delivery ANOVA Output

Factors	F-statistic	P-value
Time to onset of effect	273.33	<0.01
Smoking vs. Using a Vapourizer		<0.01
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		<0.01
Symptom relief	1.34	0.26
Smoking vs. Using a Vapourizer		0.12
Smoking vs. Eating in Food		0.18
Using a Vapourizer vs. Eating in Food		0.85
Accessibility	272.00	<0.01
Smoking vs. Using a Vapourizer		<0.01
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		<0.01
Type of "high"	7.01	<0.01
Smoking vs. Using a Vapourizer		0.22
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		0.01
Ease of use	2.76	0.06
Smoking vs. Using a Vapourizer		0.94
Smoking vs. Eating in Food		0.06
Using a Vapourizer vs. Eating in Food		0.03
Ability to find correct dose	75.97	<0.01
Smoking vs. Using a Vapourizer		0.87
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		<0.01
Number of side effects	19.39	<0.01
Smoking vs. Using a Vapourizer		<0.01
Smoking vs. Eating in Food		0.42
Using a Vapourizer vs. Eating in Food		<0.01
Duration of effect	79.90	<0.01
Smoking vs. Using a Vapourizer		0.92
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		<0.01
Level of harm	85.78	<0.01
Smoking vs. Using a Vapourizer		<0.01
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		0.68
Amount needed for effect	56.65	<0.01
Smoking vs. Using a Vapourizer		0.13
Smoking vs. Eating in Food		<0.01
Using a Vapourizer vs. Eating in Food		<0.01
Cost	270.00	0.01
Smoking vs. Using a Vapourizer		0.01
Smoking vs. Eating in Food		0.01
Using a Vapourizer vs. Eating in Food		0.66
Stigma	79.43	<0.01
Smoking vs. Using a Vapourizer		<0.01

			<0.01
Smoking vs. Eating in Food			<0.01
Using a Vapourizer vs. Eating in Food			<0.01

Table 16: Main Form Logistic Regression Model Output (n=247)

(C-statistic= 0.51)

Covariates	OR	95% CI	P-value
Gender	0.81	0.38-1.76	0.60
Age	0.97	0.94-1.00	0.09
Ethnicity	2.06	0.70-6.06	0.19
Education			0.64
Low vs. Moderate	1.54	0.63-3.77	0.35
Low vs. High	1.28	0.43-3.87	0.66
High vs. Moderate	1.20	0.46-3.16	0.71
Income			0.58
Low vs. Middle	1.51	0.54-4.20	0.44
Low vs. High	1.72	0.53-5.59	0.37
High vs. Middle	0.88	0.24-3.25	0.84
Region			0.93
Atlantic vs. Quebec	0.49	0.05-4.66	0.54
Atlantic vs. Prairies	1.04	0.16-6.66	0.97
Atlantic vs. British Columbia	1.20	0.20-7.42	0.84
Atlantic vs. Ontario and Northern	1.05	0.20-5.40	0.95
Main Medical Reason			0.70
Pain Relief vs. Mental Health	2.42	0.73-8.06	0.15
Pain Relief vs. Central Nervous System	0.98	0.27-3.59	0.98
Pain Relief vs. Side Effects	1.67	0.18-15.62	0.66
Pain Relief vs. Other	1.14	0.37-3.51	0.83
Perception of smoking harm			**0.01**
Low vs. Middle	0.62	0.20-1.82	0.38
Low vs. High	**0.17**	**0.05-0.63**	**0.01**
High vs. Middle	**3.58**	**1.38-9.29**	**0.01**
Respiratory Symptoms	0.83	0.66-1.04	0.10

The first category listed is the reference category for each.

Table 17: Reasons for Using a Main Form Between Dried Herb and Alternative Forms Chi-Square Output

Reasons	X^2	P-value
Easy to use	1.00	0.32
More accessible	**18.55**	**<0.01**
Best symptom relief	0.71	0.40
Easy to find dose	0.05	0.82
Effects occur faster	1.93	0.17
Uses less marijuana	1.78	0.18
Effects last longer	**24.39**	**<0.01**
More affordable	0.39	0.53
Less side effects	**10.04**	**<0.01**
Provides the best high	0.09	0.77
Higher quality	**5.04**	**0.03**
More potent	3.00	0.08
Less harmful	**34.67**	**<0.01**
Recommended to me	2.01	0.16
Other	**6.05**	**0.01**

Table 18: Current Vapourizer Use Logistic Regression Model Output (n=250)

(C-statistic=0.64)

Covariates	OR	95% CI	P-value
Gender	**0.41**	**0.21-0.77**	**0.01**
Age	**0.97**	**0.95-1.00**	**0.05**
Ethnicity	**2.52**	**1.03-6.19**	**0.04**
Education			0.06
Low vs. Moderate	1.38	0.68-2.79	0.38
Low vs. High	3.16	1.20-8.34	0.02
High vs. Moderate	0.44	0.19-1.02	0.06
Income			0.35
Low vs. Middle	0.68	0.30-1.51	0.34
Low vs. High	1.47	0.55-3.97	0.45
High vs. Middle	0.46	0.16-1.35	0.16
Region			**0.02**
Atlantic vs. Quebec	1.62	0.29-9.08	0.59
Atlantic vs. Prairies	**5.69**	**1.50-21.50**	**0.01**
Atlantic vs. British Columbia	2.58	0.72-9.23	0.14
Atlantic vs. Ontario and Northern	**5.29**	**1.73-16.19**	**<0.01**
Main Medical Reason			0.87
Pain Relief vs. Mental Health	1.02	0.44-2.34	0.97
Pain Relief vs. Central Nervous System	0.71	0.23-2.17	0.55
Pain Relief vs. Side Effects	0.54	0.12-2.50	0.43
Pain Relief vs. Other	0.76	0.31-1.84	0.54
Perception of smoking harm			0.26
Low vs. Middle	1.51	0.72-3.19	0.28
Low vs. High	2.57	0.82-8.05	0.10
High vs. Middle	0.59	0.22-1.59	0.30
Respiratory Symptoms	**0.78**	**0.64-0.95**	**0.01**

The first category listed is the reference category for each.

Table 19: Main Source for Obtaining Medical Marijuana Logistic Regression Model Output (n=246)

(C-statistic=0.59)

Covariates	OR	95% CI	P-value
Gender	1.12	0.55-2.27	0.75
Age	1.02	1.00-1.05	0.09
Ethnicity	0.65	0.24-1.72	0.38
Education			0.53
Low vs. Moderate	0.69	0.31-1.54	0.36
Low vs. High	0.59	0.21-1.60	0.30
Income			0.58
Low vs. Middle	0.74	0.30-1.79	0.50
Low vs. High	1.37	0.46-4.04	0.57
Region			0.09
Atlantic vs. Quebec	0.41	0.05-3.48	0.41
Atlantic vs. Prairies	0.60	0.09-3.78	0.59
Atlantic vs. British Columbia	0.18	0.03-1.01	0.05
Atlantic vs. Ontario and Northern	0.53	0.10-2.65	0.44
Main Medical Reason			0.99
Pain Relief vs. Mental Health	0.81	0.34-1.92	0.63
Pain Relief vs. Central Nervous System	1.20	0.30-4.79	0.80
Pain Relief vs. Side Effects	0.92	0.16-5.26	0.93
Pain Relief vs. Other	0.92	0.35-2.43	0.87
Perception of smoking harm			0.44
Low vs. Middle	1.58	0.68-3.65	0.29
Low vs. High	2.10	0.61-7.20	0.24
Respiratory Symptoms	**0.77**	**0.63-0.95**	**0.02**

The first category listed is the reference category for each.

Table 20: Ranking Comparison of Main Sources for Obtaining Medical Marijuana (N=364)†

Factors	Licensed Producer	Grow it yourself	Non-licensed Source
	% (n)	% (n)	% (n)
Cost			
Most Expensive (n=292)	64.7 (189)	7.5 (22)	27.7 (81)
Least Expensive (n=261)	13.0 (34)	69.0 (180)	18.0 (47)
Mean Rank (SD)	1.5 (0.7)[a]	2.6 (0.6)[a]	1.9 (0.7)[a]
Time to receive			
Most amount of time (n=276)	32.6 (90)	57.2 (158)	10.1 (28)
Least amount of time (n=261)	33.3 (87)	12.6 (33)	54.0 (141)
Mean Rank (SD)	2.0 (0.8)[a]	1.5 (0.7)[a]	2.4 (0.7)[a]
Accessibility			
Most accessible (n=301)	48.2 (145)	19.6 (59)	32.2 (97)
Lest accessible (n= 261)	25.7 (67)	49.0 (128)	25.3 (66)
Mean Rank (SD)	1.8 (0.8)[a]	2.3 (0.8)[ab]	1.9 (0.8)[b]
Safety			
Highest standards (n=293)	72.4 (212)	21.2 (62)	6.5 (19)
Lowest standards (n=255)	8.2 (21)	7.5 (19)	84.3 (215)
Mean Rank (SD)	1.4 (0.6)[a]	1.9 (0.5)[a]	2.8 (0.6)[a]
Quality			
Highest quality (n=275)	58.5 (161)	22.5 (62)	18.9 (52)
Lowest quality (n=27)*	11.1 (3)	18.5 (5)	70.4 (19)
Mean Rank (SD)	‡	‡	‡
Potency			
Most potent (n=265)	54.0 (143)	20.4 (54)	25.7 (68)
Least potent (n=205)	28.8 (59)	25.4 (52)	45.9 (94)
Mean Rank (SD)	1.8 (0.9)[ab]	2.0 (0.7)[a]	2.2 (0.8)[b]
Symptom relief			
Best relief (n=274)	61.3 (168)	21.9 (60)	16.8 (46)
Worst relief (n=187)	19.8 (37)	20.9 (39)	59.4 (111)
Mean Rank (SD)	1.6 (0.8)[a]	1.9 (0.7)[a]	2.4 (0.8)[a]
Stigma			
Most stigma (n=278)	3.6 (10)	27.3 (76)	69.1 (192)
Least stigma (n=264)	87.5 (231)	8.0 (21)	4.5 (12)
Mean Rank (SD)	2.8 (0.5)[a]	1.8 (0.6)[a]	1.4 (0.6)[a]

†Ranking was completed, where 1 represents the factor ranked as most/high/best, 2 represents moderate/middle, and 3 represents the factor ranked least/low/worst (e.g., for the factor cost: 1=most expensive, 2=moderately expensive, and 3=least expensive).
*Due to a programming error, only 27 participants answered this question.
‡Ranking could not be done due to the small participant size.
[a,b,c] Means with the same letter are significantly different at a $p<0.05$ tested using an ANOVA.

Table 21: Ranking Comparison of Main Sources for Obtaining Medical Marijuana ANOVA Output

Factors	F-statistic	P-value
Cost	131.64	<0.01
Licensed Producer vs. Grow it Yourself		<0.01
Licensed Producer vs. Non-licensed Source		<0.01
Grow it Yourself vs. Non-licensed Source		<0.01
Time to receive	67.63	<0.01
Licensed Producer vs. Grow it Yourself		<0.01
Licensed Producer vs. Non-licensed Source		<0.01
Grow it Yourself vs. Non-licensed Source		<0.01
Accessibility	18.64	<0.01
Licensed Producer vs. Grow it Yourself		<0.01
Licensed Producer vs. Non-licensed Source		0.18
Grow it Yourself vs. Non-licensed Source		<0.01
Safety	253.00	<0.01
Licensed Producer vs. Grow it Yourself		<0.01
Licensed Producer vs. Non-licensed Source		<0.01
Grow it Yourself vs. Non-licensed Source		<0.01
Quality	-	-
Potency	9.19	<0.01
Licensed Producer vs. Grow it Yourself		0.01
Licensed Producer vs. Non-licensed Source		<0.01
Grow it Yourself vs. Non-licensed Source		0.10
Symptom relief	32.92	<0.01
Licensed Producer vs. Grow it Yourself		<0.01
Licensed Producer vs. Non-licensed Source		<0.01
Grow it Yourself vs. Non-licensed Source		<0.01
Stigma	352.95	<0.01
Licensed Producer vs. Grow it Yourself		<0.01
Licensed Producer vs. Non-licensed Source		<0.01
Grow it Yourself vs. Non-licensed Source		<0.01