Marijuana Legalization: How is it affecting citizens’ health and well-being

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**Introduction**

Abstract

Since marijuana became legal, it is now relevant to everyone in Canada, not only to our generation but also to future generations. This study mainly focuses on the negative effects of marijuana, the differences between recreational, medical marijuana and alcohol, how it impacts our world badly from the point of view of public health and the workplace, and the perceptions of the seriousness of marijuana in Canada.

Marijuana is a plant of Asian origin that for centuries was used as a textile fiber and its seeds as bird food. Its botanical name is Cannabis sativa and the common name: Indian hemp. Its effects, initially considered not very dangerous and with therapeutic utility, led it to be placed in the first row of resources medicines, thousands of years ago, but are currently recognized as mostly harmful. This hard drug is listed alongside alcohol (in the form of wine and beer), as well as derived from the mandrake, and from a poppy (scientifically called Papavero somniferum), among the first psychoactive substances capable of transforming notably human behavior, effects that have been known and used with different purposes for at least six thousand years. (López and Labrador)

Unlike pharmaceutical medications, marijuana is not a single-agent compound but a complex combination of more than 100 different chemicals, which include cannabinoids, flavonoids, and terpinoids. The primary psychoactive component of marijuana is delta-9-tetrahydrocannabinol (THC). However, other cannabinoid compounds — including cannabidiol (CBD), cannabinol, cannabichromene, cannabidivarin, cannabigerol, and tetrahydrocannabivarin—have their own actions on the central nervous system and may modify the effects of THC (“entourage effects”). (Wilkinson et al.)

Even though the concentration of these compounds can vary substantially, making it difficult to characterize the specific positive or negative health effects of marijuana, especially in uncontrolled and epidemiological studies. (Wilkinson et al.) This study is still trying to find out does the legalization of marijuana positively affect citizens’ health, well-being, and wealth.

There are two main arguments around the legalization of marijuana: some of the arguments involve what philosophers call deontological moral concerns — roughly, concerns about the inherent rights and wrongs of using a mind-altering substance (other than under medical direction) on the one hand and concerns about the propriety of paternalistic restrictions on personal liberty on the other hand. (Caulkins et al.)

However, many of the debate revolves around what is known and unknown about the practical consequences of marijuana use and about marijuana production and distribution. Although our study acknowledges the deontological set of issues, this study is still going to focuses on these practical consequences.

This study distinguishes two types of questions, each of which is important for thinking about the effects of marijuana legalization on health and other outcomes: What effects does marijuana use have on health and other outcomes; What effects would a change in marijuana laws have on patterns of use and, hence, on health and other outcomes. And going to debate around these two questions, based on the harmful side effects of marijuana, differences of recreational, medical marijuana and alcohol, the impacts on the public health and society from marijuana legalization, the impact to the workplace, and the perceptions of the seriousness of marijuana use in Canada.

**The harmful side effects of marijuana negatively affecting citizens’ health**

The harmful side effects of marijuana negatively affecting citizens’ health. Canada became the second country to legalize and regulate the use and sale of cannabis and products in the world on October 17, 2018. Even though now getting cannabis is legal, is cannabis good to humans’ body?

Cannabis is a plant, known for its psychoactive properties. Some of cannabis products are herbal material, cannabis oil, concentrated extracts, edibles, tinctures and creams. These products can be used for medical and non-medical purposes. People often consume cannabis not only by smoking it, also by other ways such as vaping, or vaporization and in edibles. Cannabis flowers secrete more than 100 different chemical compounds, which are known as cannabinoids. These compounds bind to cell receptors and change the way these cells communicate with one another when consumed. Two of the best-known cannabinoids are THC (delta-9-tetrahydrocannabinol), which is the primary psychoactive component of cannabis and is responsible for the “high” that individuals experience. It has both therapeutic and harmful effects. And CBD (cannabidiol), which is the second-most common cannabinoid in cannabis. It is not psychoactive and is being studies for use in medical applications, such as relieving pain, anxiety, and other chronic conditions. (Canadian Centre on Substance Use and Addiction)

Marijuana use is linked to several adverse health outcomes, including addiction, impaired cognition, pulmonary effects, mental illness, and other problems. Approximately one in ten adult users of marijuana develops addiction, and this number is higher among adolescents. The lifetime dependence rate of marijuana is generally lower than the rates of other drugs, including alcohol, heroin, and cocaine. However, marijuana dependence is the most prevalent substance-abuse diagnosis, excepting alcohol and tobacco dependence. (Wilkinson et al.)

Over the past 30 years, substantial research in human and animal models has shown that prolonged use of marijuana may lead to physical dependence and a withdrawal syndrome upon discontinuation. Several mechanisms are thought to play a part in the drug reward system, and the resulting cannabis abuse or dependence. There are two types of cannabinoid receptors, cannabinoid 1 (CB1) and cannabinoid 2 (CB2). The CB1 receptors are expressed in the central nervous system and are found mainly in the brain, kidney, liver, and lungs. The CB2 receptors are most commonly associated with the immune system. In the brain, CB1 receptors are most abundant in the cerebellum, basal ganglia, and hippocampus. (Freeman and Murphy)

These locations explain many of the negative effects seen on short-term memory, impaired motor skills, and delayed reaction time when cannabinoids are inhaled and ingested. Research shows that CB1 receptors act as modulators of GABA release in the hippocampus. The CB1 receptors are also found on glutamate and GABA neuron axon terminals in the hippocampus and decrease the excitability of neurons. There they control the release of neurotransmitters, and it is thought that this is the primary means that cannabinoids inhibit hippocampal neuronal activity and disrupt memory. Activation of the CB1 receptor affects the central nervous system in ways similar to those of other reward-enhancing drugs such as alcohol, cocaine, and opioids, and is the accepted mechanism for the addictive properties of cannabinoids. (Freeman and Murphy)

Marijuana has well established effects on the cardiovascular system and may negatively impact patients with various disease states including cardiovascular disease, hypertension, and angina. Existing evidence supports the adverse cardiovascular effects of marijuana use. Cannabinoids have complex effects on blood pressure. The acute effects of recreational cannabis include an increase in blood pressure, and then decreased vascular resistance-induced orthostatic hypotension. Smoked marijuana causes a dose dependent increase in heart rate, increases myocardial oxygen demand, and decreases oxygen supply. Cannabis use may potentially cause tachycardia and transient hypertension and may increase the risk of myocardial infarction (MI). (Freeman and Murphy)

Repeated cannabis use causes behavioral alterations, and increased risk of mental illness including increased rates of psychosis, depression, and anxiety. Studies report that chronic cannabis use results in at least a twofold increase in schizophrenia and psychotic symptoms, and those with schizophrenia are more likely to use marijuana. According to the National Institute on Drug Abuse, ingesting large doses of cannabis may cause an acute psychosis presenting with hallucinations, delusions, and a loss of the sense of self. (Freeman and Murphy)

The major active ingredient in marijuana is delta-9-tetrahydrocannabinol (THC). This agent exerts its effects by binding to cannabinoid receptors that are present mainly in the central nervous system (CNS). Binding of THC to these receptors causes several therapeutic and psychoactive effects. Effects are also associated with modulatory effects in neurotransmitters (e.g., acetylcholine, norepinephrine, dopamine, serotonin, gamma aminobutyric acid, glutamate, and D-aspartate). The metabolism of THC has not been completely elucidated. Several enzymes appear to play a role in metabolism including CYP2C9 and CYP3A4. As a result, medications that are metabolized by either of these pathways are subjected to an increased risk of interactions. (Freeman and Murphy)

There is a paucity of information related to drug-drug interactions with marijuana. Several interactions exist between dronabinol (marinol) and commercially available agents. In addition, major interactions exist between dronabinol and cocaine, ethanol, and droperidol. Other interactions include anxiolytics, barbiturates, disulfiram, monoamine oxidase inhibitors (MAOIs), protease inhibitors, selective serotonin reuptake inhibitors (SSRIs), sildenafil, sedatives, theophylline, tricyclic antidepressants, and warfarin. Most of the interactions cited in drug interaction monographs are theoretical in nature based on the proposed mechanism of action of dronabinol and the potential offending agent; however, case reports/clinical studies indicating a potential interaction have occurred with anticholinergics, barbiturates, disulfiram, lithium, protease inhibitors (e.g., indinavir, nelfinavir), SSRIs (e.g., fluoxetine), sildenafil, theophylline, tricyclic antidepressants, opioid analgesics, and warfarin. (Freeman and Murphy)

As shown above, we can see that marijuana does negatively affecting humans’ body, both physically and mentally.

**Recreational, medical marijuana and alcohol are different**

Marijuana is the second most used substance in Canada, alcohol is the first one. People often think marijuana and alcohol are the same, but they are different, even with marijuana there are two types, recreational used and medical used marijuana. They have different levels of harmfulness.

In a now famous New Yorker interview, President Obama said, “I don’t think it [marijuana] is more dangerous than alcohol.” But is marijuana really less dangerous than alcohol?

First of all, in most cases, drinking alcohol is not life-threatening. However, when people consume too much alcohol, it can be fatal. The CDC reports that nearly 88,000 alcohol-related deaths occur each year. And binge drinking accounted for about half of these deaths. In comparison, the number of deaths caused by marijuana is almost zero. A study found that a fatal dose of TCH, the potent chemical in marijuana, would be between 15 and 70 grams. To give you an idea of how much marijuana that is, consider that a typical joint contains about half a gram of marijuana. That means that you would have to smoke between 238 and 1,113 joints in a day to overdose on marijuana. That’s a lot of joints. (Villa)

Second of all, when it comes to what substance will put someone at risk for getting hurt or hurting others, alcohol is considered to cause the most harm. A study on marijuana uses and intimate partner violence found that couples who used marijuana had lower rates of intimate partner violence in the first 9 years of marriage. In fact, men who used marijuana were the least likely to commit an act of intimate partner violence against a spouse. (Villa)

Third of all, driving stoned is considerably safer than driving drunk, but it is still dangerous. Besides alcohol, marijuana is the most commonly detected drug in drivers involved in car accidents. One study found that marijuana increased the odds of being in car accident by 83%. You may think that 83% is high, but when alcohol was involved, the odds of being in a car accident increased more than 2,200%! When both alcohol and drugs were in the system, the risk of having a fatal car accident is especially high. What’s the takeaway here? It’s never a good idea to drive under the influence of drugs or alcohol, but especially both. (Villa)

Fourth of all, after a long night of heavy drinking, you may not remember what happened the night before. This is often referred to as a “blackout.” When you drink heavily it can impair your ability to create new memories. Over 50% of frequent binge drinkers reported at least one time in the past year when they blacked out and forgot where they were or what they did when they were drinking. In an email survey, college students reported that after a blackout they did things that they could not remember, like driving drunk, having unprotected sex, or engaged in risky behavior. Along the lines of memory, recent studies have shown that adolescents who smoke marijuana may be at greater risk for problems with memory and learning later in life. The studies remain inconclusive about how much marijuana use causes impairments of learning and memory. But studies have demonstrated that these types of changes in the brain may increase the risk of psychological difficulties later in life. Controversy remains over what percentage of psychosis risk can be linked to marijuana use and how much depends on a person’s genetics. (Villa)

Last of all, using alcohol even during the first few weeks of pregnancy can cause long-lasting effects on a child. According to the CDC, 3.3 million women are at risk of exposing their baby to alcohol. If you drink during pregnancy, you are at risk for having a child born with physical, behavioral, and intellectual disabilities—these are called fetal alcohol spectrum disorders (FASDs). According to the CDC there is no known amount of alcohol that is safe to consume during pregnancy. But marijuana may not be safe either. Studies show there may be a link between marijuana use during pregnancy and low birth weight. Despite marijuana being the most commonly used illegal drug during pregnancy, it’s hard to tell what the effect of marijuana use is, since there are not many studies out there. (Villa)

Also, the purpose of medical marijuana is for treating diseases including Alzheimer’s disease, amyotrophic lateral sclerosis (ALS), cachexia, cancer, Crohn’s disease, epilepsy and seizure disorders, glaucoma, hepatitis C, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), multiple sclerosis and muscle spasticity disorders, severe and chronic pain, severe nausea, and post-traumatic stress disorder (PTSD). Cannabis has been used to treat a number of disease states and associated symptoms. However, data is lacking in human models and with the use of actual “medicinal marijuana” in its unprocessed form, as most studies evaluated the effects of the tetrahydrocannabinol (THC) derivatives, dronabinol and nabilone. There is limited data to support the use of medicinal marijuana as a treatment option for Alzheimer’s Disease and amyotrophic later sclerosis (ALS). However, other investigators have found that smoked and vaporized cannabis was associated with a reduction in significant pain from HIV-associated sensory neuropathy and central neuropathic pain and HIV/AIDS associated cachexia. (Freeman and Murphy)

As mentioned, alcohol and marijuana are both harmful to humans’ body, it is hard to compare which one is more harmful. But marijuana has more effects on youth. Also comparing recreational and medical used marijuana, recreational marijuana is totally negatively affecting humans, but for people who needed medical marijuana, the positive effects are more than the negative effects.

**Marijuana legalization negatively impacts the public health and society**

The prevalence of marijuana use in adolescents is a point of particular interest in the policy debate because many of the negative health effects of the drug (addiction/dependence, psychosis, cognitive impairment) are heightened when use begins in adolescence. Evidence also suggests that cannabis use in adolescence and early adulthood is associated with poor social outcomes, including unemployment, lower income, and lower levels of life and relationship satisfaction. Decades' worth of data from the Monitoring the Future survey have shown a clear inverse relationship between risk perception and marijuana use among adolescents: the more risk attributed to marijuana, the lower the percent of use among young people. This relationship has also been seen among adults and across age groups. It is feared that any decline in risk perception resulting from legalization will be followed by an increase in prevalence of use. 2012, there were 22%, 26%, and 8% of cannabis uses between ages 15 to 19, 20 to 24, and above 25. (Wilkinson et al.)

Another concern regarding adolescents and the legalization of marijuana is that of drug diversion, or that adolescents will have access to cannabis from adults with legal access to medical or recreational marijuana. In a cross-sectional survey (n = 80), almost half of adolescents participating in outpatient substance-abuse treatment in Colorado reported using diverted marijuana. Compared to those who had not used diverted medical marijuana, those who had were more likely to report easy availability of marijuana, >20 times of use per month in the past year, and minimal peer disapproval of regular use. Another study found a similarly high rate (74%) of adolescents engaged in substance-abuse treatment who reported having used diverted medical marijuana. (Wilkinson et al.)

With recent changes in its legal status, the impact of marijuana on driving ability is increasingly relevant. Marijuana is the most common illicit drug reported in motor vehicle accidents (MVA). However, it is difficult to ascertain a causal contribution in many of these accidents as marijuana has substantially varied effects on driving abilities due to factors such as tolerance, differences in smoking techniques, and differences in absorptions of THC. Evidence has shown that the potential negative effects of marijuana on driving may disappear after controlling for other risky driving behaviors. Epidemiological studies attempting to characterize the relationship between acute marijuana intoxication and MVA culpability have been mixed and are not as strong as the relationship between alcohol intoxication and MVAs. Experimental studies indicate that acute intoxication with marijuana affects a number of cognitive and motor skills that are relevant to driving, including reaction time, attention, signal detection, information processing speed, spatial working memory, verbal learning and recall, procedural memory, tracking accuracy, time and distance estimation, set shifting, motor coordination, and danger perception. Results from driving simulator studies suggest that the effects of marijuana on driving may be dose dependent, with minimal to no impairment at low doses and progressive impairment with increasing dose. Also, the effects of marijuana may be more pronounced as the complexity of tasks increases. Notably, heavy users may exhibit minimal functional impairment in selected driving tasks presumably due to tolerance. Whereas alcohol intoxication leads drivers to underestimate their impairment (resulting in speeding and other forms of increased risk taking), marijuana generally leads drivers to overestimate their impairment (resulting in slower driving speeds despite explicit instructions to maintain a particular speed). However, the combined effects on driving ability of marijuana and alcohol do not nullify each other. Evidence suggests that impairment as a result of both substances is greater than either alone and may be more than additive. (Wilkinson et al.)

Therefore, as Canada continue to proceed with legalization for both medical and recreational use, a number of public health issues have become increasingly relevant, including the effects of acute marijuana intoxication on driving abilities, unintentional ingestion of marijuana products by children, the relationship between marijuana and opioid use, and whether there will be an increase in health problems related to marijuana use, such as dependence/ addiction, psychosis, and pulmonary problems. In light of the rapidly shifting legal landscape, more research is urgently needed to better understand the impact of legalization on public health. (Wilkinson et al.)

**Marijuana legalization negatively impacts workplaces’ employees and employers. Which means negatively affecting country’s GDP**

The existing policy does not adequately cover any new potential workplace issues from legalization, said 46% of Canadian employers in the survey. For example, legalization has a significant impact on 75.8% of drug testing policy. (Lam)

All research showed that as marijuana became legal, more people are going to use it. A 2016 data showed places that legalized recreational marijuana earlier had higher rates of marijuana positive test results. For example, Washington’s and Colorado’s number of positive rates for 2013 were up by 23% and 20%, but the average rate across the whole United States was only 6.2%. Another example was a survey based on 1256 volunteers in Canada in 2015, 18% of volunteers had used marijuana before, and 31% would likely use it after legalized. (Lam)

Workplace issues associated with marijuana will likely arise as the potential increases in users of both recreational and medical marijuana. Based on scientific research, marijuana negatively affects humans' motor skills, cognitive function, and psychological well-being, including attention, reaction, coordination, learning, reasoning, and memory. Also, humans become less alert after marijuana consumption. These all negatively affect humans work performance. More addiction situations would be raised by increasing marijuana usage. According to human rights laws in Canada, the definition of addiction is “addiction is a disability that legally requires employer accommodation to the point of undue hardship.” As the number of employees addicted to marijuana increases, employers are harder to balance the rights and responsibilities of addicted recreational, medical marijuana users and others in the workplace, for example, the accommodation right. (Lam)

Section 25 of the Canadian Human Rights Act defines disability clearly as “any previous or existing mental or physical disability and includes disfigurement and previous or existing dependence on alcohol or a drug”. According to this definition, employers need to help people with drug addiction to accommodation to the point of undue hardship. Other provincial Human Rights Laws have also found similar provisions. Moreover, the need for accommodation is raised due to legal medical use of marijuana authorized for a disability condition, whether an addiction is concerned or not.

As the number of marijuana users increased, workplaces need to give more help to those people, and they are going to do less work since they are having some disability. So, Marijuana legalization negatively impacts workplaces’ employees and employers. Which means negatively affecting country’s GDP.

**People don’t know the real effects of marijuana**

“The legalization of marijuana has led to the misconception that it is a safe, natural product with few side effects and no serious drug or disease state interactions. Although a limited amount of information was located for medical marijuana, this information is based on the assumption that medical and recreational marijuana adverse effects are similar. The efficacy of medical marijuana in several disease states has not been elucidated; however, use may be associated with significant drug-drug interactions and adverse drug reactions. In addition, legalization has been associated with increased marijuana abuse/dependence and accidental exposures in children. Increased case reports of cardiovascular events following recreational marijuana use, its potential to exacerbate respiratory disorders, and the potential for psychiatric changes establishes the need for extensive study and education to minimize these events. In order to appropriately counsel patients, pharmacists need to be informed about the use of marijuana. Additional training is necessary and essential for pharmacists to understand and recognize the potential interactions with chronic medications, especially those used for marijuana approved disease states. Extensive investigation is needed to fully understand the pharmacologic effects of marijuana for treating disease states and to minimize the detrimental effects experienced by chronic users. Pharmacists play a key role in medication management, and the legalization of medical marijuana complicates this role with little guidance. Additional studies need to be performed to determine long-term adverse effects of medical marijuana in various populations.” (Freeman and Murphy) As Freeman and Murphy stated, many people consume recreational marijuana just for fun, they don’t know the effects after consumed marijuana.

Chart, radar chart

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Figure 1 displays a radar diagram of participants’ ratings of the “seriousness of different social problems for our society.” In absolute terms, the societal problems rated as most serious in Canada remain largely unchanged, with drug problems (cocaine, amphetamine, and heroin), environment damage, violent crime, and poverty ranked as the most serious concerns. For the addictive behaviours, there was some variation between 2008 and 2018. (Giano et al.)

Table

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Table 2 displays the results of two principal components analyses with varimax rotation (for 2008 and 2018 respectively). The component structure of the ratings of the seriousness of different problems for society was very similar in 2008 and 2018. In both surveys, two factors were identified. All addictive behaviours loaded onto factor 1, whereas societal inequality issues received the highest loadings on factor 2. Smoking tobacco, gambling problems, and misuse of medical drugs also loading onto factor 2 in 2008 at a level of 0.4 or greater. In 2018, only misuse of medical drugs loaded onto factor 2, with the remaining addictive behaviours solely loading onto factor 1 (at a level of 0.4 or greater). The other item loading exclusively on factor 1 was theft and property crime, although a substantial number of the other social problems loaded onto both factors. (Giano et al.)

Between 2008 and 2018, there was some variation in ratings of the seriousness of different addictive behaviours as societal problems. Misuse of medical drugs displayed an increase in ratings of seriousness, perhaps reflecting the ongoing increased incidence of opioid overdose deaths and their media coverage. Drug problems and use of cannabis also displayed some increases in levels of concern. For drug problems, it is possible that this change is also the result of coverage of the opioid problem, as uptake of heroin and abuse of opioids is now intertwined in Canada (and the US). Increases in ratings of the seriousness of cannabis as a societal problem was unexpected (at least by the first author) based on the assumption that the increasing availability of cannabis in the past decade would have been mirrored by ratings in its decreasing seriousness as a societal problem. However, the 2018 survey was intentionally conducted around the time of legalization (half in the months before and half during the months after), and it is possible that participants in the survey were expressing some small increase in levels of concern about Cannabis, compared to participants in 2008, because it was unknown what would happen when Cannabis was legalized (e.g., would there be dramatic increases in amount of use?). Repetition of this survey in several years would be valuable to assess any sustained changes in ratings of cannabis as a societal problem. (Giano et al.)

Of the other societal issues assessed, the most substantial was the increase in concerns regarding gender inequality as a societal problem. This probably reflects the slowly growing support for female rights issues in society. Variations in some other societal issues were also observed, with increased concerns about ethnic segregation and some decrease in ratings of concern about environmental damage and violent crime (although, also notable, concerns about environmental damage and violent crime remain two of the societal problems with the highest ratings as concerns). (Giano et al.)

**Conclusion**

In conclusion, based on all five points, which are the harmful side effects negatively affecting citizens’ health. Recreational, medical marijuana and alcohol are different. Marijuana legalization negatively impacts the public health and society. Marijuana legalization negatively impacts workplaces’ employees, employers and country’s GDP, and people don’t know the real effects of marijuana. We can conclude that we should not support the legalization of marijuana. Recreational marijuana use should be illegalized since people don’t know the effect of it, and it is truly affecting citizens’ health, more than alcohol, and more uncontrollable compared to medical use marijuana. Also, even though the legalization of marijuana decreases policies work and less illegal trades, but it is still negatively affecting country’s GDP.

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