

Assessing Metro Vancouver Residents' Knowledge and Opinions of Psilocybin

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Abstract

Background

Psilocybin is a naturally occurring hallucinogen found in different species of fungi. Psilocybin has gained extensive social popularity and political attention in the United States. Research has shown that psilocybin and psychological therapy may have promising therapeutic applications for safer and more effective treatment of mental illnesses such as major depressive disorder, addiction, anxiety, and obsessive-compulsive disorder. Psilocybin remains an illegal substance in Canada, and the current data on awareness, opinions, and use of psilocybin among Canadian adults are subpar. Further research on the health effects and clinical use of psilocybin is needed before any conclusions can be made. Addressing the current lack of reliable information about psilocybin among Canadians would be a sensible start.

Methods

A self-administered electronic survey was created using SurveyMonkey. The survey was distributed publicly on the social media website Reddit, and recruitment posters containing a QR code to the online survey were publicly distributed around the Metro Vancouver region. The survey consisted of 15 multiple-choice questions that collected information about each respondent's demography, knowledge, and opinions about psilocybin. Results from the survey were analyzed via Microsoft Excel and NCSS 2023 statistical software.

Results

The survey yielded data from 252 eligible respondents. The average knowledge test score was 77%, with a standard deviation of 26%, where the lowest score was 0% and the highest score was 100%. 40.87% were between 27 to 34 years of age, and 72.28% had completed at least some post-secondary education. The demographic factors of age and education level were found to have statistically significant associations with respondents' purpose of using psilocybin. Education and past or current usage of psilocybin were associated with respondents' opinions about decriminalizing psilocybin. Furthermore, past or current usage of psilocybin was also associated with perceptions about the health outcomes of using psilocybin. Differences in knowledge about psilocybin were observed between those with a high school or college level education and those with a university degree education. However, no such difference was found between younger (< 35 years of age) and older adults (≥ 35 years of age).

Conclusion

Findings from this study indicated that adults between 19 to 65 years of age residing in Metro Vancouver have different discernment, appreciation, and outlook on psilocybin. Such differences among those adults included their tendency to use psilocybin for recreational or medicinal purposes and their support or opposition against psilocybin decriminalization. Knowledge about psilocybin was practically equal between younger and older adults but varied based on their level of education completed. Previous or current usage of psilocybin is a stronger indicator of respondents' perceptions of psilocybin concerning the substance's overall health and social effects.

Keywords: *psilocybin, magic mushrooms, psychedelics, microdosing, knowledge, perceptions, attitudes, opinions, decriminalization*

Introduction

Psilocybin is a naturally occurring hallucinogen found in over 200 species of fungi. Mushrooms containing psilocybin as its active ingredient are consumed as a psychedelic drug, colloquially known as “magic mushrooms” or “shrooms”. The hallucinating effects of psilocybin are well-known in popular culture, particularly among recreational drug users. Over the last decades, the importance of mental health and its impact on public health has become more established. One in five Canadians will experience some form of mental illness in a year (Smetanin et al., 2011). Research has shown that psilocybin may have promising therapeutic applications for safer and more effective treatment of mental illnesses such as major depressive disorder (MDD), addiction, anxiety, and obsessive-compulsive disorder (OCD) (Davis et al., 2021; Garcia-Romeu et al., 2019; Lowe et al., 2021; Petranker et al., 2022; Rootman et al., 2021). Canada continues to suffer from an unprecedented overdose crisis fueled by an unregulated and highly toxic drug supply.

Research studies, government reports, and news media all illustrate the substantial impact of mental illness and substance abuse on the health of Canadians and the stability of the Canadian

healthcare system. Therefore, understanding and appreciating the therapeutic applications and risks of psilocybin can aid in reducing the burden of mental illnesses and substance abuse on public health and the Canadian healthcare system.

Literature Review

Knowledge, Views, Policy, and Use of Psilocybin

The current state of research and data about awareness, opinions, and use of psilocybin among Canadian adults are lacklustre compared to that among Americans. This limitation of the review is compensated by the cultural and political similarities which exist between Canada and the US. As such, this review will offer a reasonable, relevant, and a general understanding of how psilocybin is being used and discussed in North America.

Survey studies conducted among American adults between 2015 to 2021 have shown increased usage of psilocybin for several different reasons (Matzopoulos et al., 2022; Yockey & King, 2021). The reasons for use include:

- maintaining mental health and well-being (preventative health practices),
- managing a diagnosed psychiatric condition, and

- managing personal/life stressors such as relationship issues or psychological trauma.

During the period of six years, data from the National Survey on Drug Use and Health (NSDUH) were analyzed and compared by researchers in addition to independent survey studies completed by researchers. In every case, findings confirm the rising popularity of psilocybin mushrooms among adults across the US. Results from the independent studies showed a higher percentage of American adults using psilocybin than reported by the NSDUH (Matzopoulos et al., 2022; Yockey & King, 2021). The COVID-19 pandemic and the US presidential election may have contributed to higher reports of use in recent years (Matzopoulos et al., 2022), among other reasons.

Efforts to decriminalize small possessions of psilocybin are becoming increasingly popular and successful in the US. The state of Oregon and U.S. cities, including Ann Arbor, Michigan; Denver; Oakland, California; and Seattle, have already decriminalized the possession of psilocybin and legalized its therapeutic use (Basky, 2021; Webster, 2019). Experts in drug use and policy hypothesize that psilocybin mushrooms are on a similar trajectory as cannabis in terms of public opinion, therapeutic applications, as well as governments' stances and steps toward decriminalization and legalization (Basky, 2021).

Therapeutic Potential

Findings from studies show the considerable therapeutic potential of psilocybin microdosing for a wide array of mental health conditions (Lowe et al., 2021). In this context, the term 'microdosing' refers to the administration of a very small dose of a psychedelic substance without inducing hallucinations or any altered state of consciousness. Microdosing is commonly expressed qualitatively and is synonymous with using a low dosage of a hallucinogen. However, microdosing can also be expressed quantitatively, where a standard definition of a micro dose would be receiving no more than 1% of the active dose of a drug (Kuypers et al., 2019).

Mental illnesses, such as major depressive disorder (MDD), have multiple consequences, are difficult to treat, and can sometimes be impossible to completely cure. As such, mental illnesses pose a substantial challenge to public health. Psilocybin has been shown to be an effective treatment for adults clinically diagnosed with MDD when supplemented with other non-pharmacological treatments, such as supportive psychotherapy (Davis et al., 2021). Among a wide age range of American adults with MDD, adherence to treatment was notably greater and adverse side effects were reported to be non-existent or minimal compared to antidepressants (Davis et al., 2021; Lowe et al., 2021).

Although the results from popular studies are encouraging, many have considerable limitations. For example, most psilocybin microdosing experiments involve participants who have clinically diagnosed and treated mood disorders or pain, often due to cancer or other chronic diseases. Given the severity of their condition and the novel use of psilocybin, the positive outcomes of the microdosing treatment may be subjected to the placebo effect.

Adverse Effects and Health Risks

Combining and analyzing data on the toxic effects of psilocybin exposure between 2000 and 2016 indicates that adverse effects persisted for under 24 hours in over 80% of psilocybin mushroom users (Leonard et al., 2018). Most cases of poisoning were reported in persons between the ages of 13 to 29, and the total male count was three times the number of females (Leonard et al., 2018). Poisonous effects, severe adverse health outcomes, and hospitalization from microdosing psilocybin may occur but are rare; moreover, they are often a result of recreational abuse or a predisposition to psychotic disorders (Bienemann et al., 2020; Kuypers et al., 2019; Leonard et al., 2018; Petranker et al., 2022). Serious health complications are more common in lysergic acid diethylamide (LSD) than in psilocybin (Leonard et al., 2018). Therefore, this finding that psilocybin mushrooms, compared to LSD, are the more benign psychedelic drug is consistent with both the literature and public perceptions in

the US (Anderson et al., 2019; Glynos et al., 2022; Matzopoulos et al., 2022). The most reported adverse effect associated with psilocybin use is acute mild or severe anxiety (Bienemann et al., 2020). Ironically, many studies have shown that microdosing psilocybin has significant potential for effectively managing anxiety disorders, among other mental health conditions (Anderson et al., 2019; Petranker et al., 2022; Rootman et al., 2021).

Illicit substances are regulated under the Controlled Drugs and Substances Act and the Controlled Substances Act in Canada and the US, respectively. These controlled drugs and other substances can be hazardous to the health of persons and public safety. The abuse potential is a measurement that can assess the risks of addiction and substance abuse from illicit substances controlled by the mentioned legislation. In an extensive systematic review that used the eight factors of the Controlled Substances Act, the authors demonstrated that psilocybin is a low risk controlled substance (Johnson et al., 2018). The risk of developing an addiction to psilocybin is low since no evidence of physiological dependence has been shown (Basky, 2021; Johnson et al., 2018). Nevertheless, as with tetrahydrocannabinol (THC) in cannabis, psychological dependence can still develop. Therefore, the classification of psilocybin as a harmful and controlled substance was likely a product of overestimating the abuse potential, gaps in the literature, stigmatization,

and political events (Basky, 2021; Johnson et al., 2018; Matzopoulos et al., 2022; Webster, 2019).

Purpose of the Study

The purpose of this study is to assess the knowledge and perceptions of adults between the ages of 19 to 65 in Metro Vancouver regarding the effects, use, and decriminalization of psilocybin. Findings from this study will provide insights into the status of psilocybin in the region, inspire further research, and guide public health programs, policies, and legislation.

Materials and Methods

Materials

This study used a laptop computer for the survey design and statistical analyses. A SurveyMonkey license was required to create and post the survey on an online platform. Statistical data analyses were done using Microsoft Excel and NCSS 2023 software to test for an association between the respondents' demographics and the knowledge and opinions of psilocybin mushrooms. 50 standard letter-sized paper posters were used to advertise the study and recruit participants. Each poster included a brief introduction about the study and an invitation to participate in the survey via a QR code. Tapes and push pins were used to post the study invitation posters at various locations.

Standard Methods

A self-administered electronic (online) survey was created using BCIT licensed version of

SurveyMonkey, an online survey platform. A pilot study was created where BCIT colleagues and instructors were invited to test and help troubleshoot the online survey. The finalized survey was available for about two weeks. The survey was distributed publicly through the online social media platform Reddit.

Additionally, physical recruitment posters containing a QR code to the online survey were publicly distributed at busy public transit stations within the Metro Vancouver region (Coquitlam Central, New Westminster, Metrotown, Surrey Central, & Commercial Broadway) and major university campuses (SFU Burnaby and Surrey campuses, and the UBC Vancouver campus).

The survey consisted of a consent page and 15 questions divided into four segments.

Specifically, the first segment was a screening step using a single question that asked the respondent if they met the eligibility requirements of age and residency in the Metro Vancouver region. Next, five questions were asked to collect demographic data for age category, the highest level of education completed, the recent history of experiencing mental illness, and the use of psilocybin mushrooms. Afterwards, the survey prompted respondents to complete a brief knowledge test about psilocybin mushrooms. All five questions in the knowledge test segment were closed-ended, as they are based on factual information where there is a correct or incorrect answer. The

fourth and final segment consisted of four questions that collected information regarding each respondent's opinions about psilocybin. More specifically, these questions assessed respondents' views of recreational and medicinal uses of psilocybin, potential outcomes of psilocybin use, and respondents' stance on decriminalizing psilocybin in Canada. After three weeks of collecting responses, the online survey closed. Statistical analyses of the data were done to test for an association between the respondents' demographics and their knowledge and opinions about psilocybin mushrooms.

The knowledge test was intentionally made to be succinct. This would have encouraged respondents to complete the short survey while efficiently and thoroughly testing their knowledge.

Furthermore, every question in the knowledge test had an "I do not know" option to mitigate the chances of random guessing. The demographic and opinion questions also had a "Prefer not to answer" option so that respondents felt their consent, comfort, and privacy were protected throughout the survey. All questions in the survey were asked in a simple manner, had a logical flow, and were relevant with respect to the research objective (Statistics Canada, 2015). The completion of the survey was expected to be no more than ten minutes.

Inclusion and Exclusion Criteria

The target population was BC residents between the ages of 19 and 65 who had lived in the Metro Vancouver region for a minimum of 12 months. The sampling was conducted within the geographic area of the Metro Vancouver region.

Ethical Considerations

To ensure the ethics of this research study the methodology, cover letter, consent form and survey questions were sent to, and approved by, the BCIT Research Ethics Board before the survey was disseminated.

Results

Description of Data

The survey collected numerical and categorical data. Results from the knowledge test segment were converted into numerical data after scoring respondents' results out of 5. A quantitative score out of five was calculated. The demographic and opinion questions collected dichotomous and multichotomous nominal and ordinal data. The survey collected multichotomous data about respondents' age and education. The data on respondents' age and education were compiled into two categories of < 35 years and \geq 35 years, and high school or college education and university education, respectively, for the two-sample t-tests. The numerical data obtained for the knowledge test questions were not normally distributed but had equal variances.

Descriptive Statistics

All data was transferred from SurveyMonkey and tabulated onto a spreadsheet using Microsoft Excel. Lastly, the data was inputted into the NCSS 2023 software for statistical analysis. The survey yielded 282 responses in total, and 30 responses were excluded from the study for either not agreeing to participate or not meeting the eligibility criteria. Descriptive statistical data collected from the demographic and opinion sections of the survey were displayed in bar graphs and pie charts to indicate the distribution of responses by group. The knowledge test scores' means, medians, modes, ranges, and standard deviations were calculated and exported from SurveyMonkey and separately recorded in a Microsoft Excel spreadsheet. The descriptive statistics from the two sample t-tests were illustrated as box plots.

Responses were obtained from participants of all age groups, with the most responses received from those aged 27 to 34 years (40.87%; N=103) (Figure 1). Most of the respondents had at least completed post-secondary education, where 25.40% held a college or technical school diploma (N=64), 33.73% held a university undergraduate degree (N=85), and 13.15% held a university graduate degree (N=33) (Figure 2). Of those who completed their university graduate education, 96.97% held a master's degree, while the remainder held a Ph.D. doctoral degree.

1. What age group do you belong to?

Answered: 252 Skipped: 0

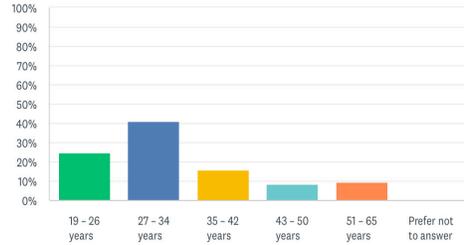


Figure 1. Age Group of Respondents

2. Please select the highest level of education you have completed:

Answered: 252 Skipped: 0

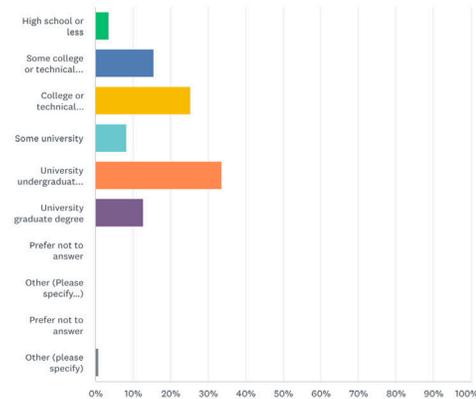


Figure 2. Highest Level of Education Completed by Respondents

When respondents were asked about their usage of psilocybin, 58.73% (N=148) stated that they have used or currently use psilocybin mushrooms or products with its active ingredient, while 39.29% (N=99) reported to have never used any psilocybin product. The rest, 1.98% (N=5), preferred not to answer (Figure 3). Among those who used or currently use psilocybin products, 66.88% (N=103) responded that their purpose for using psilocybin mushrooms was for recreational use, and 17.53% (N=27) used psilocybin mushrooms for

medicinal use. Approximately 12.34% (N=19) of respondents answered “other” when asked about the purpose of their psilocybin mushroom use. When asked to specify, their responses included “both [recreational and medicinal]”, “to reset”, “both recreation and medicinal purposes as well as meditation help”, “to quit smoking and drinking”, “spiritual/exploring”, and “it helped me to become a better person.” The rest (3.25%; N=5) preferred not to answer this question. (Figure 4).

4. Please choose one of the following:

Answered: 252 Skipped: 0

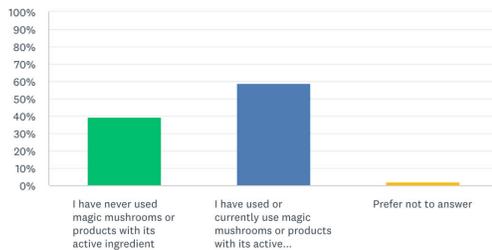


Figure 3. Usage of Psilocybin among Respondents

5. What is your purpose for using magic mushrooms

Answered: 154 Skipped: 98

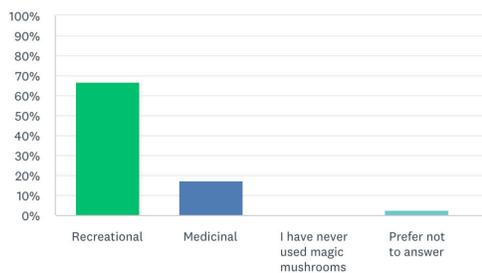


Figure 4. Purpose of Psilocybin Use among Respondents

Respondents were also surveyed about their opinions of psilocybin mushrooms. The majority of the respondents expressed “very positive” (38.10%; N=96) and “somewhat positive”

(25.79%; N=65) views about the recreational use of psilocybin mushrooms (Figure 5). Out of the total respondents, a small minority of 8.73% (N=22) held a "somewhat negative" view, and an even smaller minority of 8.33% (N=21) held a "very negative" view on recreational use. On the other hand, 15.87% (N=40) expressed a "neutral" perspective, while 3.17% (N=8) stated that they had "no opinion" (Figure 5). Similar trends were found for the medicinal use of psilocybin mushrooms. A more significant majority of respondents were found to have “very positive” (54.76%; N=138) views about the therapeutic applications of psilocybin (Figure 6). In contrast only a small minority of respondents had “very negative” (2.78%; N=7) views regarding the same idea (Figure 6).

Furthermore, a similar trend was observed when respondents were asked to describe the overall outcome of using psilocybin mushrooms. Those who believed the overall outcome of psilocybin usage was “very beneficial” and “somewhat beneficial” were 34.13% (N=86) and 29.37% (N=74), respectively (Figure 7). On the polar end of the spectrum, 5.16% (N=13) and 7.54% (N=19) of respondents indicated their answers to the question as “very harmful” and “somewhat harmful”, respectively (Figure 7). Lastly, 15.08% (N=38) had described their opinion on the overall outcome of psilocybin usage as “neutral”, while 8.33% (N=21) expressed “no opinion” (Figure 7). The survey ended with the final question asking respondents if they believe psilocybin mushrooms should be decriminalized

in Canada. A significant majority of respondents (76.19%; N=192) were in favour of decriminalizing psilocybin mushrooms in Canada (Figure 8). Those against decriminalizing psilocybin mushrooms formed a minority of 10.32% (N=26) (Figure 8). Respondents who had “no opinion” on the question formed the second largest group (12.70%; N=32), and 0.79% (N=2) preferred not to answer (Figure 8).

11. What are your views about the recreational use of mag mushrooms?

Answered: 252 Skipped: 0

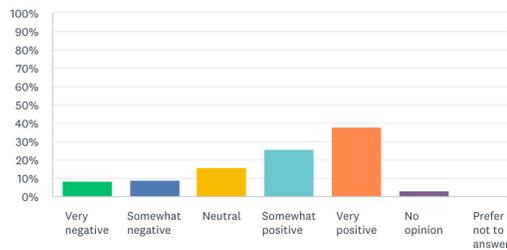


Figure 5. Views about the Recreational Use of Psilocybin

12. What are your views about the medicinal use of magic mushrooms?

Answered: 252 Skipped: 0

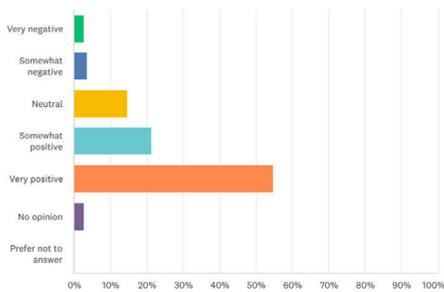


Figure 6. Views about the Medicinal Use of Psilocybin

13. Overall, how would you describe the outcome of using magic mushrooms?

Answered: 252 Skipped: 0

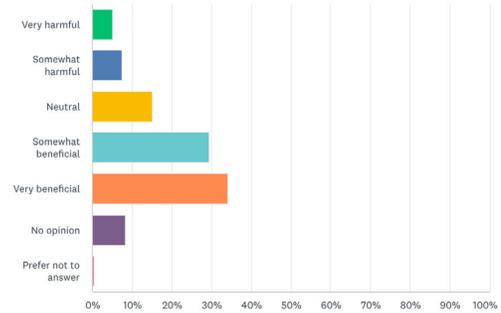
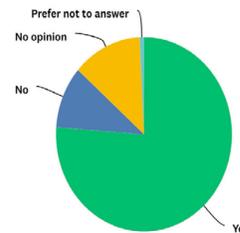


Figure 7. Views about the Overall Outcome of Psilocybin Use

14. Should magic mushrooms be decriminalized in Canada?

Answered: 252 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	76.19% 192
No	10.32% 26
No opinion	12.70% 32
Prefer not to answer	0.79% 2
TOTAL	252

Figure 8. Views about Decriminalizing Psilocybin in Canada

Regarding the knowledge test portion of the survey, the minimum, maximum, mean, median, and standard deviation of the test scores were summarized and exported from SurveyMonkey. Table 1 shows the percentage of respondents who correctly answered each of the knowledge test questions and those who answered: “I do not know”.

Table 1: Psilocybin Knowledge Test Summary Results

Question with Correct Answer	Percentage of Correct Responses	Percentage of “I do not know” Responses
What class of drugs would magic mushrooms fall under? Answer: Hallucinogens	88.89%	5.16%
What is the active ingredient of magic mushrooms? Answer: Psilocybin	73.81%	18.65%
The most notable effect of magic mushrooms on the human body is? Answer: Hallucinations	73.81%	9.13%
Please select the statement that is true: (Note: only one statement is true) Answer: Magic mushrooms may have medicinal/therapeutic uses for mood disorders	84.52%	7.94%
Magic mushrooms are highly toxic. (True or False) Answer: False	63.89%	21.43%

Inferential Statistics

Inferential statistical analysis was carried out using the NCSS 2023 statistical software. Pearson's Chi-square was used to test for independence between two categorical (non-numerical data) variables. Ten Pearson's Chi-Square tests were performed at $\alpha = 0.05$ to identify an association between respondents' demographics and opinions of psilocybin mushrooms. Two-sample t-tests were conducted to identify if any statistically significant differences exist between the means of knowledge test scores and the age groups and education level categories. One or more tests of normality assumption were rejected at $\alpha = 0.05$; therefore, the non-parametric Mann Whitney U test was used. Accordingly, the results from the Mann-Whitney U test and the power for the equal variance t-test were used for statistical inferences about respondents' knowledge of psilocybin mushrooms. The mentioned statistical tests were done for a total of 12 hypotheses. The hypotheses formulated, tests used, results generated, and conclusions drawn are summarized in Table 2.

Table 2: Summary of Inferential Statistical Analyses and Findings

#	Null (H_0) & Alternative Hypotheses (H_a)	Statistical Test	Result	Conclusion
1	<p>H_0: There is no association between the purpose of using psilocybin mushrooms and the age of Metro Vancouver residents.</p> <p>H_a: There is an association between the purpose of using psilocybin mushrooms and the age of Metro Vancouver residents.</p>	Pearson's Chi-Square Test	P-value = 0.0407	<p>Reject the null hypothesis and conclude that there is statistically significant association between the purpose of using psilocybin and age of Metro Vancouver residents.</p> <p>Potential alpha error as p-value is close to 0.05.</p>
2	<p>H_0: There is no association between opinions of the decriminalization of psilocybin mushrooms and the age of Metro Vancouver residents.</p> <p>H_a: There is an association between opinions of the decriminalization of psilocybin mushrooms and the age of Metro Vancouver residents.</p>	Pearson's Chi-Square Test	P-value = 0.0245	<p>Reject the null hypothesis and conclude that there is statistically significant association between opinions of the decriminalization of psilocybin mushrooms and the age of Metro Vancouver residents.</p> <p>Potential alpha error as p-value is close to 0.05.</p>
3	<p>H_0: There is no association between opinions about the medicinal use of psilocybin mushrooms and the reported episodes of mental illness within the last ten years among Metro Vancouver residents.</p> <p>H_a: There is an association between opinions about the medicinal use of psilocybin mushrooms and the reported episodes of mental illness within the last ten years among Metro Vancouver residents.</p>	Pearson's Chi-Square Test	P-value = 0.3730	<p>Do not reject the null hypothesis and conclude that there is no statistically significant association between opinions about the medicinal use of psilocybin mushrooms and the reported episodes of mental illness within the last ten years among Metro Vancouver residents.</p> <p>Low probability of alpha error as P-value is high.</p>

4	<p>H₀: There is no association between the purpose of using psilocybin mushrooms and the highest level of education completed among Metro Vancouver residents.</p> <p>H_a: There is an association between the purpose of using psilocybin mushrooms and the highest level of education completed among Metro Vancouver residents.</p>	Pearson's Chi-Square Test	P-value = 0.0038	<p>Reject the null hypothesis and conclude that there is statistically significant association between the purpose of using psilocybin mushrooms and the highest level of education completed among Metro Vancouver residents.</p> <p>Alpha error unlikely as p-value is very low.</p>
5	<p>H₀: There is no association between the past or current usage of psilocybin mushrooms and opinions of the overall outcome of using psilocybin mushrooms among Metro Vancouver residents.</p> <p>H_a: There is an association between the past or current usage of psilocybin mushrooms and opinions of the overall outcome of using psilocybin mushrooms among Metro Vancouver residents.</p>	Pearson's Chi-Square Test	P-value = 0.0000	<p>Reject the null hypothesis and conclude that there is statistically significant association between the past or current usage of psilocybin mushrooms and opinions of the overall outcome of using psilocybin mushrooms among Metro Vancouver residents.</p> <p>No alpha error as p-value is 0.0000.</p>
6	<p>H₀: There is no association between the past or current usage of psilocybin mushrooms and opinions of the decriminalization of psilocybin mushrooms among Metro Vancouver residents.</p> <p>H_a: There is an association between the past or current usage of psilocybin mushrooms and opinions of the decriminalization of psilocybin mushrooms among Metro Vancouver residents.</p>	Pearson's Chi-Square Test	P-value = 0.0000	<p>Reject the null hypothesis and conclude that there is statistically significant association between the past or current usage of psilocybin mushrooms and opinions of the decriminalization of psilocybin mushrooms among Metro Vancouver residents.</p> <p>No alpha error as p-value is 0.0000.</p>

7	<p>H₀: The mean knowledge test score for those < 35 years of age and ≥ 35 years of age is equal.</p> <p>H_a: The mean knowledge test score for those < 35 years of age and ≥ 35 years of age is not equal.</p>	Two Sample t-Test	<p>P-value = 0.5989</p> <p>Power = 8.83%</p>	<p>Do not reject the null hypothesis and conclude that there is no statistically significant difference between the mean knowledge test score for those < 35 years of age and ≥ 35 years of age.</p> <p>Low probability of alpha error as p-value is high. Small chance of detecting a difference as power value is < 90%.</p>
8	<p>H₀: The mean knowledge test score for those with a high school or college level education and those with a university degree education is equal.</p> <p>H_a: The mean knowledge test score between those with a high school or college level education and those with a university degree education is not equal.</p>	Two Sample t-Test	<p>P-value = 0.0380</p> <p>Power = 57.23%</p>	<p>Reject the null hypothesis and conclude that there is no statistically significant difference between the mean knowledge test score for those with a high school or college level education and those with a university degree education.</p> <p>Potential alpha error as p-value is close to 0.05. Small chance of detecting a difference as power value is < 90%.</p>

The results of five Pearson's Chi-Square tests for their respective hypotheses yielded probability values (p-values) of < 0.05 . As such, those select null hypotheses (H_0) were rejected at $\alpha = 0.05$. Therefore, it could be concluded that there are statistically significant differences in the frequencies of the expected counts and the observed counts among the past or current usage of psilocybin mushrooms, age, and education categories, in relation to the perceptions about the purpose of using psilocybin mushrooms, the opinions of the decriminalization of psilocybin mushrooms, and the views about the overall outcome of the usage of psilocybin mushrooms. In summary, there are associations between the opinions on the purpose of using psilocybin mushrooms, its decriminalization, and the views about the overall outcome of the substance's usage to the age and highest level of education completed among Metro Vancouver residents.

The two sample t-tests evaluated statistically significant differences between the means of knowledge test scores for the age and the highest level of education in the sample. The knowledge test consisted of five questions, and respondents were scored based on the number of questions they correctly answered. Each correct answer to a question earned them one point. The respondents were divided into two age cohorts: those who were < 35 years of age and ≥ 35 years of age. The first two sample t-test yielded a p-value of 0.5989, so the H_0 could not be rejected at $\alpha = 0.05$. Thus, there were no statistically

significant differences between the mean knowledge test scores of respondents < 35 and those ≥ 35 years of age. The power for the equal variance t-test at $\alpha = 0.05$ was measured to be 0.0883 (8.83%). The corresponding type II error (β) percentage was 91.17%. For the second two-sample t-test, respondents were categorized as either having a high school/college degree education or a university degree education. The test resulted in a p-value of 0.0380, where the H_0 could be rejected, at $\alpha = 0.05$. Therefore, statistically significant differences were found between the mean knowledge test scores of respondents who completed a high school or college degree education versus their counterparts who completed a university degree education. More specifically, the mean knowledge test score for adults with a university education was 73.8%, and adults with a high school or college level education had a higher average score of 80.8%. The power for the equal variance t-test at $\alpha = 0.05$ was measured to be 0.5723 (57.23%). The corresponding β percentage was 42.77%.

Discussion

The objective of this study was to survey the knowledge and perceptions of adults between the ages of 19 to 65 in Metro Vancouver regarding the effects, use, and decriminalization of psilocybin. In particular, the authors were interested in investigating if any demographic groups were associated with favourable or unfavourable opinions about psilocybin.

Additionally, the study aimed to assess the association between knowledge test scores and respondents' age and level of education.

The data collected from the survey and the results of Pearson's Chi-Square tests indicated a statistically significant association between the purpose of using psilocybin and the age of Metro Vancouver residents. Respondents < 35 years of age were almost three times more likely to use psilocybin for recreational purposes compared to those ≥ 35 years of age. The medicinal use of psilocybin was slightly more prevalent among those ≥ 35 years of age by a factor of 1.25.

Similarly, there was an association between the purpose of using psilocybin and the highest level of education completed. Those who had high school or college level education were more likely to use psilocybin for recreational, medicinal, or other purposes compared to their counterparts with university degree education who showed less interest in psilocybin usage. However, the differences between the two education cohorts concerning the purpose of psilocybin use were less than that found in the age groups.

Also, there was an association between the opinions on decriminalizing psilocybin mushrooms and the age of Metro Vancouver residents. Respondents < 35 years of age were twice more likely to vote in favour of the decriminalization of psilocybin compared to those ≥ 35 years of age. The distribution of those

against decriminalizing psilocybin was nearly equal between the two age groups.

Past or current usage of psilocybin was statistically associated with opinions about the overall outcome of using psilocybin and its decriminalization. In particular, most (85.81%) of past or current psilocybin users described their overall experience as somewhat beneficial or very beneficial. Respondents who had never used psilocybin were more likely to view the substance's effects as harmful by a factor of 15.

The overwhelming majority of respondents favoured decriminalizing psilocybin whether or not they used psilocybin in the past. Although respondents who have never used psilocybin were more likely to have negative views about its usage, they were still almost twice as likely to support the decriminalization of psilocybin compared to those who have used it. These findings provide interesting insights into the beneficial implications and popularity of psilocybin among adults in the Metro Vancouver region.

Interestingly, no significant difference was found in the mean knowledge test score between those < 35 years of age and ≥ 35 years of age. This finding came as a surprise given the tremendous popularity of the usage of psilocybin and the support for its decriminalization among the younger age cohort. On the contrary, the mean knowledge test score between those with a high school or college level education and those

with a university degree was not equal. On average, those with a high school or college level education were more likely to score higher (> 60%) on the knowledge test than their counterparts who held university degrees.

Limitations

This study was subjected to limitations surrounding the design and dissemination of the survey. With any form of a survey, especially one involving a knowledge test, there is always the inherent risk of respondents randomly guessing their responses. Due to ethical considerations, the survey did not include a draw prize and relied solely on participants' interest in the topic. This approach, along with the option of answering "I do not know" and "Prefer not to answer" questions, aimed to offset the temptation of random guessing for each survey question. Furthermore, to promote accessibility and maintain the anonymity of respondents, the online survey could only be posted on the social media platform Reddit. This methodology led to the challenge of reaching demographics who do not use Reddit, particularly older age groups and those with no or limited access to online social media. The physical recruitment posters may have offset this limitation. Nevertheless, the posters may have attracted younger demographics more, given their placement in public transit stations and major university campuses.

Disseminating the survey through Reddit also proved challenging since many relevant subreddits had rules against researchers posting their surveys there. Posting the survey link to specific subreddits also permitted other Reddit users to share the survey on different subreddits that were more likely to draw in biased respondents. This scenario occurred when a random Reddit user shared the survey unsolicitedly. The survey link was shared on the subreddit "Shroom Stocks", an online community of individuals with invested financial and personal gains in promoting psilocybin. As such, the responses from those subreddit members may have introduced biases in the study and skewed the results to score highly on the knowledge test and hold positive views about psilocybin.

Lastly, the survey had the limitation of asking a question about respondents' mental health history without having the research objective and resources to assess mental health status effectively. The question did not describe what constitutes a "mental illness" or an episode thereof. The concept of mental illness in the study was not defined as a prescribed list of medical or psychiatric diagnoses such as Major Depressive Disorder. Nonetheless, the authors decided to leave the definition of a "mental illness" to the interpretation of each respondent. The concept and experience of mental illness can vary greatly among individuals. Since this is not a psychiatric or clinical study, the survey

refrained from asking about respondents' psychiatric diagnoses. The authors appreciate the complex and subjective nature of mental health and illness. Moreover, people have diverse definitions and experiences regarding their mental health. Therefore, the authors ensured the question was as inclusive and open-ended as possible while still collecting responses via a close-ended question. However, the authors also acknowledge the possibility of biases and inconsistencies with responses that stemmed from respondents' subjective reporting of mental illness.

Knowledge Translation

The results from this study provided insights into the existing state of affairs of psilocybin in the Metro Vancouver region of BC. Psilocybin remains an illicit substance that may still be a mysterious, misunderstood, or stigmatized hallucinogenic drug in Canada. This study also identified the perceptions and level of basic knowledge of psilocybin across different demographics in the region. Regardless of the awareness of psilocybin and all associations that may be drawn from this study, the authors have reasonable grounds to believe that psilocybin has been growing in popularity across Metro Vancouver. Furthermore, the unregulated cultivation and sale of psilocybin mushrooms and their illegal possession and use continue to be an unaddressed issue from political, social, and public health perspectives. The exploratory findings from this study are relevant to the

health and safety of the public, given the current political and social landscape of BC surrounding the decriminalization of several illicit drugs. Health Canada has granted an exemption from the Controlled Drugs and Substances Act to the province of BC for selected illicit substances from January 31, 2023, until January 31, 2026 (Province of British Columbia, 2023). This study is the first to survey a Canadian population about psilocybin. The province of BC and the rest of Canada continue to experience high prevalence and increasing incidence of mental health and drug overdose crises. The findings highlight the current popularity of psilocybin usage and the reasonably high knowledge of psilocybin mushrooms in Metro Vancouver. With increasing research about the clinical applications of psilocybin to treat mental health conditions, the information gathered in this study can contribute to fruitful opportunities. Such opportunities may include but are not limited to, educational programs and other awareness-raising campaigns about the safe use of psilocybin. Furthermore, insights offered by this study and others on the topic can assist governments with developing policies and legislation to regulate the production of psilocybin products and ensure safe exposure to the public.

Future Research

The following are suggested ideas for future research projects:

- meta-analysis on comparing the effects of new psilocybin policies, guidelines, or legislation on the health of populations in US regions and Canadian regions,
- survey on the effects of microdosing psilocybin on individuals' mental health status,
- survey on assessing the general public's knowledge of psilocybin mushrooms using a more comprehensive knowledge test,
- repeat this study for other regions in BC or Canada to compare results, and
- repeat this study after the decriminalization or legalization of psilocybin to compare results.

Conclusion

Findings from this study indicated that adults between 19 to 65 years of age residing in Metro Vancouver have different discernment, appreciation, and outlook on psilocybin. Such differences among those adults included their tendency to use psilocybin for recreational or medicinal purposes and their support or opposition against psilocybin decriminalization. Metro Vancouver adults' inclination to use psilocybin for either recreational or medicinal purposes, and their stance on decriminalizing psilocybin, was associated with their age group and level of education. Persons < 35 years of age (younger adults) more commonly used psilocybin for recreational purposes, while persons \geq 35 years of age (older adults)

preferred the medicinal use of psilocybin. Support for decriminalizing psilocybin in Canada was also prevalent among younger adults and adults with no reported history of psilocybin use. Interestingly, the latter were likelier to think psilocybin has harmful health effects. Furthermore, substance usage was more common in adults who had an education up to a college diploma level in contrast to their counterparts who had a university education. Based on respondents' performance in the knowledge test, the level of awareness about psilocybin was virtually equal between younger and older adults. However, adults with a high school or college education scored a higher average on the knowledge test compared to their counterparts with a university education. Therefore, despite the higher enthusiasm about psilocybin among younger adults, years of age and higher levels of education do not signify having more knowledge about psilocybin mushrooms. Previous or current usage of psilocybin had a more significant relationship with respondents' perceptions of psilocybin's overall health and social effects.

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Competing Interests

The authors declare that they have no competing interests.

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