Attitudes and Beliefs Toward Cannabis Before Recreational Legalization: A Cross-Sectional Study of Community Adults in Ontario

Jasmine Turna,[1,2] Iris Balodis,[1,2] Michael Van Ameringen,[1,3] Jason W. Busse,[1,4] and James MacKillop[1,2,*]

Abstract

Objectives: To characterize attitudes and perceptions regarding risks and benefits of cannabis before Canadian legalization for recreational use, both in general and between cannabis users and nonusers.

Methods: A cross-sectional sample of community adults assessed in the month before legalization (September 17 to October 17, 2018). Overall, 1,480 individuals (60% female) of an average age of 34.5 years (±13.92) were included in the analysis; 48% reported cannabis use in the past 6 months. Attitudes and perceptions were assessed using a subset of items from the Canadian Cannabis Survey, the National Survey on Drug Use and Health, and the Risks and Benefits of Cannabis Use.

Results: Most commonly identified risks of cannabis were impaired memory (67%) and legal problems (54%). Most also identified addiction as a risk (52%), although 25% reported that cannabis was not addictive. The most commonly identified benefits were for pain relief (94%) and management of stress, anxiety, or depression (80%). Active cannabis users systematically reported lower endorsement of risks and higher endorsement of benefits. Only 6% of respondents anticipated increasing cannabis use postlegalization. Among other legal substances, medical cannabis was considered the most socially acceptable, followed by alcohol, recreational cannabis, electronic cigarettes, and then combustible cigarettes.

Conclusion: Before legalization, attitudes toward cannabis in this sample of Canadian adults were generally favorable, particularly for medical cannabis. Perceptions of risk were often compatible with existing evidence, but notable proportions underendorsed risk of cannabis use disorder and overendorsed benefits for mental health. These results suggest priorities for public health messaging and provide benchmarks for understanding attitudinal changes postlegalization.

Keywords: addiction; anxiety; attitudes; cannabis; legalization; marijuana; pain

Introduction

Over the past two decades, cannabis use in Canada has gradually increased[1] and the regulatory landscape has evolved rapidly. Historically, cannabis was an illicit substance until 2001, when medical access was initially permitted.[2] Access to medical cannabis was revised in two subsequent legislative changes that created a commercial industry to produce and distribute cannabis, and an expanded set of products. Most recently, on October 17, 2018, Canada legalized nonmedical (recreational) cannabis use,[3] making Canada the first G7 nation and the second country at all (after Uruguay) to have fully legalized sale and consumption of recreational cannabis nationwide. Characterizing the effects of this legislation is a high priority and understanding the context before legalization will be essential to do so.

Monitoring effects on attitudes and perceptions about cannabis is one important domain. In the United

[1]Department of Psychiatry and Behavioural Neurosciences, Michael G. DeGroote Centre for Medicinal Cannabis Research, McMaster University and St. Joseph's Healthcare Hamilton, Hamilton, Canada.
[2]Department of Psychiatry and Behavioural Neurosciences, Peter Boris Centre for Addictions Research, McMaster University and St. Joseph's Healthcare Hamilton, Hamilton, Canada.
[3]Department of Psychiatry and Behavioural Neurosciences, MacAnxiety Research Centre, McMaster University, Hamilton, Canada.
[4]Department of Anesthesia, McMaster University, Hamilton, Canada.

*Address correspondence to: James MacKillop, PhD, Michael G. DeGroote Centre for Medicinal Cannabis Research, McMaster University and St. Joseph's Healthcare Hamilton, 100 West 5th Street, Hamilton, Ontario L8P 3R2, Canada, E-mail: jmackill@mcmaster.ca

States, there is extensive evidence that attitudes toward cannabis have become more positive.[4,5] Since the early 2000s, data from the United States reveal decreases in perceived risk of cannabis use in adolescents and adults.[6,7] For example, a 2017 national survey found that 9% believed that there were no risks associated with cannabis use and 22% believed it was not addictive.[8] Over time, these attitudinal shifts have been associated with greater use of cannabis.[6,7,9] Thus, data on Canadian attitudes before legalization may also forecast subsequent changes in behavior. In addition, general attitudes toward risks and benefits are important population-level indicators, as they are not specific to active cannabis users. Finally, disconnects between attitudes and evidence may identify important gaps in public education and prevention for health care workers and policy makers.

The current study sought to characterize attitudes toward cannabis risks/benefits in a cohort of community adults immediately before cannabis legalization, examining both overall trends and differences between recent cannabis users and nonusers. Our goal was to provide a snapshot of Canadian attitudes toward cannabis before legalization to establish a reference point for subsequent patterns postlegalization.

Methods

Setting and participants

We administered an online survey to establish attitudes toward cannabis and other legal substances. Participants were community adults (age 18–65 at recruitment) in the Population Assessment for Tomorrow's Health Research Registry ($N = 2,152$) at the Peter Boris Centre for Addictions Research (McMaster University and St. Joseph's Healthcare Hamilton, Hamilton, Canada) who responded to an e-mail solicitation and provided informed consent.

The principal eligibility criteria for enrollment in this registry were intentionally broad: ages 18–65; ≥9th grade education (for literacy); openness to being contacted for future studies; and no terminal illnesses that would preclude participation in future studies. In addition, the registry was enriched with emerging adults (age 19.5–23 years) reporting high-risk drinking (i.e., >4/3 drinks in an episode for males/females, respectively) two or more times in the prior month; this comprised 35% of the original registry. Data for this follow-up investigation were collected online via Research Electronic Data Capture (RED-Cap)[10] during the month before legalization, from

September 16 to October 17, 2018. In addition to the first e-mail solicitation, weekly e-mail reminders were sent to all participants of the registry to complete this baseline assessment. Participants received an online gift card ($40 CAD) upon completion of the survey.

In total, 1,502 participants enrolled in the study (70% of the original research registry), of whom 1,480 (98.5%) provided a completed survey and met data quality check criteria (see Online assessment) (Fig. 1). Approximately half (47.9%, $n = 709$) reported cannabis use in the past 6 months, at a median frequency of two to three times/month. Recent cannabis users were younger, more often male, and reported greater use of other legal substances (Table 1). Within cannabis users, frequent users (defined as those using 3–4 days/week or more frequent; $n = 207$) reported significantly lower education and income, but not age, ethnicity, sex, or marital status, compared to occasional users (cannabis use <1 day/month). All procedures were approved by the Hamilton Integrated Research Ethics Board (Project number 4699; McMaster University and St. Joseph's Healthcare Hamilton) and were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

Online assessment

Our survey captured demographic characteristics, including age, sex, race, income, marital status, and education. Attitudes and perceptions regarding cannabis use before legalization were assessed using a subset of items from the Canadian Cannabis Survey,[11] the National Survey on Drug Use and Health,[12] and Risks and Benefits of Cannabis. Recent cannabis users were defined as those reporting cannabis use (medical or nonmedical) in the past 6 months, and these respondents also completed the Cannabis Use Disorder Identification Test—Revised (CUDIT-R).[13] A modified version of the first item of the CUDIT-R was used to inform cannabis use frequency. Past 6-month drinkers and smokers completed the Alcohol Use Disorders Identification Test (AUDIT)[14] and the Fagerström Test for Nicotine Dependence (FTND), respectively.[15] Five data quality control questions with predetermined correct answers (e.g., "For this item, select option B") were included to flag low effort or inattention; participants were required to answer ≥3/5 correctly for inclusion.

Statistical analysis

We used descriptive statistics to summarize the data and explored for differences in sociodemographic

FIG. 1. Flowchart of all respondents.
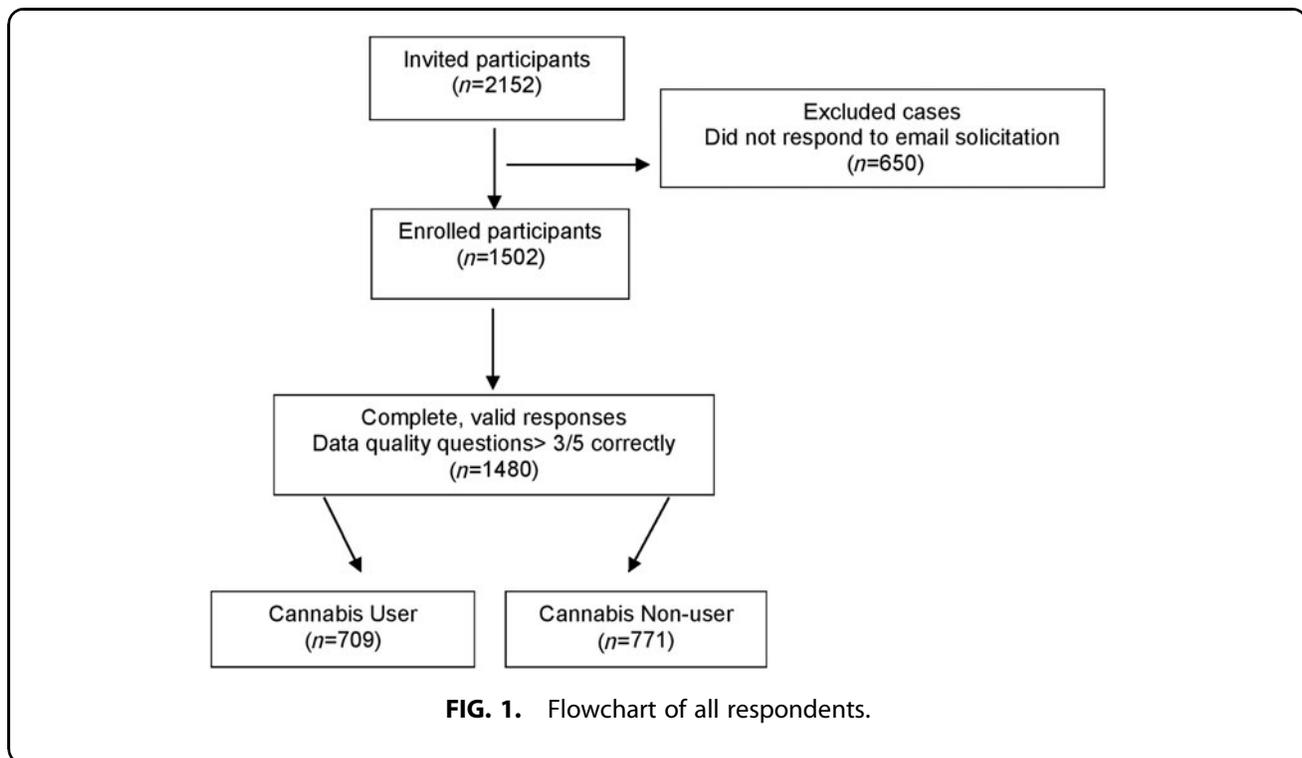
characteristics based on recent cannabis use status using t-tests for continuous outcomes and χ^2 tests for categorical outcomes. Data regarding risks and benefits of cannabis use and perception of other legal substances among cannabis users and nonusers were assessed using analysis of covariance. The selected demographic covariates included the following: (1) age; (2) sex; (3) income; (4) marital status; and (5) level of education as cannabis users and nonusers differed on these variables. All analyses were conducted using IBM SPSS Statistics 25[16] with a conservative significance level of 0.005 to reduce the risk of spurious associations.[17]

Results

Perceived risks and benefits of cannabis use

Overall, impaired memory (67%), legal problems (54%), addiction (52%), and decreased energy (52%) were the risks most often associated with cannabis use (Table 2). The most common perceived benefits related to pain management (94%), relief from stress, anxiety, or depression (80%), treatment of diseases such as epilepsy or multiple sclerosis (76%), improved sleep (66%), and appetite (64%). Approximately half of respondents (51%) reported that use of cannabis could help reduce use of prescription medication. Only 2% of respondents believed that cannabis had no benefits (Table 2).

Participants who reported recent cannabis use generally identified fewer risks and more benefits of cannabis. Compared with nonusers, significantly fewer users identified addiction to cannabis (40% vs. 60%), personal or relationship problems (38% vs. 55%), increased use of other drugs (7% vs. 16%), decreased intelligence (25% vs. 41%), or new or worsening health problems (18% vs. 28%) as risks of use. Perceived risk of impaired memory, legal problems, and decreased energy were comparable between the two groups. Legal problems and addiction to cannabis were reported as the most important risks of cannabis by users and nonusers, respectively (Table 2).

Compared with nonusers, more users rated cannabis as nonaddictive (35% vs. 16%), at least somewhat safe for pregnant women (10% vs. 3%), at least somewhat safe in terms of second-hand smoke exposure (47% vs. 20%), and associated with less risk of physical harm when used regularly (Table 2). A large majority of both users and nonusers reported pain management to be a benefit of cannabis use (95% vs. 94%), and the most important of its benefits. Cannabis users were more likely to report benefits of cannabis for mental health (86% vs. 75%), treatment of diseases such as epilepsy or multiple sclerosis (81% vs. 71%), improved sleep (80% vs. 53%), and appetite (78% vs. 52%). Furthermore, users more

Table 1. Participant Demographics and Substance Use Behaviors

Variable	Total cohort (N = 1,480)	Recent nonusers (n = 771)	Recent cannabis users (n = 709)	p
Age, years; mean ± SD	34.53 ± 13.92	38.53 ± 14.49	30.19 ± 11.82	<0.005
Sex (%)				<0.005
Female	59.73	64.07	55.01	
Male	40.27	35.93	44.99	
Race (%)				0.476
White/European	79.19	81.19	77.01	
Nonwhite/Non-European	20.81	18.81	22.99	
Income (%)				<0.005
<$30k	21.35	16.08	27.08	
At least $30k but less than $60k	20.95	17.38	24.82	
At least $60k but less than $90k	19.93	23.48	16.08	
At least $90k but less than $120k	17.70	20.63	14.52	
>$120k	20.07	22.44	17.49	
Marital status (%)				<0.005
Single	68.24	81.81	55.77	
Married	31.76	18.19	42.23	
Education level (%)				<0.005
<High school	2.50	2.20	2.82	
High school	6.08	5.71	6.49	
Some college/university	37.70	33.33	42.45	
Associate degree	8.38	8.69	8.04	
Bachelor's degree	34.32	35.80	32.72	
Master's degree completed	8.17	9.86	6.35	
Professional degree completed	2.84	4.41	1.13	
CUDIT-R (mean ± SD)	NA	NA	6.87 ± 5.52	
AUDIT (mean ± SE)	4.51 ± 4.11[a]	3.63 ± 0.14[b]	5.47 ± 0.15[b,c]	<0.005
Drinks per week (mean ± SE)	6.03 ± 7.70[a]	4.85 ± 0.28[b]	7.33 ± 0.29[b,c]	<0.005
FTND (mean ± SE)	0.32 ± 1.19[a]	0.23 ± 0.04[b]	0.42 ± 0.4[b,c]	<0.005
Smoker status	14.8	9.5	20.6	<0.005

Significance level for all is p < 0.005.
[a]Sample size is as stated in each column unless noted by the following: n = 1,479 (total).
[b]Adjusted means are presented with age, sex, income, marital status, and education as relevant covariates.
[c]Sample size is as stated in each column unless noted by the following: n = 708 (recent users).
AUDIT, Alcohol Use Disorders Identification Test; CUDIT-R, Cannabis Use Disorder Identification Test—Revised; FTND, Fagerström Test for Nicotine Dependence; NA, not applicable; SD, standard deviation; SE, standard error.

often reported improved creativity (60% vs. 24%) and reducing/discontinuing medications (61% vs. 42%) as additional benefits of cannabis (Table 2).

Perceived risks and benefits of cannabis relative to other legal substances

In the overall sample, second-hand smoke from cannabis and smoking cannabis were both, to a degree, rated safer than the analogous cigarette-related behaviors. Heavy tobacco (≥1 pack/day; 78%) and alcohol (≥4 for women or ≥5 drinks for men/day; 71%) consumption was perceived to be a significant health risk. Driving under the influence of cannabis was rated comparable with drinking and driving (44%) (Table 3).

In comparisons based on cannabis use, users felt that smoking a joint was much safer than smoking a cigarette (32% vs. 10%) or drinking a glass of wine (8% vs. 2%) per day. Furthermore, users believed that second-hand smoke from cannabis was much safer

than second-hand tobacco smoke (31% vs. 7%), as was driving under the influence of cannabis compared with alcohol (16% vs. 2%) (Table 3).

Social acceptability of cannabis and other legal substances

Among other legal substances, acceptability of medicinal cannabis was highest, followed by alcohol. Participants were generally neutral toward cigarettes, e-cigarettes, and recreational cannabis (Fig. 2).

In comparisons based on recent cannabis use status, most cannabis users "strongly" approved (58.2%) of adults trying recreational cannabis once or twice, while nonusers were most commonly neutral (47.0%). Nonusers exhibited very favorable attitudes toward medicinal cannabis while exhibiting neutral attitudes toward recreational use. Acceptability ratings of alcohol, cigarettes, vaping, and e-cigarettes were comparable between the two groups (Fig. 3).

Table 2. Perceived Risks and Benefits of Cannabis Use

Variable	Total, $N = 1{,}480$, %		Recent nonusers, $n = 771$, %		Recent users, $n = 708$, %		p
	At all	Most important	At all	Most important	At all	Most important	
What do you believe are the risks of cannabis?							
Impaired memory	67.36	12.57	68.61	11.15	66.00	14.12	0.410
Legal problems	54.19	16.16	53.70	11.54	54.72	21.19	0.272
Addiction to cannabis	52.09	19.95	63.68	25.29	39.49	14.12	<0.005
Decrease in energy	51.76	4.60	49.93	2.33	53.74	7.06	0.991
Personal or relationship problems	46.62	7.23	54.47	7.91	38.08	6.50	<0.005
Increased use of other drugs	35.67	11.43	46.69	15.82	23.70	6.64	<0.005
Increase in stress, anxiety, or depression	33.58	9.40	32.42	7.13	34.84	11.86	0.248
Decrease in intelligence (IQ)	33.58	4.53	41.12	4.93	25.39	4.10	<0.005
New or worsening health problems	23.04	6.09	27.89	6.87	17.77	5.23	<0.005
Disrupted sleep	21.69	0.81	21.27	0.13	22.14	1.55	0.574
Other risk	7.97	3.85	9.34	4.67	6.49	2.97	0.206
Cannabis has no risks	3.92	3.38	2.07	2.20	5.92	4.66	<0.005
What do you believe are the benefits of cannabis?							
Pain management	94.26	44.69	93.90	51.88	94.64	36.86	0.720
Relief from stress, anxiety, or depression	80.00	16.90	74.45	9.21	86.04	25.28	<0.005
Treatment of disease (e.g., epilepsy or MS)	75.74	26.10	71.08	29.31	80.82	22.60	<0.005
Improved sleep	66.01	3.11	53.18	1.17	79.97	5.23	<0.005
Improved appetite	64.39	1.15	52.27	1.17	77.57	1.13	<0.005
Help decreasing/stopping other medicines	51.22	4.19	42.02	3.24	61.21	5.23	<0.005
Improved creativity	40.88	0.74	23.74	0.52	59.52	0.99	<0.005
Improved focus or concentration	16.89	0.07	7.39	0.00	27.22	0.14	<0.005
Increased energy	12.50	0.34	5.58	0.26	20.02	0.42	<0.005
Other benefits	3.78	0.81	1.69	0.26	6.06	1.41	<0.005
Cannabis has no benefits	2.23	1.89	3.24	2.98	1.13	0.71	0.011
How addictive is cannabis?							
Very	10.95		17.25		4.10		<0.005
Somewhat	64.23		67.06		61.16		
Not at all	24.81		15.69		34.75		
How safe is cannabis use for pregnant women?							
Completely unsafe	70.86[a]		79.38		61.58[b]		<0.005
Somewhat unsafe	22.92		17.77		28.53		
Somewhat safe	5.95		2.85		9.32		
Completely safe	0.27		0.00		0.56		
In your opinion, does using cannabis for nonmedical purposes impair one's ability to drive or operate a vehicle?							
Yes	78.08[c]		87.53[d]		67.80[b]		<0.005
No	3.04		1.17		5.08		
It depends	13.60		6.36		21.47		
Don't know/not sure	5.28		4.94		5.65		
How safe is exposing adults to second-hand smoke from cannabis?							
Completely unsafe	20.35[a]		30.22		9.60[b]		<0.005
Somewhat unsafe	46.59		49.68		43.22		
Somewhat safe	23.33		16.86		30.37		
Completely safe	9.74		3.24		16.81		
How safe is exposing children to second-hand smoke from cannabis?							
Completely unsafe	68.22		75.87		59.89		<0.005
Somewhat unsafe	24.95		20.36		29.94		
Somewhat safe	5.88		3.37		8.62		
Completely safe	0.95		0.39		1.55		
How much do people risk harming themselves physically and in other ways when they use cannabis once a month?							
No risk	43.03[c]		28.83[d]		58.47[b]		<0.005
Slight risk	43.98		51.56		35.73		
Moderate risk	10.83		16.10		5.08		
Great risk	2.17		3.51		0.71		
How much do people risk harming themselves physically and in other ways when they use cannabis once or twice a week?							
No risk	24.83[c]		14.16[d]		36.44[b]		<0.005
Slight risk	43.03		39.35		47.03		
Moderate risk	25.71		35.97		14.54		
Great risk	6.43		10.52		1.98		

Statistically siginifcant findings are at alpha 0.005.
Sample size is as stated in each column unless noted by the following: [a]$n = 1{,}479$ (total); [b]$n = 708$ (recent users); [c]$n = 1{,}478$ (total); [d]$n = 770$ (nonusers).
IQ, intelligent quotient; MS, multiple sclerosis.

Table 3. Perceived Risks of Other Substances and Their Relation to Cannabis

	Variable	Total (n = 1,479), %	Recent nonusers (n = 771), %	Recent users (n = 708), %	p
Cigarettes					
How does smoking one cannabis joint per day compare with smoking one cigarette per day?	Much less safe	7.51	11.15	3.53	<0.005
	Somewhat less safe	13.72	16.47	10.73	
	Equally safe	20.01	23.99	15.68	
	Somewhat safer	38.20	38.52	37.85	
	Much safer	20.55	9.85	32.20	
How does second-hand smoke from cannabis compare with second-hand smoke from tobacco?	Much less safe	5.34	8.30	2.11	<0.005
	Somewhat less safe	9.26	12.58	5.65	
	Equally safe	26.77	34.24	18.64	
	Somewhat safer	40.03	37.48	42.80	
	Much safer	18.59	7.39	30.79	
How much do people risk harming themselves physically and in other ways when they smoke one or more packs of cigarettes per day?	No risk	4.60[a]	4.16[b]	5.08	0.471
	Slight risk	5.01	5.71	4.24	
	Moderate risk	12.04	11.30	12.85	
	Great risk	78.35	78.83	77.82	
Alcohol					
How much do people risk harming themselves physically and in other ways when they have four (females) or five (males) drinks of an alcoholic beverage nearly every day?	No risk	0.41	0.26	0.56	0.100
	Slight risk	5.21	4.80	5.65	
	Moderate risk	23.19	20.36	26.27	
	Great risk	71.20	74.58	67.51	
How much do people risk harming themselves physically and in other ways when they have four (females) or five (males) drinks of an alcoholic beverage once or twice a week?	No risk	6.36[c]	5.71	7.06[d]	<0.005
	Slight risk	36.11	33.07	39.41	
	Moderate risk	47.53	48.90	46.04	
	Great risk	10.01	12.32	7.49	
How does smoking one cannabis joint per day compare with drinking one glass of wine per day?	Much less safe	12.37	17.64	6.64	<0.005
	Somewhat less safe	30.16	34.76	25.14	
	Equally safe	43.41	38.91	48.31	
	Somewhat safer	9.13	6.87	11.58	
	Much safer	4.93	1.82	8.33	
How does driving under the influence of cannabis compare with driving under the influence of alcohol?	Much less safe	6.22	8.17	4.10	<0.005
	Somewhat less safe	9.94	12.45	7.20	
	Equally safe	43.88	53.18	33.76	
	Somewhat safer	31.44	24.25	39.27	
	Much safer	8.52	1.95	15.68	

Statistically siginifcant findings are at alpha 0.005.

Sample size is as stated in each column unless noted by the following: [a]n = 1,478 (total); [b]n = 770 (nonusers); [c]n = 1,480 (total); [d]n = 709 (recent users).

Perceived consequences of cannabis use

Overall, participants believed cannabis had a positive effect on mental health, creativity, and sleep, but a negative effect on cognition (i.e., memory, attention, thinking/decision-making, concentration), physical fitness (i.e., coordination, reaction time, and balance), and motivation (Fig. 4).

In comparisons based on recent cannabis use status, users indicated more favorable effects on mood, creativity, and sleep, and nonusers rated cannabis' effects on remaining factors significantly more negatively, with the exception of anxiety, shyness, and memory (Fig. 5). Cannabis users reported that cannabis use either had no effect or a slight positive effect across life domains. In each case, "no effect" was the modal response, reported by below half to approximately three-quarters of users. The second-most common attribution was a weak positive effect of cannabis use;

<10% of respondents perceived any negative effect on life factors (Table 4).

Cannabis accessibility prelegalization

Reported accessibility of cannabis before legalization was high, with 86.3% of nonusers and 97.5% of users stating it was "fairly easy" or "very easy" to obtain cannabis if desired. Most respondents reported noticing public use of cannabis in the 6 months preceding legalization. Although vaping (32.2%), edibles (18.9%), or "other" (9.3%) means of consumption were not commonly noticed, many detected the odor (68.4%) or someone smoking cannabis (73.4%). Only 10.9% had not noticed anyone using cannabis in public. When asked about intended recreational cannabis use following legalization, only a small proportion of both groups intended to increase (6.1% overall; 9.4% of users vs. 3.0% of nonusers) or decrease (1.2% overall; 1.0% of
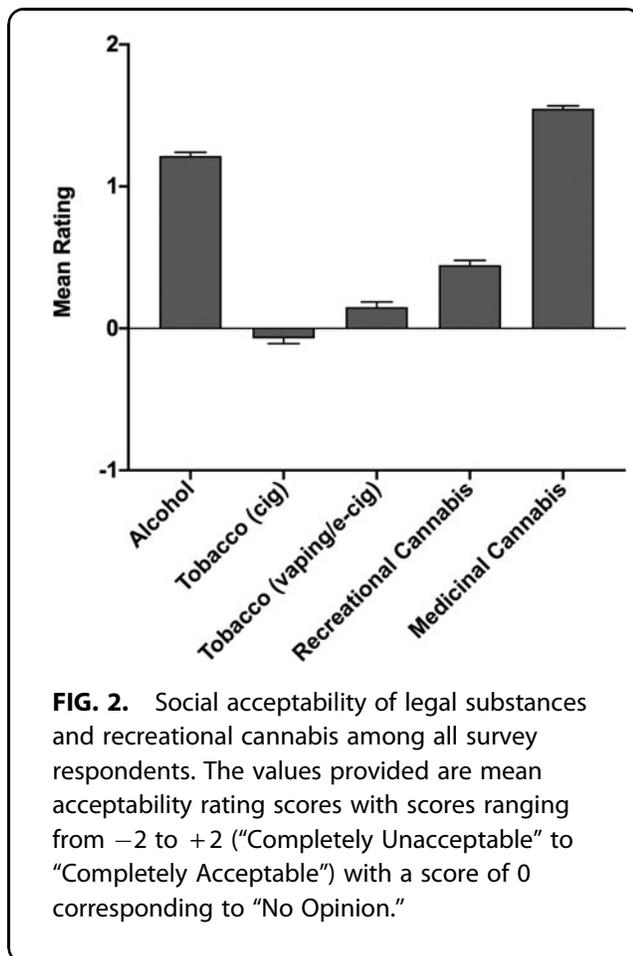
FIG. 2. Social acceptability of legal substances and recreational cannabis among all survey respondents. The values provided are mean acceptability rating scores with scores ranging from −2 to +2 ("Completely Unacceptable" to "Completely Acceptable") with a score of 0 corresponding to "No Opinion."

users vs. 1.4% of nonusers). Rather, most of the sample reported no intention of changing use (50.8%; 64.4% of users and 38.6% of nonusers).

Discussion

In the month before legalization, attitudes toward cannabis in this cohort of community adults varied considerably but were generally favorable. Medicinal cannabis use, in particular, was highly acceptable and above levels of other legal substances. Cannabis was considered to be readily accessible before legalization, and most participants did not intend to increase their use following legalization. In many ways, these generally sanguine perceptions of cannabis, for both users and nonusers, reflect public support of legalization.

Attitudes expressed toward cannabis were generally consistent with the existing evidence. For example, driving simulator studies on cannabis effects have demonstrated a relationship between blood tetrahydrocannabinol levels and impaired performance,[18] and cannabis intoxication has been associated with moderate statistically significant increases in motor vehicle crash risk.[19] Consistent with this, a large majority of participants recognized the risks of using cannabis and operating an automobile. Similarly, cannabis use during pregnancy is associated with adverse birth outcomes (i.e., lower birth weight and placement in neonatal intensive care unit) and problems later in life,[20] and more than 90% of participants reported cannabis use being unsafe for pregnant women. Despite this, the prevalence of cannabis use during pregnancy in Ontario increased from 1.2% to 1.8% between 2012 and 2017 ($p < 0.001$).[21]

An earlier Canadian survey study from 2016 reported increasingly positive perceptions associated with cannabis use; however, in comparison with our results, these previous findings revealed greater harm perceptions associated with cannabis use[22] regardless of cannabis use status. For instance, 71% of respondents in this 2016 survey reported driving under the influence of cannabis to be as harmful as driving under the influence of alcohol[22]; while only 44% of our sample said they were "equally safe" and 31% indicated that it was "somewhat safer" (Table 3). Furthermore, ~40% of the 2016 sample reported cannabis to be more harmful than helpful for physical and mental health,[22] whereas in the current sample, an overwhelming majority identified certain physical and mental health benefits of cannabis (e.g., pain management = 94% and relief from stress, anxiety, and depression = 80%) exceeding the rates of any reported risk (e.g., impaired memory = 67%) (Table 2).

Some beliefs expressed in the current sample reflect substantive disconnects between participant attitudes and the existing evidence, potentially serving as "red flags" for widely held misconceptions. For example, approximately a quarter of participants endorsed the perspective that cannabis is not addictive. Although it only affects a minority of cannabis users, cannabis use disorder is nonetheless a well-recognized syndrome[9,23] that generally scales to level of use.[24] Remarkably, 80% of participants reported mental health benefits of cannabis, although the clinical evidence for its use for treating those conditions is almost entirely absent and based entirely on low-quality data.[25] Furthermore, there is evidence that cannabis use is positively associated with psychiatric symptoms (especially among groups with a genetic predisposition)[26,27] and that it longitudinally precedes depression and suicidality in adolescents.[28]

Similarly, a benefit of cannabis in treating pain was almost universally endorsed in this sample, which
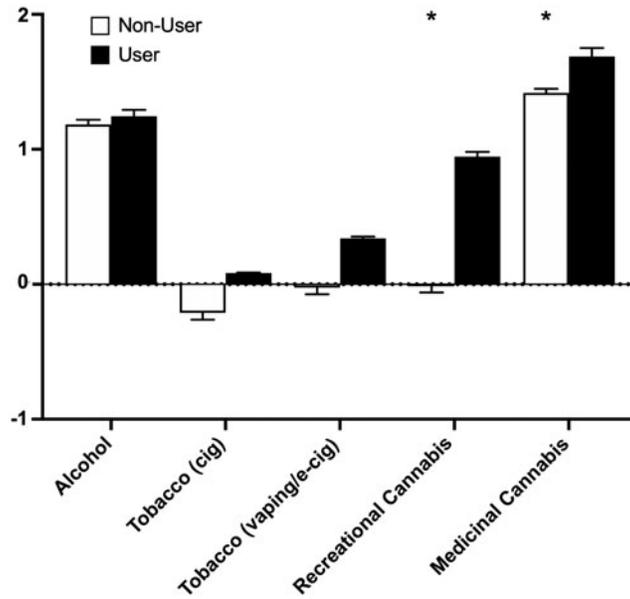
FIG. 3. Social acceptability of legal substances and recreational cannabis based on the past 6-month cannabis use status. The values provided are mean acceptability rating scores with scores ranging from −2 to +2 ("Completely Unacceptable" to "Completely Acceptable") with a score of 0 corresponding to "No Opinion." *Indicates difference is statistically significant ($p < 0.005$).
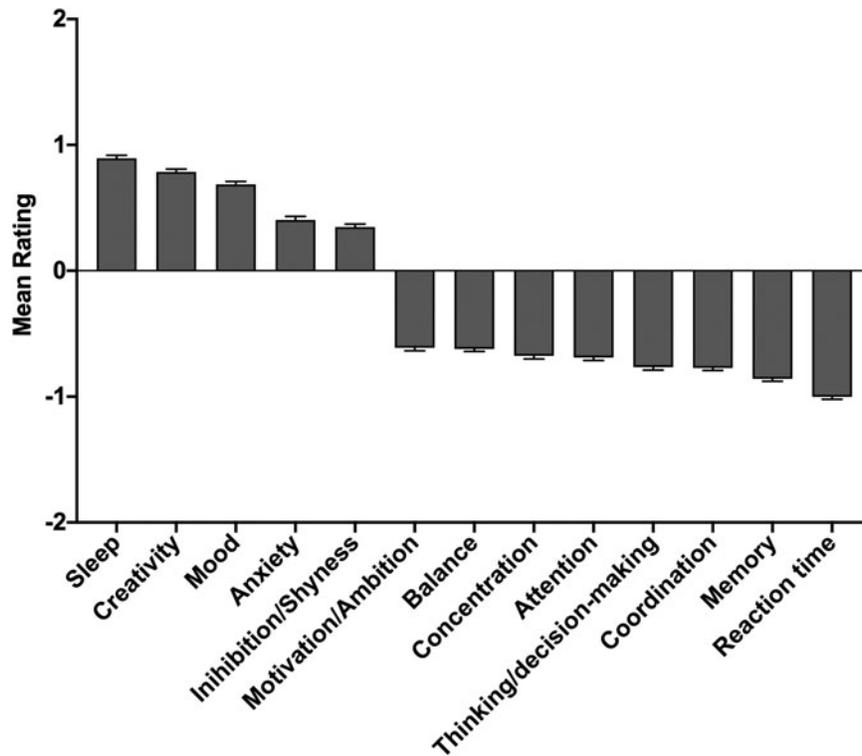

FIG. 4. Perceived effects of cannabis among all survey respondents. The values provided are mean effect rating scores with scores ranging from −2 to +2 ("Very Positive" to "Very Negative") with a score of 0 corresponding to "No Effect/Don't Know."
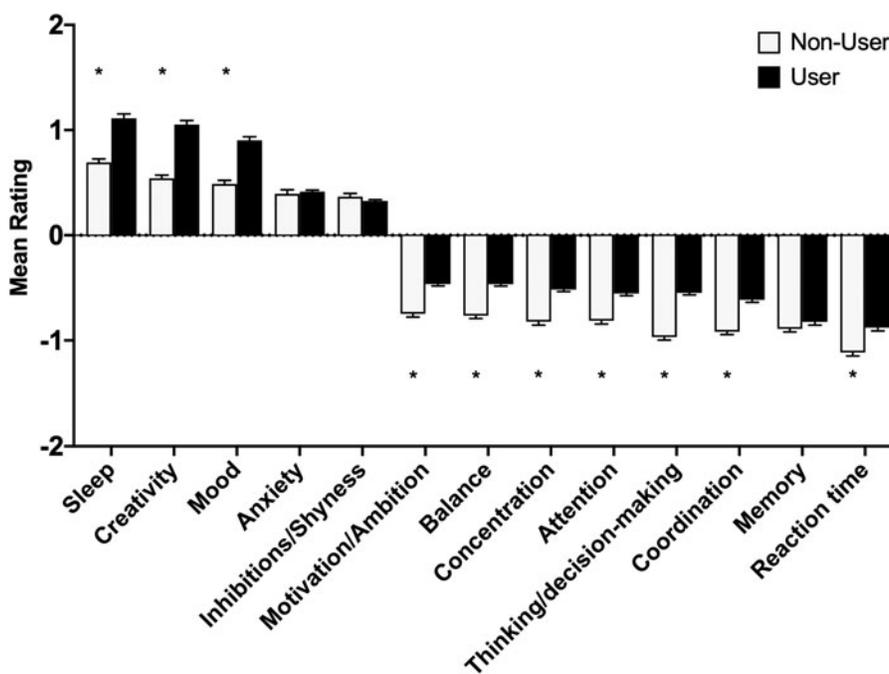
FIG. 5. Perceived effects of cannabis based on the past 6-month cannabis use. The values provided are mean effect rating scores with scores ranging from −2 to +2 ("Very Positive" to "Very Negative") with a score of 0 corresponding to "No Effect/Don't Know." *Indicates difference is statistically different ($p < 0.005$).

also outpaces existing empirical evidence. For example, in a recent meta-analysis of cannabis for chronic non-cancer pain, a significant effect was present, but the effect size reflected only an average reduction of 3 mm on a 100 mm visual analog scale. Furthermore, the number needed to treat for pain relief was 24 and, for adverse events, the number needed to harm was 6.[29] However, the adverse events reported in this review were minor, with dizziness, drowsiness, nausea, cognitive or attention disturbance, and intoxication reported most frequently. Likewise, a recent Cochrane review on

Table 4. Perceived Effect of Cannabis Use on Life Factors Among Cannabis Users ($n = 709$)

	Very positive	Positive	No effect	Negative	Very negative
Life factor			%		
Friendships or social life	9.87	32.16	54.02	3.67	0.28
Physical health	6.63	20.59	64.46	8.04	0.28
Physical mobility	6.77	16.50	68.69	7.90	0.14
Mental health	11.42	33.43	47.25	7.05	0.85
Home life or marriage	5.22	15.80	75.04	3.67	0.28
Work or studies	5.22	9.73	76.87	6.91	1.27
Quality of life	13.12	37.09	46.12	3.10	0.56

cannabis for neuropathic pain concluded that the observed benefits appear to be outweighed by the harms.[30] Given that the scientific base for medical cannabis is relatively mixed in general,[31] the current cohort evinced more positive attitudes on medical benefits than the existing evidence. Medical cannabis legalization, which has been present in Canada since 2001, may explain the positive perceptions, despite the literature only supporting use in a small number of conditions.[32]

Notably, the discordance between attitudes and evidence in these areas was significantly larger for cannabis users. For instance, less than half of users identified addiction as a risk of cannabis use at all and more than one-third characterized it as being not at all addictive. These generally favorable attitudes have also been noted in the United States.[8] For example, in a national survey, more than 85% similarly indicated relief from stress, anxiety, or depression as a benefit, with more than a quarter reporting this as the most important benefit. Finally, even in areas where attitudes and evidence were consonant, small but meaningful proportions of users identified cannabis as safe for operating a vehicle or for use in pregnant women. In general,

where gaps were present between attitudes and evidence, they were larger among cannabis users.

Differing perceptions may also be fueled by demographic differences among cannabis users. For instance, existing research suggests that cannabis users, particularly younger adults (18–34 years old)[8,33] and males,[33–35] associate cannabis with fewer risks and consequently greater use. With that said, recent work suggests that the "gender gap" may be reducing[36] and results of the National Cannabis Survey also suggest that following cannabis legalization in Canada, seniors have shown the greatest increase in cannabis use.[37] Consequently, it is important that future work examines the effect of legalization on cannabis use and perceptions particularly among different demographic groups.

A number of considerations bear on the current findings. For instance, the survey included questions drawn from existing population surveys, many of which used the term "marijuana" in place of cannabis. It is possible that these questions may have impacted participants when responding, given its racial and stigmatizing connotations. Furthermore, the distinction between users and nonusers pertains to the past 6 months; nonusers in this sample are not necessarily "never-users." Similarly, users were typically occasional users and by no means a clinical sample of individuals with cannabis use disorder. Also of note, the temporal window to which these results pertain immediately precedes legalization (the preceding 6 months in terms of behaviors). Thus, attitudes may have been actively changing over time, and this may be explained by the increasingly positive attitudes noted in jurisdictions who are about to legalize cannabis or those with existing medical cannabis legislation.[38]

Furthermore, in Canada specifically, the observed largely positive attitudes at prelegalization may also have taken effect when the country elected a government proposing cannabis legalization or when plans regarding implementation of the *Cannabis Act* were announced. Equally, the close temporal proximity to legalization is also a strength of the study in terms of benchmarking attitudes, as are its moderately large sample size and the conservative significance threshold that was substantially exceeded by the vast majority of comparisons. Finally, the study capitalized on an existing research registry and the sample was not representative of the Canadian population as a whole, possibly limiting the generalizability of our findings. For instance, the mean age of the current sample is in the midthirties and older individuals (age 65+) were not well represented. Similarly, although intentional oversampling was not used, the rates of cannabis use were higher than seen in the general population. However, this aspect of nonrepresentativeness is mitigated to the extent that higher rates provided greater resolution into attitudes held by cannabis users and permitted greater statistical power for comparisons with nonusers. Thus, the current study provides one window into cannabis and other drug attitudes in a general community sample before the legalization of recreational cannabis in Canada, but not a definitive or comprehensive account.

Conclusion

Cannabis use has increased considerably in Canada, with last-year rates having more than doubled from 1985 (5.6%) to 2015 (12.3%).[1,11] Use rates and risk perception are influenced by macrolevel factors, such as laws, that shape perceptions regarding normative substance use,[39] and previous legislative changes may have partially contributed to these changes. Medicinal cannabis laws may also explain the generally positive attitudes in the current sample, as data from U.S. states with legalized medicinal cannabis reveal decreased perceived risk and higher rates of use.[38]

Given the major regulatory change in the form of legalization, a high priority for the future is longitudinal surveillance to determine the extent to which change (or stability) is present. The current findings provide an important anchor point for understanding attitudinal changes in the years to come, as changes in risk and benefit perception are important population-level indicators and may forecast changes in behavior and other health outcomes, and may also inform public health strategies for minimizing harms in the postlegalization era. In particular, aggressive large-scale public education strategies on the state of the evidence on both cannabis risks and potential benefits are needed. Such public education strategies are especially warranted for active cannabis users.

Author Disclosure Statement

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Abbreviation Used

CUDIT-R = Cannabis Use Disorder Identification Test - Revised