



Cannabis use behaviors and prevalence of anxiety and depressive symptoms in a cohort of Canadian medicinal cannabis users



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ABSTRACT

Cannabis is commonly used recreationally for its euphoric and relaxing effects, while its medical use is permitted in several jurisdictions. With only low-quality evidence suggesting anxiolytic effects of cannabis and strong public sentiment surrounding such purported effects, the purpose of this study was to examine the prevalence of cannabis for medicinal purposes (CMP) use for anxiety symptoms. An online survey was disseminated to CMP users registered with a Canadian licensed producer. Respondents completed demographic and validated self-report questionnaires (GAD-7, PHQ-9, MINI-SPIN, and panic disorder/agoraphobia DSM-5 criteria). Cannabis use behaviors were also discussed. Overall, 2032 completed responses with a verified user number were collected. Of the total sample, 888 (43.7%) reported CMP authorization to treat anxiety symptoms and completed all psychometric screening instruments. Rates of probable disorders were high (Generalized Anxiety Disorder: 45.6%, Social Anxiety Disorder: 42.4%, Major Depressive Disorder: 25.7%, Panic Disorder/Agoraphobia: 25.7%); 63.4% met screening criteria for ≥ 1 disorder. Most (92%) reported that cannabis improved their symptoms, despite continuing to endorse moderate-level severity. Nearly half (49%) reported replacing a non-psychiatric (53.7%) or psychiatric medication (46.3%) prescribed to them by their physician with CMP. Respondents endorsed daily CMP use and severity of anxiety (GAD-7, $p < 0.001$) and depressive (PHQ-9, $p < 0.001$) symptoms were positively associated with the amount of cannabis used/day. The vast majority perceived symptom improvement with CMP use and did not believe CMP use was associated with impairment or an inability to control use. Nevertheless, the possibility of cannabis use disorder cannot be ruled out as well as the possibility that improvements in non-psychiatric conditions were attributed to improvements in anxiety. These results highlight the need to systematically evaluate CMP use for mental illness.

1. Introduction

Cannabis is commonly used recreationally for its euphoric and relaxing effects. The dried plant is typically smoked or vaporized and also consumed in foods or used as a concentrated oil. Although considered an illicit substance in many parts of the world, regulatory bodies in the Netherlands, and several US states have legalized medicinal and/or recreational use, with Canada having legalized recreational use on October 17, 2018. Prior to this, only cannabis for medicinal purposes (CMP) could be legally obtained from licensed producers for a myriad of medical conditions, with appropriate physician authorization. A

recent meta-analysis revealed moderate-quality evidence to support cannabinoid treatment of chronic pain and spasticity, with very low-quality evidence suggesting improvement in anxiety and no effect in depression (Whiting et al., 2015). Only small studies of synthetic cannabinoids (Fabre and McLendon, 1981; Glass et al., 1981; Ilaria et al., 1981; Lee, 2009) or cannabidiol (CBD) (Bergamaschi et al., 2011; Crippa et al., 2011) have been examined in clinically anxious populations. Yet, many Canadians report using cannabis to alleviate self-reported anxiety (Walsh et al., 2013).

Anxiety disorders are chronic conditions with a lifetime prevalence of 31.6% (Kessler et al., 2012). They include social anxiety disorder

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(SAD), generalized anxiety disorder (GAD), panic disorder (PD) and specific phobias. These disorders are associated with significant burden for afflicted individuals, their families and society (Katzman et al., 2014). While many established efficacious first-line treatments exist, including antidepressants and cognitive-behavioral therapy, 40–60% of patients continue to have residual, impairing symptoms while others are non-compliant or have difficulty accessing treatments (Katzman et al., 2014). Given such limitations, individuals may seek alternative treatments and public sentiment surrounding cannabis' purported anxiolytic effects suggest cannabis may fulfil this role.

The primary active components in cannabis are Δ^9 -tetrahydrocannabinol (THC) and CBD. While THC is thought to have anxiolytic, antidepressant and hypnotic effects, CBD has demonstrated anti-inflammatory, analgesic, anticonvulsant, and anxiolytic properties, (Walsh et al., 2017). Of the two primary cannabinoids, THC is the psychoactive constituent and at higher doses has been documented to induce panic, paranoia and anxiety, (D'Souza et al., 2004; Fusar-Poli et al., 2009). The ratio of these cannabinoids varies greatly between strains of cannabis and consequently may induce a wide variety of effects. For instance, when CBD is administered with THC, it has demonstrated an ability to “undo” the unwanted and anxiogenic effects of THC by acting as a pharmacological antagonist (Karniol et al., 1974; Zuardi et al., 1982). Given the various cannabinoids and other active compounds in the cannabis plant, it is difficult to discern the specific behavioral effects of cannabis. As such, the existing cannabis literature comprised of studies of pure or synthetic cannabinoids may not be a sufficient proxy to illustrate cannabis' potential anxiolytic effects. Canadians are currently using cannabis for anxiety symptoms (Sexton et al., 2016; Walsh et al., 2013) but whether these individuals are treating state anxiety or symptoms of a clinical disorder remains unclear. With the scientific literature indicating cannabis as a non-evidence-based treatment for anxiety, mood and related disorders (Turna et al., 2017), this study examines the prevalence of CMP use for anxiety, psychiatric symptom severity and CMP use behaviors in a sample of authorized Canadian medicinal cannabis users.

2. Methods

2.1. Study population and design

An online survey was disseminated to all authorized CMP users registered with Tilray (British Columbia, Canada, $n = 16,675$) on January 9, 2017, and was closed 48 h later. Respondents received a \$10 account credit towards future Tilray purchases. Following acknowledgement of a disclosure statement, information regarding demographics and CMP use was collected. Questions were structured in multiple choice, checklist and rating scale format. Individuals were not able to skip question(s) they did not wish to answer, therefore, all completed questionnaires did not contain missing data. Many questions contained “skip logic”, so that if the respondent answered “no”, they did not complete further questions concerning this topic. Study data was collected and managed using Research Electronic Data Capture (REDCap) (Harris et al., 2009), a Health Insurance Portability and Accountability (HIPAA) and Personal Information Protection and Electronic Documents Act (PIPEDA) compliant online survey tool allowing participants to directly enter responses.

2.2. Outcome measures

All respondents answered questions regarding primary illness and symptoms treated with CMP. Those who identified anxiety as one of their primary symptoms treated with CMP in the second question then completed validated self-report symptom severity scales to characterize psychiatric morbidity including: 1) the GAD-7: a 7-item questionnaire used to screen for GAD and anxiety symptom severity, a score ≥ 10 was used to suggest moderate anxiety (Spitzer et al., 2006); 2) The Patient

Health Questionnaire (PHQ-9) is a multipurpose instrument for screening, monitoring and measuring depressive symptom severity with a total score ≥ 15 suggesting moderately severe depression (Kroenke et al., 2001); 3) The MINI Social Phobia Inventory (Mini-SPIN) is a validated 3-item scale in which a total score ≥ 6 indicates significant SAD symptoms (Connor et al., 2001). Given that no brief measure for panic disorder was found in the literature, four screening questions from the Panic Agoraphobia Scale (PAS) (Bandelow, 1995) were included, and a positive screen for potential panic disorder symptoms was coded if respondents identified the presence of panic attacks and reported > 1 panic attack in the past 2 weeks. Respondents were instructed to answer questions based on the past two weeks. Additional questions regarding CMP use and its effect on symptoms were also incorporated. The survey included 25 anxiety-related questions.

2.3. Statistical analysis

Descriptive statistics, including means, standard deviations and percentages were used to describe demographics, perceived efficacy, conditions, etc. Data analysis was performed using R (version 3.3.1, R Core Team). Frequencies were compared using a chi-square test. A one-way ANOVA or *t*-test was used to examine mean differences between groups, where applicable.

2.4. Ethics approval

This study was approved by the Institutional Review Board Services.

3. Results

In total, 3405 responses were received and 2032 responses were paired with a verified user number. Of the total sample, 888 (43.7%, ANX group) identified anxiety as one of the primary symptoms for CMP use from a list of 14 prepopulated medical symptoms. These respondents were asked to complete all symptom severity screening questionnaires.

3.1. Sample demographics

The mean age of the ANX group was 36.3 ± 10.8 years (range: 16–84 years). The sample was primarily male (58.2%), married (36.1%), employed full-time (50.3%), living in an urban area (43.6%) and with a college education (32.2%); additional demographic characteristics can be found in Table 1. This sample was prescribed CMP by 607 different physicians.

3.2. Psychiatric comorbidity

Based on the cut-off for each respective screening tool, rates of probable anxiety and depressive disorders within the ANX were high (Table 2). In this sample 63.4% met screening criteria for ≥ 1 disorder.

The severity of anxiety (GAD-7) and depressive (PHQ-9) scores were positively associated with the amount of cannabis used per day. This was examined using a one-way ANOVA with GAD-7 score as the dependent variable and low (< 1 g/day), moderate (1–2g/day) or high (≥ 3 g/day) CMP use as the independent variables. Post-hoc comparisons revealed that high users had significantly higher GAD-7 (11.5 ± 5.8) and PHQ-9 (11.8 ± 6.9) scores than moderate (GAD-7: 9.1 ± 5.3 ; PHQ-9: 9.5 ± 6.6) or low users (GAD-7: 9.3 ± 5.3 ; PHQ-9: 9.8 ± 6.1) (GAD-7: $F(2,771) = 14.0$, $p < 0.001$; PHQ-9: $F(2,771) = 9.3$, $p < 0.001$). No differences were observed between low and moderate users.

3.3. Psychiatric effects of CMP use

To better understand perceived efficacy of CMP for symptomatic

Table 1
Demographic characteristics of ANX sample.

Characteristic (n = 888)		%	Characteristic (n = 888)		%
Sex	Male	58.2	Employment	Full-time	50.3
	Female	41.5		Part-time	13.0
	Other	0.3		Unemployed (looking for work)	11.1
Marital Status	Married/Common-law	61.1		Unemployed (not looking for work)	5.4
	Single	31.1		Retired	2.5
	Divorced/Separated	7.1		Disabled	17.7
	Widowed	0.7			
Education	High School or less	25.0		Annual Household Income	≤ \$39,000
	Some college/university	23.5	\$40,000 - \$69,999		26.8
	Technical/non-university degree	32.2	\$70,000 - \$99,999		16.3
	University degree	14.8	≥ \$100,000		16.4
	Graduate degree	4.5	Ethnicity	Caucasian	85.1
Province	Alberta	64.2		More than one race	5.4
	Ontario	19.7		Metis	1.9
	British Columbia	6.0		Asian	1.7
	Other Provinces	10.1		Other ^a	5.9

^a Other: Aboriginal, South Asian, Black, Hispanic and ‘Other’.

Table 2
Prevalence of anxiety and depressive disorders in ANX as per self-report screening measures (n = 888).

Disorder	Diagnostic cut-off score	Prevalence (%)	Mean Score
GAD	GAD-7 ≥ 10	45.6%	9.8 ± 5.5
SAD	Mini-SPIN ≥ 6	42.4%	4.9 ± 3.5
MDD	PHQ-9 ≥ 15	25.7%	10.4 ± 6.4
PD/agoraphobia	Modified PAS criteria	25.7%	NA

relief, the ANX group was asked to identify the anxiety and depressive symptoms CMP use improved, using 21 prepopulated choices (allowed to check all that applied). The majority of the ANX group reported that CMP improved their “anxiety, worry, fears” (92.0%), “irritability” (75.5%), “difficulty falling to sleep” (72.4%), “anxiety attacks” (58.8%) and “low mood” (56.9%) (Fig. 1). When asked how effective CMP was at relieving these symptoms on a scale of 1 (not at all effective) to 5 (very effective), 64.9% reported a rating of 4 or more; only 1%

responded “not at all effective”. Respondents using > 3 g cannabis/day reported significantly greater perceived benefit related to cannabis use as compared to individuals using < 3 g/day (p < 0.0001).

Many in the ANX group reported using cannabis to feel relaxed (84.4%). Respondents were also asked which cannabis strains were thought to best improve their anxiety and which strains they found to worsen their anxiety. They could select as many of the 6 prepopulated options available. *Cannabis indica* was more often reported to have a subjective anxiolytic effect (51.5%), while *Cannabis sativa* was the most frequently reported anxiogenic strain (32.3%) (Fig. 2).

3.4. Cannabis use behaviors

A majority of the ANX group used cannabis recreationally (99.5%) prior to medicinal use. However, 85.5% reported trying at least 1 traditional mental health treatment before CMP ($\bar{x} = 2.6 \pm 2.0$ treatments), with 55.5% reporting medication and 20.5% reported cognitive-behavioral therapy. Use of other cannabinoid drugs was relatively

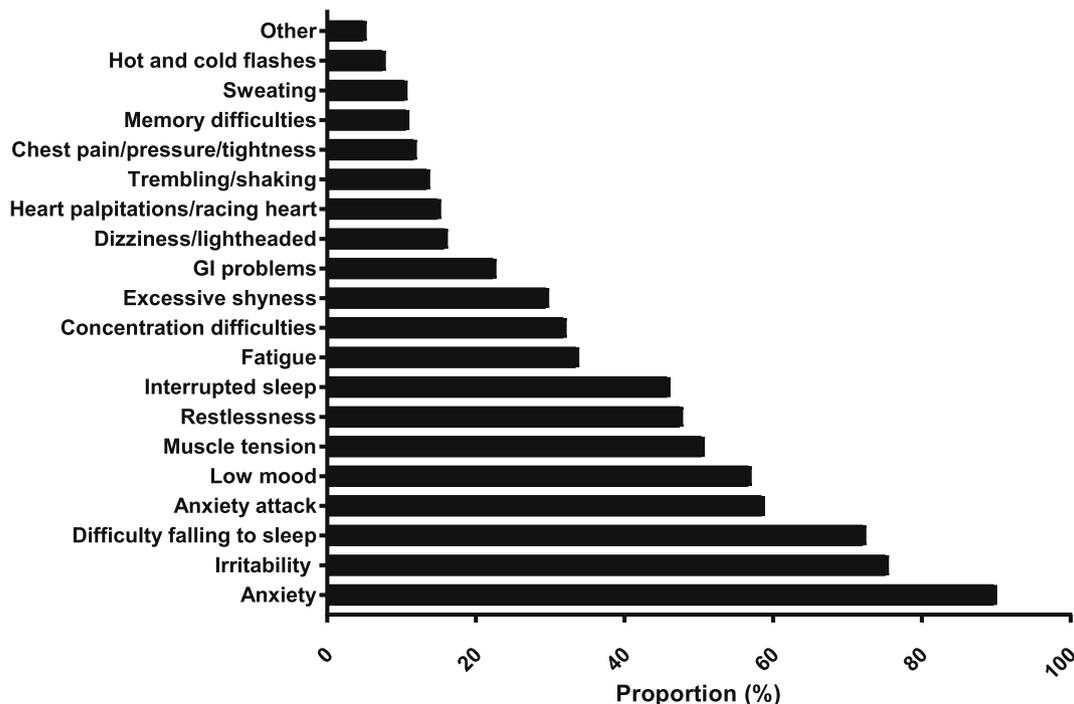


Fig. 1. Symptoms of anxiety and depressive disorders reported to be relieved by CMP use in ANX group (n = 888).

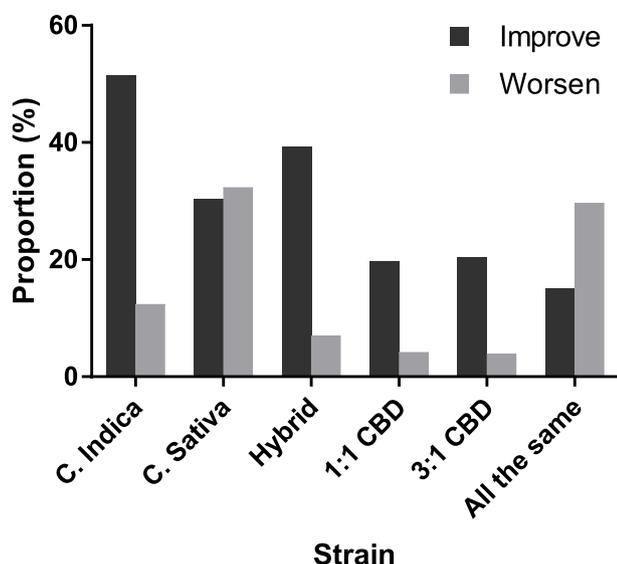


Fig. 2. Subjective reports of anxiogenic versus anxiolytic effects of varying cannabis strains (n = 888).

low (Dronabinol:1.0%, Nabilone:5.9%, Sativex:1.6%, Other Cannabinoids:0.6%). Fifty respondents (6%) endorsed having a primary mental health condition and had no previous treatment prior to their CMP. Although not significant, these individuals tended to be male, have lower levels of education and endorsed that cannabis is safer than prescription medication compared with respondents who had tried at least one traditional treatment. They also reported significantly younger mean age of recreational cannabis use (15.96 vs. 17.48, $t(99.97) = -2.5571, p = 0.01$).

In total, 22.1% of respondents stated that their use of cannabis had increased “a lot” since obtaining access to CMP, with 42% of individuals using 1–2 g of cannabis per day. Thirty-five percent reported using < 1 g/day while 23% of the sample used ≥ 3 g/day. Respondents did not believe they had difficulty controlling CMP use (79.7%) or that their social and leisure activities were impaired by it (84.4%). Most respondents also reported vaporizing (47.6%) as the preferred mode of delivery, followed by oral ingestion (21.4%, includes edibles, oils, etc.), joints (18.5%), etc.

Respondents were also asked which prescription drugs they had replaced with cannabis (up to 3 answers permitted) and at what rate they were substituting the prescription medication with CMP. Nearly half of the ANX sample (49%) reported substituting a prescribed medication with CMP to some degree, of whom 61% indicated that cannabis had completely (100%) replaced a drug prescribed to them by their physician for a given medical condition (Table 3). We also compared the rates of substitution between individuals with and without

Table 3
Proportion of the ANX sample replacing a prescribed medication with medicinal cannabis (n = 888).

Drug Class	%
Antidepressants	23.8
Opioid	19.2
Benzodiazepine	15.8
NSAIDs	6.1
Antiepileptic	5.0
Sedative-Hypnotic	4.2
General Analgesic	3.9
Psychostimulant	3.7
Antipsychotic	3.0
All others	15.3

Table 4
Frequencies of primary condition for which CMP has been authorized by a medical doctor.

Indication	ANX group (n = 888)	All respondents (n = 2032)
Mental Health (Stress, Anxiety, Depression, PTSD, eating disorders)	52.9%	30.6%
Chronic Pain	17.2%	26.7%
Insomnia	8.0%	9.4%
Other	5.0%	8.9%
Arthritis	3.5%	7.7%
All others	13.4%	16.7%

anxiety. No significant differences in medication substitutions or CMP usage patterns were found between those with anxiety and those without.

3.5. Primary condition for CMP

Among all respondents (n = 2032), mental health (30.6%) was most frequently identified as the primary medical condition currently being treated with CMP. Mental health (52.9%) was also the most frequent indication in the ANX group (n = 888) (Table 4). Demographic characteristics and cannabis use behaviours were compared among individuals in the ANX group who were prescribed CMP to treat a mental health condition (52.9%) versus those taking CMP for a non-psychiatric condition (47.1%). Respondents who were prescribed CMP for a non-psychiatric condition appeared to use slightly more cannabis ($\chi^2(6) = 19.339, p = 0.004$) and were more likely to be on disability ($\chi^2(5) = 33.15, p < 0.001$; 24.1% vs. 11.9%) than respondents prescribed CMP to treat a mental health condition. Although not significant, most respondents using CMP for a non-psychiatric condition were male, married, living in a suburban area and have a technical or non-university degree. No significant differences were found between groups in terms of level of income, province of residence, scores on the PHQ-9 or GAD-7 nor in the perceived benefit of cannabis use.

4. Discussion

The primary finding of this study is the high frequency of CMP use for the treatment of self-reported anxiety symptoms (43.7%, ANX). Almost 2/3 of the ANX group met screening criteria for ≥ 1 disorder (63.4%), with GAD and SAD being the most common (Table 2). Similarly, anxiety and depressive scores were also higher in those using more cannabis (using ≥ 3 g/day). Although the majority of participants reported that CMP use improved their anxiety symptoms (Fig. 1), severity measures indicated at least ongoing moderate symptoms (Table 2). This suggests that even if cannabis has been helpful for these individuals, it may not be effectively decreasing symptoms to a clinically significant level. For instance, their symptoms may have previously been more severe and have, with CMP use, decreased to a moderate level. An alternative explanation may be that the improvement noted by CMP users in anxiety may be related to the relief of cannabis-withdrawal associated anxiety symptoms. Or that this improvement may have been confounded by improvements in the non-psychiatric conditions also treated with CMP. Mental health conditions were the leading indication for CMP authorization in both the ANX group and the overall sample (Table 4). Many were also replacing prescribed medications with CMP. The most frequently replaced drugs included psychotropics (antidepressants and benzodiazepines) and pain relievers (Table 3). While most denied social impairment and difficulty controlling use, many would be considered heavy users due to daily use. Cannabis indica, followed by hybrids, were most often rated as anxiolytic (Fig. 2). Interestingly, both strains contain high THC (above

18%) and relatively low CBD (1%). Although THC has been purported to have anxiolytic properties, it has also been associated with the development of panic, paranoia and anxiety, D'Souza et al., 2004; Fusar-Poli et al. (2009). Furthermore, while pre-clinical research suggests that CBD may be anxiolytic (Bergamaschi et al., 2011; Crippa et al., 2011), it is critical to note that the vast biochemical variability of these plants makes it difficult to discern which effects are attributable to which compound. Rather, the notion of an “entourage effect” or synergistic effect between the many cannabinoids, terpenoids and flavonoids (Elzinga et al., 2015) may provide one possible explanation of the reported anxiolytic properties of *Cannabis indica* and hybrids in this sample.

The prevalence of CMP use for anxiety in our sample exceeded what has been previously reported. An older study reported less than 10% of authorized Health Canada CMP users were prescribed cannabis for anxiety, while non-authorized use was significantly higher (Walsh et al., 2013). Canadian regulations surrounding CMP authorization have become more inclusive since this study in 2013, now requiring physician authorization for any condition the physician feels warrants cannabis treatment. This process involves acquiring a medical document which includes the name of the healthcare practitioner and patient, daily CMP quantity prescribed and duration of use; this document is then submitted to the licensed producer (Health Canada, 2017). This change is likely reflected in the considerable increase of authorized users in our sample using cannabis for anxiety. Despite these changes in CMP legislation, the scientific evidence examining cannabis treatment in anxiety disordered clinical populations is still in its infancy. When using the four levels of evidence as defined by the Canadian Network for Mood and Anxiety Treatments (CANMAT) (Kennedy et al., 2016), the existing cannabis literature would be considered Level Three evidence for certain mental health conditions including social anxiety disorder, posttraumatic stress disorder and Tourette's Syndrome (Turna et al., 2017). The increasing number of CMP authorization for mental health issues, reveal that Canadian physicians are being approached for CMP prescriptions to treat these conditions and/or may be willing to prescribe for these symptoms despite a dearth of supporting evidence examining the efficacy and safety of CMP in anxiety.

There is strong public sentiment regarding CMP efficacy for a wide range of medical conditions, including subjective anxiolytic effects (Sexton et al., 2016). However, this is the first study to characterize symptom severity beyond subjective reports of anxiety noted in previous studies (Sexton et al., 2016; Walsh et al., 2013). Validated clinical self-report measures revealed clinically significant psychiatric symptoms in our sample, with 63.4% meeting criteria for at least 1 disorder. Yet, respondents perceived CMP treatment as efficacious for their anxiety symptoms. Given that the symptom severity measures used in this survey have demonstrated sensitivity to change with treatment in clinical trials, these results elude to a possible disconnect between respondent belief regarding CMP efficacy and quantifiable symptom improvement. Furthermore, respondents using > 3g/day also reported greater perceived benefit, yet endorsed higher anxiety and depression symptoms. This finding can be interpreted in several ways: these individuals may be using more cannabis because they are more symptomatic; perhaps cannabis used in this group is not reducing anxiety/depressive symptoms but is providing an improved sense of well-being; or perhaps this a group of patients who have problematic use, as there is some evidence to suggest that higher daily use of cannabis is associated with cannabis use disorder (CUD) (van der Pol et al., 2015). However, we have no way of evaluating CUD within this sample, and the cross-sectional nature of the study limits our ability to derive any conclusions regarding symptomatic change with CMP use. Even though respondents endorsed moderate symptoms we cannot preclude the possibility of improvement in that their symptoms may have been more severe prior to beginning treatment with CMP. Despite many respondents reporting increased cannabis use since receiving CMP authorization and many endorsing daily use, symptoms indicating problematic cannabis use

(social impairment and difficulty controlling use) were minimal. However, data from the National Survey of Drug Use and Health (NSDUH) has suggested that up to 11% of individuals using CMP meet criteria for DSM-IV cannabis abuse/dependence (Lin et al., 2016). Further, daily use is more frequent in medical cannabis users (33%) compared to recreational users (11%) (Lin et al., 2016). We cannot preclude cannabis use disorder (CUD) in our sample as it was not directly examined, however many respondents reported increased use of cannabis since obtaining a prescription. This may suggest the development of tolerance, a hallmark symptom of CUD. The recently published Lower-Risk Cannabis Use Guidelines (LRCUG) (Fischer et al., 2017) suggest frequency or intensity of use to be the strongest and most consistent predictors of severe and/or long-term cannabis-related health problems. However, these guidelines are not specific to medicinal use as there is no existing data to suggest that daily medicinal cannabis use increases risk of CUD. These data highlight the need for additional research to appropriately characterize patients that may benefit from CMP use while protecting those that may be at-risk to possible negative effects.

Of note, many respondents to our survey reported replacing a prescription medication with CMP, primarily antidepressants. A recent US study revealed that 71.8% of their sample of chronic pain medicinal cannabis users decreased use of anti-anxiety medications (benzodiazepines), and to lesser extent antidepressants (37.6%) while using medical cannabis (Piper et al., 2017). Given the high rates of CMP prescription seen for mental health conditions and lack of literature examining the efficacy of CMP in these conditions (NASEM, 2017; Turna et al., 2017), there is an imminent need to begin developing a systematic body of research examining CMP in these conditions. Future studies should examine both the efficacy of cannabis for mental health conditions, as well as its equivalence to current, evidence-based pharmacological treatments. These studies will be critical to inform the development of treatment guidelines so that physicians may prescribe cannabis treatments to patients in an evidence-based and informed manner.

As with any cross-sectional online survey, there are several limitations inherent to the study design. All responses were self-report and retrospective in nature. Although we utilized validated and reliable symptom severity scales to examine prevalence and severity of a given disorder, these do not replace physician confirmation of anxiety and mood disorders. Nevertheless, given that these individuals are physician-authorized CMP users for primarily mental health conditions, it is likely that a medical diagnosis was made by their prescribing physician. We may have a potentially unrepresentative sample as the study was open to self-selection and non-response biases; although the submission of multiple surveys from one participant was prevented, as a verified user number was required. Further participation was incentivized which may have produced additional biases and the number of survey respondents capped. In addition, due to limitations inherent in the cross-sectional design, we were unable to answer several important questions including the impact of potential confounders such as non-psychiatric comorbidity or how many respondents developed anxiety or depression after beginning use of recreational cannabis or CMP. Further, only 25 of 888 respondents in the ANX group endorsed only anxiety and depression and no non-psychiatric condition, limiting the generalizability of these findings. In light of these limitations, the presented findings should be interpreted cautiously and highlight the importance of additional studies to replicate findings in samples of CMP users.

Nevertheless, the results of this study show that patients and physicians are pursuing CMP for a variety of medical conditions including anxiety and a need to inform the significant gaps currently plaguing the existing literature is evident. This research highlights the importance of future studies to clarify the role of cannabis in the treatment landscape. For instance, cannabis is thought to be safe, but it is unclear whether regular use as an anxiolytic treatment poses additional risks. Further, the abuse liability of cannabis is an issue warranting further

consideration, as symptoms of tolerance and withdrawal are not well understood, and psychiatric populations may be particularly vulnerable to this potential consequence. CMP use for mental health conditions requires systematic evaluation to examine efficacy and equivalence using rigorously designed studies including, but not limited to double-blind randomized controlled trials. Research informing CMP prescribers will also be critical given that there is limited information to guide physicians on strains, frequency and dose. This raises a time-sensitive public health concern as legalization of recreational cannabis is forthcoming in Canada which may increase the rate of self-medication with cannabis for mental health purposes. With no information to guide CMP use, it is critical that the scientific literature catch up to policy to better inform patients and physicians respectively.

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Phillipe Lucas is the Vice President, Patient Research and Access for Tilray.

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All authors have approved the final article.

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Tilray (sponsor) permitted inclusion of questions related to anxiety, cannabis use and other variables of interest to the McMaster team in Tilray's annual patient survey. Tilray was responsible for the administration of the survey, data collection and providing respondents with a \$10 incentive. The McMaster-based authors did not receive any funding to support creation of the survey, data analysis or preparation of the manuscript and had complete academic freedom in their interpretation of the data. The sponsor is in agreement to submit the article for publication.

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