

## Editors' choice

## Cannabis for therapeutic purposes: Patient characteristics, access, and reasons for use



Zach Walsh<sup>a,\*</sup>, Robert Callaway<sup>b</sup>, Lynne Belle-Isle<sup>c,d</sup>, Rielle Capler<sup>e</sup>, Robert Kay<sup>f</sup>, Philippe Lucas<sup>d</sup>, Susan Holtzman<sup>a</sup>

<sup>a</sup> University of British Columbia, 3333 University Way, Kelowna, BC V1V1V7, Canada

<sup>b</sup> 1814B Edgehill Court, Kelowna, BC V1V 1R7, Canada

<sup>c</sup> Canadian AIDS Society, 190 O'Connor Street, Suite 100, Ottawa, ON K2P2R3, Canada

<sup>d</sup> Centre for Addictions Research of British Columbia, PO Box 1700 STN CSC, Victoria, BC V8W 2Y2, Canada

<sup>e</sup> Canadian Association of Medical Cannabis Dispensaries, Box 14, Lions Bay, BC V0N 2E0, Canada

<sup>f</sup> Green Cannapy Research and Development, 288 Highway 33W, Kelowna, BC V1X 1X7, Canada

## ARTICLE INFO

## Article history:

Received 18 April 2013

Received in revised form 10 August 2013

Accepted 30 August 2013

## Keywords:

Cannabis

Medical marijuana

Access to cannabis

## ABSTRACT

**Background:** The authorized and unauthorized use of cannabis for therapeutic purposes (CTP) has increased dramatically in recent years, and physicians have called for further research to better clarify the parameters of effective and appropriate use. We report findings from a large cross-sectional study of the use of CTP in Canada and compare use across medical conditions and across authorized and unauthorized users.

**Methods:** We examined cannabis use history, medical conditions and symptoms, patterns of current use of CTP, modes of access and perceived effectiveness among 628 self-selected Canadians consumers of CTP. Participants were recruited from medical cannabis dispensaries and from organizations that assist users of CTP.

**Results:** Patients reported using cannabis to treat multiple symptoms, with sleep, pain, and anxiety being the most common. Cannabis was perceived to provide effective symptoms relief across medical conditions. Patterns of use were also consistent across medical conditions. Notable differences were observed with regard to modes of access.

**Conclusion:** Across medical conditions respondents reported using cannabis to effectively address diverse symptoms. Results indicate a substantial disconnect between the therapeutic use of cannabis and research on the risks and benefits of such use; particularly with regard to the anxiolytic and sedative use of cannabis. Authorized and unauthorized users exhibited few meaningful differences with regard to medical conditions and patterns of use, but faced substantial differences regarding access.

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Cannabis has a long history of medical use (Abel, 1980; Earleywine, 2005; Iverson, 2008), and after decades of marginalization the therapeutic properties of cannabis and cannabis derivatives are receiving increased attention (Earleywine, 2005; Holland, 2010; Lucas, 2008). Indeed, robust and growing evidence indicates that cannabis has medical benefits for diverse conditions and an acceptable risk profile (Joy, Watson, & Benson, 2003). In response to legal recognition of the constitutional rights of Canadians to access cannabis for therapeutic purposes (CTP), the federal government enacted the *Marihuana Medical Access Regulations* and

initiated a centralized program in 2001, and in 2003 Health Canada began to provide CTP to patients. This program authorizes two categories of individuals to possess cannabis for medical purposes; Category 1 includes symptoms associated with HIV/AIDS, arthritis, spinal cord injury or disease, cancer, epilepsy, or MS, whereas Category 2 includes other symptoms and conditions assessed by a physician and a specialist. Those authorized can purchase dried cannabis from Health Canada, can purchase seeds to grow cannabis, or designate a person to grow cannabis on their behalf. In addition, medical cannabis dispensaries that operate under an ambiguous legal status provide CTP and related services to over 50,000 patients across Canada (Lucas, 2008).

Despite widespread concern with the efficiency of the Health Canada program (Holland, 2010), registration has grown exponentially from under 500 registrants in 2002 to over 26,000 in 2012 (Health Canada, 2012a). National surveys indicate substantial access outside of the Health Canada program; recent estimates

\* Corresponding author. Tel.: +1 250 807 9373.

E-mail addresses: [zachary.walsh@ubc.ca](mailto:zachary.walsh@ubc.ca) (Z. Walsh), [rojocal@yahoo.ca](mailto:rojocal@yahoo.ca) (R. Callaway), [LynneB@cdnaids.ca](mailto:LynneB@cdnaids.ca) (L. Belle-Isle), [rielle@telus.net](mailto:rielle@telus.net) (R. Capler), [bekindok@hotmail.com](mailto:bekindok@hotmail.com) (R. Kay), [plucas@uvic.ca](mailto:plucas@uvic.ca) (P. Lucas), [susan.holtzman@ubc.ca](mailto:susan.holtzman@ubc.ca) (S. Holtzman).

suggest that 400,000 to 1,000,000 Canadians use CTP (Health Canada, 2011). Diverse reasons for use and multiple modes of access complicate the characterization of use of CTP, and health care professionals have expressed concern regarding the dearth of information on CTP; a recent Canadian Medical Association-sponsored survey reported that over 80% of physicians wanted more information on therapeutic indications, clinical guidelines, and risks and benefits of CTP (CMA, 2012).

Several studies have examined CTP use among Canadians. A regional survey reported that approximately 2% of adults used CTP in the past year, primarily to relieve nausea and pain (Braitstein et al., 2001), and a more recent national survey estimated that one million Canadians, or 4% of those aged 15 and older, used cannabis to treat self-defined medical conditions in the previous 12 months (Adlaf, Begin, & Sawka, 2005). Studies of persons living with HIV/AIDS report rates of 15–30% use of CTP, primarily for treatment of nausea, pain, and mood-related symptoms (Belle-Isle & Hathaway, 2007; Ware, Rueda, Singer, & Kilby, 2003). Studies of patients with MS and patients with chronic pain report similar results; approximately 15% of respondents report use of CTP with high levels of perceived effectiveness for diverse symptoms including nausea, pain, and mood (Belle-Isle & Hathaway, 2007; Ware et al., 2003; Clark, Ware, Yazer, Murray, & Lynch, 2004). Studies of CTP from the US, Europe, and Australia report findings that are consistent with those of Canadian studies; CTP is perceived to be an effective treatment for symptoms including pain, nausea, and negative mood (Grotenherman & Schnelle, 2003; Harris et al., 2000; Lucas, 2012; Reiman, 2007; Reinerman, Nunberg, Lanthier, & Heddleston, 2011; Swift, Gates, & Dillon, 2005; Ware, Adams, & Guy, 2005).

In sum, patient-centered research provides evidence for the acceptability and perceived effectiveness of CTP. However, substantial knowledge gaps remain and health care professionals have explicitly called for further research to better specify the parameters for appropriate use of CTP (CMA, 2012). Indeed, to date no studies have directly compared use of CTP across medical conditions or across modes of access (i.e., authorized vs. unauthorized). In the present study we report demographic characteristics, medical conditions and symptoms, reasons for use, perceived effects, and authorized and unauthorized modes of accessing CTP among Canadians. Comparing users of CTP across symptoms and across medical conditions with regard to patterns of use, and perceived effectiveness may help direct future controlled studies of the efficacy of CTP for specific conditions, and inform the development of tailored CTP regimens. In addition, comparing authorized and unauthorized CTP users may elucidate factors that underlie patient adoption of the Canadian CTP program, and help to guide the refinement of the complex process of CTP distribution and monitoring.

## Method

### Design

We obtained cross-sectional data in 2011–2012 from 628 self-selected current CTP users. Participants were recruited from two contexts; *national* participants completed the survey online from the location of their choice, and *local* participants completed the survey at a cannabis dispensary in the Interior region of British Columbia (BC). This recruitment strategy was designed to allow for comparison of the relatively less controlled online *national* condition with the confirmed CTP users queried in-person in the *local* condition. A total of 702 *national* participants completed the consent form, of whom 541 (77%) reported current CTP use. All 87 *local* participants who completed the consent form reported current CTP use. The *national* survey was promoted via organizations and media

**Table 1**  
Demographics.

|                  | CTP patients, % (n) | Census, % | Z                  |
|------------------|---------------------|-----------|--------------------|
| Male             | 71(443)             | 49        | 11.03 <sup>a</sup> |
| Ethnicity        |                     |           |                    |
| White            | 92 (581)            | 80        | 7.52 <sup>a</sup>  |
| Aboriginal       | 7 (47)              | 4         | 3.80 <sup>a</sup>  |
| Age              |                     |           |                    |
| 18–24yrs old     | 17 (99)             | 12        | 3.86 <sup>a</sup>  |
| 25–34            | 26 (158)            | 16        | 6.84 <sup>a</sup>  |
| 35–44            | 19 (115)            | 20        | .63                |
| 45–54            | 24 (141)            | 20        | 2.51               |
| 55>              | 14 (85)             | 32        | 9.67 <sup>a</sup>  |
| Education        |                     |           |                    |
| <high School     | 4 (27)              | 15        | -7.86 <sup>a</sup> |
| HS Grad          | 37(234)             | 24        | 7.63 <sup>a</sup>  |
| % post secondary | 58 (367)            | 61        | -1.54              |
| Income           |                     |           |                    |
| <\$20,000        | 33 (206)            | 44        | -5.55 <sup>a</sup> |
| \$20,000–39,999  | 26 (165)            | 27        | -.56               |
| \$40,000–59,999  | 17 (103)            | 15        | 1.43               |
| \$60,00 +        | 24 (146)            | 14        | 7.22 <sup>a</sup>  |
| Residence        |                     |           |                    |
| Rural            | 22 (137)            | 20        | 1.25               |
| Urban            | 78 (485)            | 80        | -1.25              |

Note: Z = One sample Z-test for proportions, comparing medical cannabis users to values from the 2006 Canadian Census (Statistics Canada, 2006).

<sup>a</sup>  $p < .01$ .

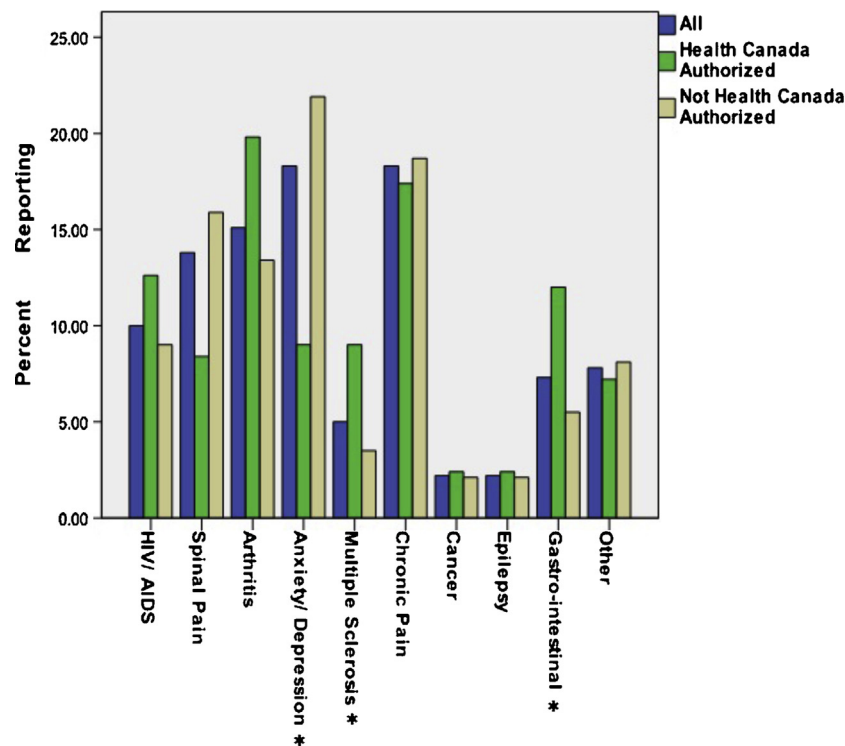
that serve users of CTP patients (e.g., Canadian AIDS Society, Canadian Aboriginal AIDS Network, Cannabis Culture), and by national advertisements at MC dispensaries. To preserve confidentiality, no identifying data (i.e. IP addresses) were collected for *national* participants. The *local* group was comprised of dispensary members who were either authorized to possess cannabis through Health Canada or had documented confirmation of a medical condition for which CTP is indicated. No confirmation of medical condition was provided for *national* participants; however such confirmation is required to obtain Health Canada authorization and to obtain dispensary membership. Participants in the *local* group were compensated \$10 and were aided by research assistants; participants in the *national* group were not assisted or financially compensated.

The survey was designed to be completed in less than one hour, and consisted of a total of 414 adaptive questions administered online without forced response. The survey was organized hierarchically such that many items were contingent on prior responses; as a result, respondents were presented with diverse item sets and response rates for specific items, and total response times varied accordingly. The survey was developed based on previous research, and on consultations with a community research board comprised of CTP patients and experts, and includes questions drawn from a prior study of CTP use (Belle-Isle & Hathaway, 2007). It queried access, perceived effectiveness, patterns and history of cannabis use, medical diagnoses and symptoms, mood, and demographics (a copy of the survey is available upon request from the first author). The study was approved by the Behavioural Research Ethics Board of the Okanagan campus of the University of British Columbia. All categorical data were compared using  $\chi^2$ . In light of varying response rates across items, total number of responses is reported for each analysis. Due to the large number of comparisons all significance testing was conducted at the  $p < .01$  level to minimize the likelihood of interpreting chance results while maintaining power (Nakagawa, 2004).

## Results

### Preliminary analyses

We compared the responses of *local* participants who reported residency in the province of BC and accessing CTP via



**Fig. 1.** Primary medical conditions treated with cannabis by authorization. *Note:* Sleep Disorders, Attention Deficit Disorder, Fibromyalgia, Hepatitis C, Parkinson's Disease, Wilson's Disease, Scleroderma, Tourette's Syndrome, and unspecified Psychotic Disorder Conditions each comprised less than 2% of the sample and were aggregated into the category 'Other'. The anxiety and mood disorders category included 35 participants who reported a primary *illness/condition* of anxiety, 34 who reported depression and 40 who reported both anxiety and depression. Comparisons of these groups indicated equivalent profiles with regard to demographic characteristics, health, and use of CTP, and were therefore aggregated for statistical analyses;  $n = 502$  \* = difference between proportion Health Canada Authorized and Unauthorized  $p < .01$ .

dispensary ( $n = 63$ ) to *national* participants who reported BC residency and accessing CTP via dispensary ( $n = 53$ ). Analysis indicated no differences with regard to quantity or frequency of cannabis use, and indicated substantial similarity with regard to primary medical condition; the only difference was a smaller proportion of *local* respondents reporting gastrointestinal (GI) condition as primary ( $\chi^2 = 8.94$  (1),  $p < .01$ ). This broad similarity between in-person confirmed users of CTP (i.e. *local*) and online respondents increased our confidence in the validity of online responses.

#### Demographics

Comparisons of the sample to values drawn from the Canadian 2006 Census of Population (Statistics Canada, 2006; Table 1) indicated that male, White, and Aboriginal participants were over-represented. The users of CTP were also younger, had a higher income, and were more likely to have completed high school. The regional distribution was consistent with participation in the Health Canada program (Health Canada, 2012b).

#### Medical conditions and symptoms

Participants were queried regarding a single primary *condition* treated with cannabis (Fig. 1). Participants also checked all applicable *symptoms* (Table 2) they treated with cannabis from a list. The mean number of symptoms patients endorsed treating was 6.74 ( $n = 605$ ,  $SD = 3.00$ , Median = 6.00, Interquartile range = 4.00–8.00). Symptoms reportedly treated with CTP by fewer than 10% of the sample include high blood pressure (9%), tics (8%), regulating blood sugar (7%), seizures (6%), bladder dyscontrol (6%) and impotence (6%). Aggregate examination across *condition* indicated that pain, anxiety, and sleep problems were the most frequently endorsed

symptoms; 57% reported use to address all three symptoms, and 99% endorsed treating one or more of the three.

Symptoms treated with cannabis varied across *condition* (Table 2). Use to address pain symptoms was more prevalent among individuals whose primary conditions were pain-related (i.e., chronic spinal and non-spinal pain, arthritis). Chronic spinal pain participants were more likely to report treating muscle spasms. Participants with arthritis were more likely to report use for inflammation and ocular pressure, and less likely to report use to address anxiety and appetite. Participants who identified mood and anxiety disorders as their primary condition were more likely to use cannabis to address mental health-related symptoms (i.e., anxiety, depression, aggression, mania/psychosis), and were less likely to treat pain, inflammation, and muscle spasms. Participants who identified HIV/AIDS or GI as their primary conditions were more likely to treat symptoms of nausea and appetite, and HIV/AIDS was associated with less treatment of pain and aggression. Overall, cannabis was perceived to provide effective symptoms relief; 72% ( $n = 439$ ) reported that CTP was *always* helpful and an additional 24% ( $n = 147$ ) described it as *often* helpful. The proportion of participants who described CTP as *always* helpful was relatively consistent across conditions. The only difference across groups was relatively lower endorsement of *always* helpful (55%) by participants with HIV/AIDS ( $\chi^2 = 10.04$  (1),  $n = 593$ ,  $p < .01$ ). Over half (57%,  $n = 358$ ) of participants reported using other medications to address the symptoms they were treating with CTP. Of these, 79% ( $n = 281$ ) described CTP as having fewer side effects than the concurrent treatment.

#### Use patterns

History of non-therapeutic cannabis use prior to therapeutic use was reported by 82% ( $n = 441$ ) of participants.

**Table 2**  
Symptoms addressed with medical cannabis by condition.

|                 | All |    | Pain-spinal |    |                    | Pain–nonspinal |    |                    | Arthritis |    |                    | Mood |    |                    | HIV/AIDS |    |                    | GI |    |                    |
|-----------------|-----|----|-------------|----|--------------------|----------------|----|--------------------|-----------|----|--------------------|------|----|--------------------|----------|----|--------------------|----|----|--------------------|
|                 | n   | %  | n           | %  | X <sup>2</sup>     | n              | %  | X <sup>2</sup>     | n         | %  | X <sup>2</sup>     | n    | %  | X <sup>2</sup>     | n        | %  | X <sup>2</sup>     | n  | %  | X <sup>2</sup>     |
| Sleep           | 502 | 85 | 68          | 83 | 0.35               | 93             | 85 | <.01               | 80        | 90 | 1.91               | 99   | 93 | 5.7                | 47       | 78 | 2.4                | 33 | 77 | 2.54               |
| Pain            | 486 | 82 | 80          | 98 | 15.13 <sup>a</sup> | 102            | 94 | 11.56 <sup>a</sup> | 86        | 97 | 14.67 <sup>a</sup> | 56   | 52 | 81.21 <sup>a</sup> | 41       | 68 | 9.07 <sup>a</sup>  | 40 | 93 | 3.62               |
| Anxiety         | 463 | 79 | 65          | 79 | 0.04               | 85             | 78 | 0.02               | 57        | 64 | 12.92 <sup>a</sup> | 106  | 99 | 32.81 <sup>a</sup> | 44       | 73 | 1.05               | 29 | 67 | 3.34               |
| Depression      | 394 | 67 | 55          | 67 | <.01               | 68             | 62 | 1.16               | 51        | 57 | 4.24               | 98   | 92 | 36.26 <sup>*</sup> | 34       | 57 | 3.08               | 27 | 63 | 0.33               |
| Appetite/weight | 331 | 56 | 43          | 52 | 0.52               | 56             | 51 | 1.21               | 35        | 39 | 11.98 <sup>a</sup> | 61   | 57 | 0.04               | 46       | 77 | 11.47 <sup>a</sup> | 33 | 77 | 8.02 <sup>a</sup>  |
| Nausea          | 294 | 49 | 36          | 44 | 1.34               | 56             | 51 | 0.13               | 33        | 37 | 6.82 <sup>a</sup>  | 43   | 40 | 4.86               | 47       | 78 | 21.71 <sup>a</sup> | 35 | 81 | 18.48 <sup>a</sup> |
| Inflammation    | 291 | 49 | 51          | 62 | 6.31               | 52             | 48 | 0.14               | 79        | 89 | 65.23 <sup>a</sup> | 25   | 23 | 35.23 <sup>a</sup> | 20       | 33 | 6.83 <sup>a</sup>  | 25 | 58 | 1.44               |
| Spasms          | 280 | 48 | 58          | 71 | 20.69 <sup>a</sup> | 53             | 49 | 0.07               | 50        | 56 | 3.2                | 23   | 22 | 35.33 <sup>a</sup> | 20       | 33 | 5.34               | 22 | 51 | 0.255              |
| Headache        | 237 | 40 | 44          | 54 | 7.21               | 56             | 51 | 6.99 <sup>a</sup>  | 36        | 40 | <.01               | 38   | 36 | 1.18               | 15       | 25 | 6.4                | 12 | 28 | 2.9                |
| Aggression      | 140 | 24 | 19          | 23 | 0.01               | 28             | 26 | 0.28               | 16        | 18 | 1.92               | 42   | 39 | 17.40 <sup>a</sup> | 5        | 8  | 8.75 <sup>a</sup>  | 8  | 19 | 0.67               |
| Drug Withdrawal | 76  | 13 | 10          | 12 | 0.04               | 17             | 16 | 0.88               | 10        | 11 | 0.25               | 18   | 17 | 1.81               | 8        | 13 | 0.01               | 1  | 2  | 4.61               |
| Ocular Pressure | 68  | 12 | 11          | 13 | 0.33               | 11             | 10 | 0.27               | 19        | 21 | 9.92 <sup>a</sup>  | 8    | 8  | 2.1                | 7        | 12 | <.01               | 1  | 2  | 3.85               |
| Mania/Psychosis | 67  | 11 | 9           | 11 | 0.01               | 11             | 10 | 0.21               | 7         | 8  | 1.27               | 25   | 23 | 18.72 <sup>a</sup> | 4        | 7  | 1.46               | 5  | 12 | <.01               |
| Respiratory     | 67  | 11 | 5           | 6  | 2.62               | 20             | 18 | 6.5                | 14        | 16 | 1.99               | 12   | 11 | <.01               | 3        | 5  | 2.68               | 6  | 14 | 0.31               |
| Skin Conditions | 63  | 11 | 8           | 10 | 0.08               | 7              | 6  | 2.54               | 13        | 15 | 1.7                | 16   | 15 | 2.51               | 3        | 5  | 2.26               | 5  | 12 | 0.04               |

Note: X<sup>2</sup> = Comparison of each groups versus aggregation of other groups.

<sup>a</sup> *p* < .01.

Mean age was 17.30 years (*n* = 540, *SD* = 7.08, Median = 16, Interquartile range = 14.00–18.00) for first use and 28.35 years (*n* = 538, *SD* = 11.25, Median = 25, Interquartile range = 19.00–37.00) for first therapeutic use. Individuals with and without history of non-therapeutic use did not differ with regard to demographic characteristics, or conditions and symptoms. Most participants who reported prior use reported increased use with the initiation of therapeutic use; 33% reported a large increase and 32% a small increase, whereas 7% reported a large decrease and 10% a small decrease. Aggregate analyses indicated that 40% (*n* = 167) of users fell into the modal quantity of use category of *more than 14 grams per week*, and that 42% (*n* = 226) fell in the modal frequency of use group reporting *2–3 uses per day*. Among the group that used more than 14 grams per week, the median weekly amount used was 28 grams (Interquartile range = 21–45). Comparisons of the six medical conditions that each account for 5% or more of the sample (Table 3) indicated no difference with regard to modes of use and few differences in patterns of use; a larger proportion of individuals identifying HIV/AIDS as primary condition were among the groups with lowest quantity and frequency of use, and those who identified anxiety and/or depression as primary conditions were less likely to fall in the most frequent use group. Overall health quality was also associated with frequency of use such that participants who described their overall health as *fair* or

*poor* (34%, *n* = 161) were overrepresented in the most frequent use group ( $X^2 = 8.31$  (1), *n* = 473, *p* < .01).

#### Access

Aggregate examination indicated that 32% (*n* = 167) of respondents had Health Canada authorization to possess CTP. An additional 12% (*n* = 64) had applications in process, and 3% (*n* = 13) had applied and been rejected. The proportion of authorized individuals varied across condition (Fig. 1); individuals who identified anxiety and/or depression as primary condition were less likely to be authorized ( $X^2 = 13.13$  (1), *n* = 502, *p* < .01), whereas a greater proportion of MS ( $X^2 = 11.08$  (1), *n* = 502, *p* < .01) and GI ( $X^2 = 8.68$  (1), *n* = 502, *p* < .01) participants were authorized. Most participants reported using more than one mode of accessing CTP; the mean number of access modalities was 1.89 (*n* = 500, *SD* = .88, Median = 2.00, Interquartile range = 1.00–2.00). Authorization was a determinant of access (Fig. 2); the mean number of access modalities for authorized individuals was 2.11 (*n* = 162, *SD* = .98, Median = 2.00, Interquartile range = 1.00–3.00) compared to 1.78 (*n* = 337, *SD* = .81, Median = 2.00, Interquartile range = 1.00–2.00) for unauthorized users ( $F$  (1, 497) = 16.26, *p* < .01). Authorized users were more likely to access CTP via Health Canada ( $X^2 = 11.88$  (1), *n* = 443, *p* < .01), to grow for themselves ( $X^2 = 31.42$  (1), *n* = 493,

**Table 3**  
Characteristics of cannabis use by condition.

|                            | All |    | Pain-spinal |    |                | Pain–nonspinal |    |                | Arthritis |    |                | Mood |    |                   | HIV/AIDS |    |                    | GI |    |                |
|----------------------------|-----|----|-------------|----|----------------|----------------|----|----------------|-----------|----|----------------|------|----|-------------------|----------|----|--------------------|----|----|----------------|
|                            | n   | %  | n           | %  | X <sup>2</sup> | n              | %  | X <sup>2</sup> | n         | %  | X <sup>2</sup> | n    | %  | X <sup>2</sup>    | n        | %  | X <sup>2</sup>     | n  | %  | X <sup>2</sup> |
| Amount per week (Grams)    |     |    |             |    |                |                |    |                |           |    |                |      |    |                   |          |    |                    |    |    |                |
| ≤2                         | 42  | 9  | 5           | 8  | 0.1            | 9              | 10 | 0.13           | 3         | 4  | 2.59           | 9    | 10 | 0.3               | 11       | 27 | 18.01 <sup>a</sup> | 1  | 3  | 1.68           |
| 2.1–5                      | 60  | 13 | 8           | 13 | <.01           | 11             | 12 | 0.05           | 10        | 13 | 0.04           | 11   | 13 | <.01              | 5        | 12 | <.01               | 0  | 0  | 5.46           |
| 5.1–9                      | 85  | 18 | 7           | 11 | 2.44           | 22             | 24 | 2.81           | 11        | 15 | 0.63           | 24   | 28 | 6.81 <sup>a</sup> | 6        | 15 | 0.33               | 6  | 17 | 0.02           |
| 9.1–14                     | 76  | 16 | 15          | 24 | 3.04           | 15             | 16 | <.01           | 15        | 20 | 1.06           | 11   | 13 | 0.89              | 4        | 10 | 1.3                | 6  | 17 | 0.04           |
| >14                        | 212 | 45 | 29          | 45 | 0.01           | 35             | 38 | 2              | 46        | 48 | 0.41           | 32   | 37 | 2.66              | 15       | 37 | 1.18               | 22 | 63 | 5.08           |
| Frequency of use           |     |    |             |    |                |                |    |                |           |    |                |      |    |                   |          |    |                    |    |    |                |
| < daily                    | 58  | 11 | 6           | 9  | 0.4            | 13             | 13 | 0.31           | 3         | 4  | 4.72           | 13   | 14 | 1.06              | 13       | 25 | 10.85 <sup>a</sup> | 2  | 5  | 1.4            |
| 1x day                     | 71  | 14 | 7           | 10 | 0.71           | 16             | 16 | 0.43           | 12        | 16 | 0.32           | 17   | 19 | 2.31              | 8        | 15 | 0.12               | 1  | 3  | 4.17           |
| 2–3x                       | 174 | 33 | 21          | 31 | 0.19           | 31             | 30 | 0.56           | 26        | 34 | 0.01           | 36   | 39 | 1.77              | 16       | 30 | 0.24               | 14 | 37 | 0.24           |
| 4x+                        | 221 | 42 | 34          | 50 | 1.96           | 43             | 42 | 0.01           | 36        | 47 | 0.78           | 26   | 28 | 8.86 <sup>a</sup> | 16       | 30 | 3.48               | 21 | 55 | 2.88           |
| Preferred mode of use      |     |    |             |    |                |                |    |                |           |    |                |      |    |                   |          |    |                    |    |    |                |
| Smoke ( <i>n</i> = 513)    | 293 | 57 | 35          | 54 | 0.33           | 62             | 61 | 0.94           | 41        | 53 | 0.55           | 48   | 53 | 0.86              | 35       | 67 | 2.45               | 24 | 65 | 0.98           |
| Vaporize ( <i>n</i> = 502) | 217 | 43 | 31          | 49 | 1.05           | 42             | 43 | <.01           | 30        | 39 | 0.67           | 37   | 41 | 0.3               | 22       | 44 | 0.01               | 16 | 43 | <.01           |
| Oral ( <i>n</i> = 501)     | 139 | 28 | 16          | 26 | 0.13           | 29             | 30 | 0.21           | 29        | 39 | 5.25           | 25   | 26 | 0.1               | 15       | 31 | 0.22               | 8  | 22 | 0.75           |

Note: X<sup>2</sup> = Comparison of each groups versus aggregation of other groups.

<sup>a</sup> *p* < .01.



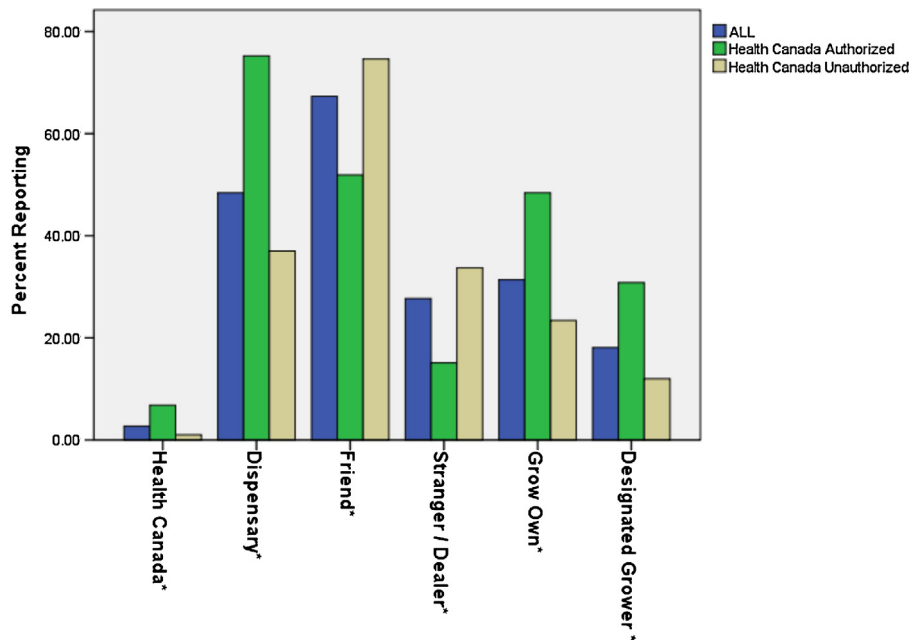


Fig. 2. Modes of Access. Note: \* = difference between proportion Health Canada Authorized and Unauthorized  $p < .01$ ;  $n = 498$ .

$p < .01$ ), have a designate grow for them ( $X^2 = 25.85$  (1),  $n = 493$ ,  $p < .01$ ) or use a dispensary ( $X^2 = 54.46$  (1),  $n = 444$ ,  $p < .01$ ). In contrast, unauthorized users were more likely to access CTP from a friend ( $X^2 = 25.46$  (1),  $n = 495$ ,  $p < .01$ ) or from a stranger ( $X^2 = 18.69$  (1),  $n = 494$ ,  $p < .01$ ).

## Discussion

Canadians use cannabis to treat diverse conditions and symptoms in a manner that only partially overlaps with the federally authorized program. There is considerable consistency with regard to patterns of use and reported effectiveness; nearly all respondents used cannabis to treat pain, anxiety, or sleep disturbances, and over half used it to treat all three symptoms. We also observed consistency across participants with and without histories of non-therapeutic cannabis use, which suggests that, with regard to CTP, individuals who may enjoy non-therapeutic use of cannabis were not different with regard to therapeutic application of cannabis from those participants who may have been less likely to expect extra-therapeutic benefit. The substantial minority of respondents who were federally authorized to possess cannabis exhibited few differences from unauthorized users with regard to symptoms treated and patterns of use, but differed considerably with regard to mode of access.

Most respondents reported using CTP to treat conditions that are explicitly listed within the federal program; however, a large contingent also reported use for other conditions. Comparisons of symptoms treated across conditions indicated high levels of congruence (e.g., respondents with pain-related conditions were more likely to use cannabis to address pain symptoms), but also reflected substantial consistency across conditions. Specifically, use to treat sleep disturbances, and to a lesser extent anxiety and depression, was consistently high across conditions. However, despite widespread use for anxiolytic and sedative purposes, participants who reported anxiety or depression as primary reason for CTP use were less likely to have obtained federal authorization to access CTP. This may be due to the absence of these conditions among those explicitly listed by the federal program, but may also reflect accentuated stigma associated with the use of cannabis to address mental health issues. Indeed, stigma has been identified as a

substantial barrier to accessing care for mental health conditions such as depression and anxiety (Brown et al., 2010), and this may be compounded by the considerable stigma associated with use of CTP (Bottorff et al., 2013) to create a substantial barrier to accessing treatment. Research that further elucidates the appropriateness of using cannabis to treat anxiety and depression is required to guide effective treatment and help to reduce stigma.

Patterns of use were also consistent across medical conditions, with the only notable difference being slightly lower levels of use among respondents with HIV/AIDS, a difference which may be due to intermittent use to address nausea. Most participants reported initiating non-therapeutic use prior to use of CTP, and noted increased levels of use associated with the transition to therapeutic use. This reported increase is consistent with our observation that the median level of therapeutic use exceeds typical levels of non-therapeutic use (Reinarman, Cohen, & Kaal, 2004; Hazekamp et al., 2013; but see also Hazekamp & Heerdink, 2013), and suggests a potentially meaningful distinction between therapeutic and non-therapeutic use. In contrast, the relative consistency of use among CTP-users suggests that CTP regimens might transfer well across conditions, and enjoy good adherence. The most pronounced differences across respondents involved modes of access, such that unauthorized users were much less likely to access CTP from authorized, or semi-authorized (i.e. dispensaries) sources. This discrepancy contrasts with the pronounced similarity between authorized and unauthorized users on indicators of health and use of CTP, and suggests that the current system of authorization may not be discriminating among qualitatively different groups.

The primary limitations of this study are common to online medical surveys such as potential for multiple responses from a single respondent, a potentially unrepresentative sample, and lack of physician confirmation of medical conditions. In addition, response bias related to participant self-selection, and recruitment through organizations that support medical cannabis patients likely resulted in overrepresentation in our sample by individuals who respond favourably to CTP. In light of this potential bias, our characterization of the therapeutic use of cannabis should be interpreted with caution pending replication from research that employs a more systematic recruitment approach. However, these limitations are counterbalanced by several methodological

strengths including the inclusion of an in-person subsample, engagement of a community research board in the development and dissemination of the survey, and general adherence to established standards for reporting internet-based surveys (Eysenbach, 2004).

## Conclusions

This was the largest and most comprehensive study to date of the therapeutic use of cannabis in Canada. We draw three primary conclusions from the data. First, reasons for use and perceived effectiveness were generally consistent across medical conditions; respondents overwhelmingly reported using cannabis to effectively address pain, sleep disturbance, and anxiety. Second, further research is required to address the substantial disconnect between the therapeutic use of cannabis and research on the risks and benefits of such use. This is particularly evident with regard to the anxiolytic and sedative use of cannabis; extrapolation from our sample to the national population of CTP users suggests levels of use for anxiolytic and sedative purposes that may be comparable to the number of Canadians who currently use benzodiazepine and other sedatives (Kassam & Patten, 2006). Such widespread use suggests a need for the systematic evaluation of the effectiveness and adverse effects of cannabis for the treatment of these conditions, as well as comparisons of cannabis with the widely-used pharmaceutical products that currently represent frontline treatments. Finally, our findings highlight the apparent discrepancy in access to cannabis across CTP users. Authorized and unauthorized users exhibit few meaningful differences with regard to medical conditions and patterns of use, but face substantial differences regarding access; many seriously ill Canadians risk increased stigma (Bottorf, Bissell, Balneaves, Oliffe, Capler & Buxton, 2013), legal sanction, and other negative outcomes associated with accessing cannabis from illegal markets. At the time of this writing the federal medical cannabis program is undergoing substantial structural changes. The present study provides a baseline for assessing the impact of these changes, the most important of which must surely involve providing a program that facilitates informed, safe, legal, and affordable access to a source of CTP for ill Canadians.

## Acknowledgements

This research was supported by a grant from the UBC Institute for Healthy Living and Chronic Disease Prevention. The authors thank the people who took the time to respond to the survey. We would also like to thank Ben Atkinson, Kim Crosby and Megan Hiles for their contribution to data collection and management, and Brian Emerson for providing valuable feedback on the manuscript.

## Conflict of interest statement

None of the authors have any conflicts of interest with regard to the contents of this manuscript. Access.

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