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# Comparing Medical and Recreational Cannabis Users on Socio-Demographic, Substance and Medication Use, and Health and Disability Characteristics

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## Keywords

Canada · Cannabis · Health · Medical cannabis · Substance use

## Abstract

**Background:** While recreational cannabis use is common, medical cannabis programs have proliferated across North America, including a federal program in Canada. Few comparisons of medical and recreational cannabis users (RCUs) exist; this study compared these groups on key characteristics. **Methods:** Data came from a community-recruited sample of formally approved medical cannabis users (MCUs;  $n = 53$ ), and a sub-sample of recreational cannabis users (RCUs;  $n = 169$ ) from a representative adult survey in Ontario (Canada). Samples were telephone-surveyed on identical measures, including select socio-demographic, substance and medication use, and health and disability measures. Based on initial bivariate comparisons, multivariate logistical regression with a progressive adjustment approach was performed to assess independent predictors of group status. **Results:** In bivariate analyses, older age, lower household income, lower alcohol use, higher cocaine, prescription opioid,

depression and anxiety medication use, and lower health and disability status were significantly associated with medical cannabis use. In the multivariate analysis, final model, household income, alcohol use, and disability levels were associated with medical cannabis use. **Conclusions/Scientific Significance:** Compared to RCUs, medical users appear to be mainly characterized by factors negatively influencing their overall health status. Future studies should investigate the actual impact and net benefits of medical cannabis use on these health problems.

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## Introduction

Cannabis is the most commonly used illegal drug globally, and current (e.g., “past year”) use rates (about 8–14% among adults, and 21–25% among adolescents) are comparatively high in Canada, and particularly in Ontario [1, 2]. Recently, control regimes for cannabis as a psychoactive substance have diversified considerably in North American jurisdictions, from mainly prohibitive to more liberal control systems, including legal regimes, where

cannabis is legally accessible for therapeutic purposes [3, 4]. Therapeutic benefits from cannabis have been suggested for numerous, usually chronic, health conditions, yet are most strongly evidenced primarily for neuropathic pain, spasticity, as well as anti-emetic and appetite-stimulant effects (e.g., for “wasting syndrome”) [5–8]. Medical cannabis control regimes exist in numerous US states and Canada (since 2001), among other countries [3, 4, 9]. Through iterative revisions to the medical cannabis program in Canada (e.g., the Access to Cannabis for Medical Purposes Regulations 2016), access has been considerably simplified, and under current regulations, medical cannabis use can be endorsed by a physician for virtually any health condition where benefits are expected; by 2015 >50,000 individuals were estimated to be enrolled in the program [9, 10].

A worthwhile question is whether medical cannabis users (MCUs) differ from non-medical (or recreational) cannabis users on key characteristics (e.g., socio-demographics, substance use, or health indicators). One could expect numerous differences, as MCU populations report several chronic/severe health conditions (e.g., chronic pain, HIV/AIDS, arthritis, sleep and mental health issues) for which therapeutic use is sought [11–14]. Additionally, data suggest that medical use of cannabis may act as a substitute for other psychoactive substances or medications (e.g., alcohol, psychotropic drugs) [11, 12, 15, 16]. This might be in contrast to recreational use, where cannabis use commonly co-occurs with other substance use, or – especially among intensive/problematic users – with substance use disorders or co-morbid (e.g., mental) health problems [17–20]. Conversely, the dividing lines between “medical” and “recreational” cannabis use may be fluid and unclear. Up to 1 in 4 cannabis users in Canada have self-reported their cannabis use to include medical reasons [10, 21]. In the context of persistent prohibition control, medical cannabis regimes may have offered a “side-door” legal access for many users who may otherwise consider their use as recreational [9].

Few empirical comparisons between medical and recreational cannabis users (RCUs) exist; specifically, two recent US studies found few differences: they generally observed that medical users had more medical problems, including pain, yet lower alcohol and drug use severity compared to recreational users [22, 23]. However, no Canadian studies exist, although both the characteristics of MCUs, as well as the particular contexts of medical cannabis use regimes and the health care system in Canada, may make for distinct results, and so relevantly contribute to this emerging area of knowledge. On this

basis, we seized upon the unique opportunity of identically assessed (formally authorized) medical cannabis and RCU samples in Canada for the present study, which compared these two groups in terms of socio-demographic, substance and medication use, and health and disability measures.

## Methods

The data analyzed in this study were drawn from an Ontario-based community-recruited sample of formally approved MCUs, and a sub-sample of current RCUs identified in the CAMH Monitor (CM), the long-standing representative telephone-based survey of the Ontario general adult (18+ years) population, focusing on socio-demographic, substance use and health/disability measures [24]. While recruited differently, both samples were assessed by the CM protocol based on identical methods and questions.

### *MCU Sample*

The MCU sample was assembled using a community-based recruitment approach across Ontario between June and August 2015. Study information was circulated in medical cannabis dispensaries, information points, and posted on relevant websites using print and virtual information tools; study applicants called a central study number and were assessed for study eligibility. Criteria included 18 years of age or older; resident of Ontario; and holding formal approval under federal regulations for medical cannabis use (e.g., the initial Marihuana Medical Access Regulations or subsequent Marihuana for Medical Purposes Regulations). Of the 97 individuals screened, 86 were eligible and 55 provided consent and were enrolled into the study. Participants were contacted over the telephone by the Institute for Social Research, Toronto, and 53 completed the CM survey protocol [24].

### *RCU Sample*

The RCU sample was selected from a random subsample ( $n = 510$ ) of the 2015 cycle of the CM survey. Those respondents who had indicated any “cannabis use in the past 12 months” ( $n = 122$ ) were selected and the sample was weighted to adjust for varying selection probabilities and regional representation, resulting in an RCU sample of 169.

### *Measures*

Select CM survey measures administered to both samples were examined in the present analyses, including socio-demographic factors like gender, age, and household income. Substance and medication use variables including tobacco smoking (past 12 months); alcohol use (past 12 months); hazardous alcohol use measured using the Alcohol Use Disorders Identification Test, a 10-item screening tool (with a cutoff score of >7 indicating hazardous use) [25]; cocaine use (lifetime); any (medical and non-medical) prescription opioid use; and prescription depression and anxiety medication use; furthermore, cannabis use frequency (i.e., daily or near-daily use in last 3 months) was examined for sample descriptions. Health and disability measures such as self-rated health, dichotomized into “excellent, very good, or good” and “fair or poor” [26, 27]; number of physically unhealthy or mental dis-

tress days (past 30 days; dichotomized into “0–13 days” and “14+ days”); the 12-item version of the World Health Organization Disability Assessment Schedule 2.0 (WHODAS) measuring disability in six major life domains, with summary scores from 0 (no disability) to 100 (full disability); scores were trichotomized per normed standards into 0–9; 10–16; 17–100 [28].

#### Statistical Analysis

For analysis, the MCU and RCU samples were merged, providing an unweighted sample size of 175 participants, and a final analysis sample of 222 (after weighting) on which the analyses are based. Covariate selection for the multivariate analyses was based on theoretical models and existing evidence. Bivariate odds ratio (OR) (including 95% confidence intervals [CIs]) analyses were performed to identify variables associated with the cannabis user group status. Then, multivariate logistical regression models were computed using a progressive adjustment approach with successive entry of variable blocks. The first block included socio-demographic factors, followed by substance and medication use variables, and finally health and disability measures (see models 1, 2 and 3 of Table 2). At each stage of analysis, the variables significantly related to group status were carried over to the next stage. To assess the goodness-of-fit of the regression models at each stage, the generalized (pseudo) ( $R^2$ ) values and “Hosmer-Lemeshow tests” were computed [29]. All analyses were weighted and performed using SAS version 9.3.

#### Consent and Ethics Approval

Written consent was obtained from MCUs; RCU respondents provided verbal consent during CM survey participation. Study procedures were approved by the CAMH Research Ethics Board (references 305/2009-06 and 17/2015-01).

## Results

The vast majority (84.9%) of the MCU group and only a small minority (9.8%) of the RCU group used cannabis on a daily/near-daily basis ( $p < 0.0001$ ).

Results of the bivariate study variable comparisons between the MCU and RCU groups are presented in Table 1. Approximately two-thirds of the sample were male in both groups; the RCU sample had a higher income level and was younger. Lifetime cocaine use, prescription opioid use, and depression and anxiety medication use were all more common in the MCU sample; conversely, current and hazardous alcohol use was more common in the RCU sample. Compromised health and disability status – specifically, fair/poor health, physically unhealthy days, mental distress days and elevated WHODAS disability scores – were all more common in the MCU group.

Multivariate regression analyses results are presented in Table 2. In the final model, lower household income, lower alcohol use, and higher WHODAS disability scores emerged as significant predictors of MCU status; high

WHODAS disability scores (17–100) increased the odds of MCU status by almost 10 times (OR 9.98; 95% CI 3.05–32.68) relative to low scores (0–9). The amount of variance explained by the set of variables included at each stage increased to 58% in model 3; the model-fit-statistic also indicated model 3 as the best fit for the observed data.

## Discussion

Our analyses compared medical and RCU samples in Ontario, Canada, assessed by identical methods and measures. These data contribute to the currently limited evidence comparing these cannabis user groups in the context of increasing medical cannabis utilization in North America [22, 23], providing a unique Canadian perspective. That perspective is unique, in that no such comparisons have existed for Canada to date, and also given the distinct features of medical cannabis availability and its use in Canada. Such availability has existed by way of national regulations since 2001, which have gradually been eased and allowed increasingly large numbers of people access to medical cannabis use based on increasingly flexible requirements.

The two study groups were associated with distinctly different cannabis use patterns, in that close to all (4 in 5) of the MCU group, and yet only 1 in 10 of the RCU group, featured frequent (i.e., daily or near-daily) cannabis users. These differences in use patterns are to be expected, given the distinct user group status and the presumed respective reasons (i.e., medical versus recreational) for use. In terms of differences in group co-variables based on the multivariate analysis results, the MCU group reported higher disability scores after controlling for potential confounders. This likely reflects the fact that MCUs commonly feature severe overall health problems, as documented by several North American studies [13, 30–32], including (often multiple) chronic physical and/or mental conditions. These chronic conditions are often indicated as the reason for medical cannabis use. The significant inter-group differences in disability levels were further corroborated by other health indicators (e.g., self-rated health, physically or mentally unhealthy days), where the MCU group consistently reported more compromised status in bivariate analyses.

The MCU group was characterized by less common alcohol consumption than the RCU group (as well as less common hazardous alcohol use, which defined almost half of the RCU group). This finding is consistent with comparably low alcohol use found in other MCU samples

**Table 1.** Demographic, substance and drug use, and health status characteristics of medical and recreational cannabis users and bivariate analysis results ( $n = 222$ )

Variables	Total, <i>n</i> (%)	Medical, <i>n</i> (%)	Recreational, <i>n</i> (%)	OR (95% CI)*
Gender				
Male	147 (66.4)	37 (69.8)	110 (65.5)	1.22 (0.63–2.39)
Female	74 (33.6)	16 (30.2)	58 (34.5)	Ref.
Age, years				
18–34	107 (48.2)	12 (22.6)	95 (56.2)	0.35 (0.14–0.87)
35–54	74 (33.2)	30 (56.6)	44 (26.0)	1.89 (0.82–4.35)
55+	41.3 (18.6)	11 (20.8)	30 (17.8)	Ref.
Household income, CAD (\$)				
80,000+	93 (49.8)	15 (28.3)	78 (46.2)	0.07 (0.03–0.19)
50,000–79,000	41 (21.9)	9 (17.0)	32 (18.9)	0.11 (0.04–0.32)
30,000–49,000	24 (12.8)	7 (13.2)	17 (10.1)	0.16 (0.05–0.52)
<30,000	29 (15.5)	21 (39.6)	8 (4.7)	Ref.
Tobacco smoking <sup>&amp;&amp;</sup>				
Yes	81 (36.6)	19 (35.8)	62 (36.9)	0.96 (0.50–1.80)
No	141 (63.4)	34 (64.2)	107 (63.1)	Ref.
Alcohol use <sup>&amp;&amp;</sup>				
Yes	200 (90.2)	38 (71.7)	162 (96.1)	0.10 (0.04–0.27)
No	21 (9.7)	15 (28.3)	7 (3.9)	Ref.
Hazardous alcohol use				
AUDIT score >8	83 (37.8)	10 (18.9)	73 (44.0)	0.30 (0.14–0.63)
AUDIT score ≤8	136 (62.2)	43 (81.1)	93 (56.0)	Ref.
Cocaine use <sup>&amp;</sup>				
Yes	97 (44)	32 (60.4)	65 (38.8)	2.40 (1.28–4.52)
No	123 (56)	21 (39.6)	102 (61.2)	Ref.
Any prescription opioid use <sup>&amp;&amp;</sup>				
Yes	75 (33.9)	27 (50.9)	48 (28.5)	2.61 (1.38–4.91)
No	147 (66.1)	26 (49.1)	121 (71.5)	Ref.
Depression medication use <sup>&amp;&amp;</sup>				
Yes	48 (21.8)	18 (34.0)	30 (18)	2.34 (1.17–4.67)
No	173 (78.2)	35 (66.0)	138 (82)	Ref.
Anxiety medication use				
Yes	48 (21.8)	20 (37.7)	28 (16.8)	3.00 (1.51–5.97)
No	173 (78.2)	33 (62.3)	140 (83.2)	Ref.
Self-rated health				
Fair or poor	38 (17.2)	16 (30.2)	22 (13)	2.89 (1.38–6.04)
Good, excellent	184 (82.8)	37 (69.8)	146 (87)	Ref.
Number of physically unhealthy days <sup>&amp;&amp;&amp;</sup>				
14+ days	34 (15.3)	16 (30.2)	18 (10.6)	3.66 (1.70–7.88)
0–13 days	186 (84.7)	37 (69.8)	149 (89.4)	Ref.
Number of mental distress days <sup>&amp;&amp;&amp;</sup>				
14+ days	46 (20.7)	16 (30.2)	30 (17.7)	2.01 (1.00–4.08)
0–13 days	175 (79.3)	37 (69.8)	138 (82.3)	Ref.
WHODAS score (0–100)				
17–100	48 (21.5)	30 (56.6)	18 (10.5)	13.30 (6.00–29.48)
10–16	41 (18.7)	8 (15.1)	33 (19.8)	1.88 (0.73–4.80)
0–9	132 (59.8)	15 (28.3)	118 (69.7)	Ref.

All frequencies are weighted and rounded to the nearest integer.

\* ORs represent risk of medical versus recreational cannabis use.

& In lifetime; && in past 12 months; &&& in last 30 days.

AUDIT, Alcohol Use Disorders Identification Test; WHODAS, World Health Organization Disability Assessment Schedule 2.0.

**Table 2.** Regression models of factors predicting medical versus recreational cannabis user group status ( $n = 222$ )

Variables	OR (95% CI)*		
	model 1	model 2	model 3
Gender			
Male	0.83 (0.38–1.82)	0.81 (0.32–2.02)	1.37 (0.50–3.78)
Female	Ref.	Ref.	Ref.
Age, years			
18–34	0.32 (0.11–0.90)	0.58 (0.16–2.11)	0.65 (0.17–2.57)
35–54	1.84 (0.70–4.82)	3.33 (1.01–11.02)	3.06 (0.85–11.02)
55+	Ref.	Ref.	Ref.
Household income, CAD (\$)			
80,000+	0.07 (0.02–0.19)	0.06 (0.02–0.25)	0.09 (0.02–0.31)
50,000–79,000	0.11 (0.03–0.35)	0.10 (0.02–0.43)	0.14 (0.03–0.65)
30,000–49,000	0.20 (0.05–0.72)	0.23 (0.05–1.04)	0.26 (0.05–1.29)
<30,000	Ref.	Ref.	Ref.
Tobacco smoking <sup>&amp;&amp;</sup>			
Yes		0.58 (0.23–1.47)	
No		Ref.	
Alcohol use <sup>&amp;&amp;</sup>			
Yes		0.19 (0.05–0.75)	0.17 (0.04–0.69)
No		Ref.	Ref.
Hazardous alcohol use			
AUDIT score >8		0.57 (0.20–1.61)	
AUDIT score ≤8		Ref.	
Cocaine use <sup>&amp;</sup>			
Yes		1.60 (0.66–3.88)	
No		Ref.	
Any prescription opioid use <sup>&amp;&amp;</sup>			
Yes		1.58 (0.67–3.71)	
No		Ref.	
Depression medication use <sup>&amp;&amp;</sup>			
Yes		2.39 (0.58–9.85)	
No		Ref.	
Anxiety medication use			
Yes		1.88 (0.51–6.99)	
No		Ref.	
Self-rated health			
Fair or poor			0.35 (0.09–1.46)
Good, excellent			Ref.
Number of physically unhealthy days <sup>&amp;&amp;&amp;</sup>			
14+ days			2.78 (0.46–6.98)
0–13 days			Ref.
Number of mental distress days <sup>&amp;&amp;&amp;</sup>			
14+ days			1.92 (0.60–6.17)
0–13 days			Ref.
WHODAS score (0–100)			
17–100			9.98 (3.05–32.68)
10–16			1.07 (0.32–3.53)
0–9			Ref.
Generalized $R^2$	0.41	0.54	0.58
Hosmer–Lemeshow goodness-of-fit ( $p$ values)	0.03	<0.001	0.003

All frequencies are weighted and rounded to the nearest integer.

\* ORs represent risk of medical versus recreational cannabis use.

& In lifetime; && in past 12 months; &&& in last 30 days.

AUDIT, Alcohol Use Disorders Identification Test; WHODAS, World Health Organization Disability Assessment Schedule 2.0.

[16, 22, 23], as well as the fact that alcohol use commonly co-occurs with recreational cannabis use [33]. This result may also lend indirect support to the suggestion – also considering other self-report data from MCUs – that medical cannabis use may reduce (by “substitution”) certain psychoactive substance use, including alcohol [11, 12, 34]. Notably, our multivariate analyses did not identify intergroup differences with regard to psychoactive substance or medications use, even though these had emerged in the bivariate analyses. There, key psychotropic medications use (i.e., opioid, depression and anxiety medications), but also a lifetime history of cocaine use were found to be more common among the MCU sample. While the former may be intuitive due to the MCU group’s elevated physical and mental health burden, the latter seems to be a counterintuitive finding which cannot be readily explained.

While the multivariate analysis did not confirm significant differences in gender or age, it indicated for the MCU group to be characterized by significantly lower household income. This is likely indicative of recreational cannabis use being spread more across socio-economic strata, but also – as possibly influenced by the much higher levels of health problems and disability – that a large proportion of individuals in the MCU group were likely not generating income from employment, and/or lived on limited social (e.g., disability, welfare) benefits/payments.

This study includes important potential limitations. The MCU sample consisted of a small, community-recruited convenience sample, involving possible sampling bias with possible overrepresentation of certain characteristics (e.g., health problems or disability). The MCU sample size was also relatively small, rendering limited statistical power. While the general CM sample (from which the RCU sample was drawn) was considered representative of the Ontario adult population, the CM survey had a limited response rate (45%) [24] and excluded

certain marginalized populations. On this basis, comparison results are not generalizable beyond the specific study samples or the Ontario-specific study context. In addition, the survey instruments relied on self-report items, which may entail response bias.

In sum, our study shed some light on comparative characteristics between MCUs and RCUs in a Canadian context. The differences found are limited to select markers (similar to those found by other studies), most of which presumably related to elevated chronic disease status among medical users. Further, the findings can be interpreted in two different ways; either, the outcomes of the current Canadian medical cannabis program are successfully reaching its intended audience (e.g., users who suffer from worse disability/health status), or alternatively, the program is being utilized by people who are potentially not using cannabis strictly for medical uses. These specific dynamics are important and should be examined more closely as one of the research questions arising from the present study. For purposes of future policy-making in this contentious realm, it will be important to further rigorously (e.g., based on large and representative samples) examine the potential differences in characteristics and outcomes between these two coexistent cannabis user groups.

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## Disclosure Statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

## References

- 1 Canadian Centre on Substance Abuse (CCSA): Canadian Drug Summary: Cannabis. Ottawa, Canadian Centre on Substance Abuse (CCSA), 2016.
- 2 Ialomiteanu AR, Hamilton HA, Adlaf EM, Mann RE: CAMH Monitor eReport: Substance Use, Mental Health and Well-Being among Ontario Adults, 1977–2013. CAMH Research Document Series No. 40. Toronto, Centre for Addiction and Mental Health, 2014.
- 3 Belle-Isle L, Walsh Z, Callaway R, Lucas P, Capler R, Kay R, Holtzman S: Barriers to access for Canadians who use cannabis for therapeutic purposes. *Int J Drug Policy* 2014;25:691–699.
- 4 Pacula RL, Hunt P, Boustead A: Words can be deceiving: a review of variation among legally effective medical marijuana laws in the United States. *J Drug Policy Anal* 2014;7:1–19.
- 5 Hill KP: Medical marijuana for treatment of chronic pain and other medical and psychiatric problems: a clinical review. *JAMA* 2015;313:2474–2483.
- 6 Borgelt LM, Franson KL, Nussbaum AM, Wang GS: The pharmacologic and clinical effects of medical cannabis. *Pharmacotherapy* 2013;33:195–209.
- 7 Ben Amar M: Cannabinoids in medicine: a review of their therapeutic potential. *J Ethnopharmacol* 2006;105:1–25.
- 8 Koppel BS, Brust JC, Fife T, Bronstein J, Youssof S, Gronseth G, Gloss D: Systematic review: efficacy and safety of medical marijuana in selected neurologic disorders: report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology* 2014;82:1556–1563.

- 9 Fischer B, Kuganesan S, Room R: Medical marijuana programs: implications for cannabis control policy – observations from Canada. *Int J Drug Policy* 2015;26:15–19.
- 10 Kalant H, Porath-Waller A: Clearing the Smoke on Cannabis and Cannabinoids – An Update. Ottawa, Canadian Centre on Substance Abuse, 2016.
- 11 Bonn-Miller MO, Boden MT, Bucossi MM, Babson KA: Self-reported cannabis use characteristics, patterns and helpfulness among medical cannabis users. *Am J Drug Alcohol Abuse* 2014;40:23–30.
- 12 Grella CE, Rodriguez L: Differences between younger and older medical marijuana users from a cluster-based sample of dispensaries in Los Angeles. *Drug Alcohol Depend* 2014;140:e75–e76.
- 13 Ilgen MA, Bohnert K, Kleinberg F, Jannausch M, Bohnert AS, Walton M, Blow FC: Characteristics of adults seeking medical marijuana certification. *Drug Alcohol Depend* 2013;132:654–659.
- 14 Walsh Z, Callaway R, Belle-Isle L, Capler R, Kay R, Lucas P, Holtzman S: Cannabis for therapeutic purposes: patient characteristics, access, and reasons for use. *Int J Drug Policy* 2013;24:511–516.
- 15 Nunberg H, Kilmer B, Pacula RL, Burgdorf J: An analysis of applicants presenting to a medical marijuana specialty practice in California. *J Drug Policy Anal* 2011;4:pii:1.
- 16 Reinerman C, Nunberg H, Lanthier F, Heddlestone T: Who are medical marijuana patients? Population characteristics from nine California assessment clinics. *J Psychoactive Drugs* 2011;43:128–135.
- 17 Conway KP, Compton W, Stinson FS, Grant BF: Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *J Clin Psychiatry* 2006;67:247–257.
- 18 Hall W, Degenhardt L: Prevalence and correlates of cannabis use in developed and developing countries. *Curr Opin Psychiatry* 2007;20:393–397.
- 19 Hall W, Degenhardt L: Adverse health effects of non-medical cannabis use. *Lancet* 2009;374:1383–1391.
- 20 Volkow ND, Baler RD, Compton WM, Weiss SR: Adverse health effects of marijuana use. *N Engl J Med* 2014;370:2219–2227.
- 21 Ogborne AC, Smart RG, Adlaf EM: Self-reported medical use of marijuana: a survey of the general population. *CMAJ* 2000;162:1685–1686.
- 22 Roy-Byrne P, Maynard C, Bumgardner K, Krupski A, Dunn C, West II, Donovan D, Atkins DC, Ries R: Are medical marijuana users different from recreational users? The view from primary care. *Am J Addict* 2015;24:599–606.
- 23 Woodruff SI, Shillington AM: Sociodemographic and drug use severity differences between medical marijuana users and non-medical users visiting the emergency department. *Am J Addict* 2016;25:385–391.
- 24 Ialomiteanu A, Adlaf EM: CAMH Monitor 2011: Metadata User's Guide. Toronto, Centre for Addiction and Mental Health (CAMH), 2012.
- 25 Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M: Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption – II. *Addiction* 1993;88:791–804.
- 26 Moriarty DG, Zack MM, Kobau R: The Centers for Disease Control and Prevention's Healthy Days Measure – population tracking of perceived physical and mental health over time. *Health Qual Life Outcomes* 2003;1:37.
- 27 Ounpuu S, Krueger P, Vermeulen M, Chambers L: Using the U.S. behavior risk factor surveillance system's health related quality of life survey tool in a Canadian city. *Can J Public Health* 2000;91:67–72.
- 28 Üstün TB, Kostanjsek N, Chatterji S, Rehm J: Measuring Health and Disability: Manual for WHO Disability Assessment Schedule – WHODAS 2.0. Geneva, World Health Organization, 2010.
- 29 Hosmer DW, Lemeshow S, Sturdivant RX: Applied Logistic Regression. Third Edition. Hoboken, Wiley, 2013.
- 30 Lucas P, Reiman A, Earleywine M, McGowan SK, Oleson M, Coward MP, Thomas B: Cannabis as a substitute for alcohol and other drugs: a dispensary-based survey of substitution effect in Canadian medical cannabis patients. *Addict Res Theory* 2013;21:435–442.
- 31 Lucas P, Walsh Z, Crosby K, Callaway R, Belle-Isle L, Kay R, Capler R, Holtzman S: Substituting cannabis for prescription drugs, alcohol and other substances among medical cannabis patients: the impact of contextual factors. *Drug Alcohol Rev* 2016;35:326–333.
- 32 Walsh Z, Callaway R, Belle-Isle L, Capler R, Kay R, Lucas P, Holtzman S: Cannabis for therapeutic purposes: patient characteristics, access, and reasons for use. *Int J Drug Policy* 2013;24:511–516.
- 33 Subbaraman MS, Kerr WC: Simultaneous versus concurrent use of alcohol and cannabis in the National Alcohol Survey. *Alcohol Clin Exp Res* 2015;39:872–879.
- 34 Reiman A: Medical cannabis patients: patient profiles and health care utilization patterns. *Compl Health Pract Rev* 2007;12:31–50.