The prevalence of cannabis use pre-versus post-cannabis legalization in Canada by mental health status: findings from national repeat cross-sectional surveys

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Summary

Background The bidirectional relationship between cannabis use and mental health is complex. With the liberalization of cannabis laws in many countries, it is increasingly important to understand the impacts of cannabis legalization on individuals with mental health conditions. This study aimed to examine changes in cannabis use by mental health status pre-versus 5-years post-legalization of recreational cannabis in Canada.

Methods Data were from the International Cannabis Policy Study's national repeat cross-sectional surveys, conducted annually in Canada between 2018 and 2023, one year before and five years after the legalization of cannabis. The current analysis includes 92,843 Canadians aged 16–65 years. Adjusted logistic regression models examined changes in daily and past 12-month cannabis use pre-versus post-legalization among individuals experiencing each of the five mental health problems in the last year: anxiety, bipolar, depression, post-traumatic stress disorder (PTSD), and schizophrenia.

Findings Past 12-month cannabis consumption increased from pre-legalization versus the year immediately following legalization (2019) among those with anxiety (adjusted odds ratio (AOR) = 1.33, 95% CI = 1.15, 1.53, $p < 0.0001$), depression (AOR = 1.47, 95% CI = 1.26, 1.73, $p < 0.0001$), and those reporting 'no experience' of a mental health problem in the past year (AOR = 1.52, 95% CI = 1.37, 1.68, $p < 0.0001$). Past 12-month cannabis use remained significantly higher in 2023 versus pre-legalization for anxiety and depression. Daily cannabis use increased from 2018 to 2019 only among those not reporting any experience of a mental health problem in the past year (AOR = 1.34, 95% CI = 1.10, 1.62, $p < 0.0001$). No other pre-post legalization differences were observed among individuals who experienced bipolar, PTSD, or schizophrenia.

Interpretation Few changes in cannabis use were observed pre-versus post-cannabis legalization among Canadians who reported experiencing a mental health problem, whereas daily and past 12-month use increased among Canadians not reporting a mental health problem.

Funding Funding for the ICPS study was provided by a Canadian Institutes of Health Research Project Grant and Project Bridge Grant (PJT-153342).

Keywords: Cannabis; Mental health problem; Anxiety; Depression; Prevalence

Introduction

The liberalization of cannabis laws has potentially important implications for the prevalence of cannabis use and mental health. To date, 24 of the US states and a growing number of countries have legalized 'non-medical' or 'recreational' cannabis, including Canada in October 2018.[1,2] Emerging evidence suggests that cannabis may have therapeutic benefit to individuals who suffer from post-traumatic stress disorder (PTSD), while non-intoxicating cannabinoids such as cannabidiol (CBD) may have potential in the treatment of psychosis and schizophrenia.[3,4] However, there is sub-

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Research in context

Evidence before this study
Google Scholar and PubMed were searched to identify previously published evidence on the association between cannabis use and mental health status prior to undertaking this study. From October 2024 to May 2025, searches were conducted which included all literature, including grey literature and government reports and data, assessing this relationship. The search terms used were mental health, anxiety, depression, bipolar, post-traumatic stress disorder (PTSD), schizophrenia, psychosis, cannabis, cannabis use, cannabis prevalence, and legalization, and were not limited to the English language. Three main studies were identified which examined trends in the prevalence of cannabis before and after cannabis legalization among individuals experiencing problems with their mental health. One was among youth receiving psychiatric care for schizophrenia or psychosis, one was a national survey among adults experiencing depression in the United States, and lastly, one reported on data from the US National Survey on Drug Use and Health (NSDUH) and compared trends between states with different cannabis laws.

Added value of this study
The current study extends current knowledge by addressing key gaps in the sparse literature to date. The manuscript contributes novel findings: 1) cannabis prevalence is substantially higher among those with a history of mental health conditions, both before and after legalization; and 2) the prevalence of cannabis use increased pre-versus post-legalization to a greater extent among those with no history of mental health problems, with few post-legalization changes among those reporting either a previous diagnosis or recent experience of a mental health condition.

Implications of all the available evidence
Despite evidence indicating increased risks from cannabis use among those with a history of mental health problems, the current findings highlight substantially higher rates of cannabis use among those with a lifetime diagnosis and recent experience with anxiety, depression, bipolar, PTSD or schizophrenia/psychosis. The findings highlight a disconnect between health recommendations and 'real world' patterns of substance use that warrant greater attention. The findings also advance our understanding of the impact of substance use policy at the population level. Notably, concerns that 'recreational' cannabis legalization would lead to higher rates of cannabis use among those with a history of mental health problems do not appear to be supported, at least over the first five years following legalization in Canada.

stantially greater evidence of adverse impacts on mental health.[5,6] A comprehensive review concluded there was "substantial evidence" of an statistical association between high-risk cannabis use and the development of schizophrenia, and "moderate evidence" between regular cannabis use and the development of depression and social anxiety disorders, as well as increased symptoms of mania and hypomania among individuals experiencing bipolar disorder.[5] "Moderate evidence" has also been identified between heavy cannabis use and increased incidences of suicidal ideation, attempts and completion.[5] Mental health risk is increased when cannabis use is initiated in adolescence and young adulthood, and among people biologically and socially predisposed to developing a mental health disorder.[7,8]

The causal relationship between cannabis use and mental health is complex, including shared genetic and environmental risk factors.[9,10] The association between cannabis and mental health is also 'bidirectional' in nature: cannabis can increase or exacerbate mental health risk, while people experiencing mental health conditions are likely to use cannabis more often in an effort to manage mental health symptoms.[9,11,12] Indeed, approximately half of people who report using cannabis for medical purposes in Canada and the United States report doing so to manage anxiety and depression.[12] These patterns of cannabis use are consistent with the self-medication hypothesis, in which individuals use cannabis for temporary relief from their symptoms, despite poorer mental health outcomes in the long-term.[8,13] For example, cannabis use among people experiencing bipolar disorder is associated with decreased acute symptoms of depression and mania, meanwhile individuals with co-occurring bipolar and cannabis use disorder (CUD) exhibit a more severe and complex course of illness than individuals with bipolar disorder alone.[14]

Few studies have directly examined the impact of cannabis legalization among individuals experiencing mental health conditions.[15] A recent scoping review yielded mixed results concerning the effects of 'recreational' cannabis legalization on many mental health disorders, including schizophrenia, depression, and anxiety.[16] Within this review, several studies observed increases in cannabis-induced psychosis,[17] and increases in depression among women[18] and adult cannabis consumers.[19] However, other studies found no significant differences in pre-post legalization cannabis-induced psychosis or schizophrenia,[20] depressive or bipolar diagnoses,[21] nor anxiety diagnoses.[22] Comparisons across studies are challenging due to differences in the way that mental health conditions are assessed in large, population-based studies: studies that use clinical diagnoses are likely to have greater validity; however, many individuals experiencing mental health conditions go undiagnosed, such

that studies based on clinical diagnoses are likely to under-represent the proportion of people who use cannabis and experience serious mental health conditions.[23]

Three studies have specifically examined trends in the prevalence of cannabis before and after cannabis legalization among individuals experiencing mental health conditions. The first study found no significant difference in cannabis use pre-post legalization among youth receiving psychiatric care for schizophrenia or psychosis.[24] The second study used national survey data to examine trends in past-month cannabis prevalence among 20 to 59 year-olds in the United States between 2005 and 2016, a period during which many states adopted medical and recreational cannabis laws. Although cannabis prevalence increased among those with a probable diagnosis of depression, cannabis use increased to a similar extent among individuals with and without a probable diagnosis of depression.[25] Finally, an analysis of data from the US National Survey on Drug Use and Health between 2008 and 2017 compared trends between states with different cannabis laws. Cannabis prevalence increased to a greater extent among those with high versus low anxiety in states that had legalized medical cannabis, but the effect was not observed for 'recreational' cannabis legalization.[26]

Overall, there is lack of evidence on the impact of cannabis legalization among people experiencing mental health conditions. The current study had two primary objectives: 1) to examine differences in the prevalence of cannabis use by mental health status; 2) to examine trends in cannabis prevalence before and after the legalization of 'recreational' cannabis in Canada by mental health status; and 3) to examine whether these trends are consistent when mental health status is defined as 'past 12 month experience' versus 'lifetime diagnosis' of a mental health condition.

Methods

Data were from six waves of the International Cannabis Policy Study (ICPS) collected in Canada between 2018 and 2023. ICPS is a repeat, cross-sectional national survey conducted annually. The study population represents a 'general population' sample of Canadians between the ages of 16 and 65 recruited through the Nielsen Consumer Insights Global Panel and partner panels. The final sample included 92,843 respondents across the 6 annual data waves. The American Association for Public Opinion Research (AAPOR) Cooperation Rate #2, defined as the percentage of respondents who completed the survey among all eligible respondents ever contacted, ranged from 64.2% in 2018 to 53.8% in 2023. The median survey completion time ranged from 19.9 min to 25.1 min across waves. The survey methodology was the same across survey waves, including sampling, survey mode, and core survey measures. More detailed methodology, including the reporting of the development of the post-stratification sampling weights can be found online in the Technical Reports but the overall study design remains the same between survey years (e.g., survey method, method of assessment) with minimal changes to specific survey questions (https://cannabisproject.ca/methods/).[27] The study was reviewed and received approval by the research ethics board at the University of Waterloo (ORE #31330), and all participants consented to participation prior to the initiation of the online survey. The study sponsor had no role in the study design including data collection, analysis, interpretation of the data, writing of the manuscript nor decision to submit the manuscript for publication.

Measures
Prevalence of cannabis use
Prevalence of cannabis use served as the primary study outcome. Validated measures were used to assess two measures of cannabis use: 1) past 12-month use (including any use in past 12-months) and 2) daily cannabis use (defined as cannabis use on 5 or more days per week at the time of the survey).

Past 12-month experience of a mental health problem
Respondents reported whether they had experienced a mental health problem in the past 12 months. In Waves 1 and 2, respondents first answered "Have you ever experienced any of the following mental health problems (regardless of whether you were diagnosed)?" with response options related to anxiety, bipolar disorder, depression, PTSD, schizophrenia, psychotic disorder, and substance use disorder. If respondents endorsed any one of the mental health problems they were then asked, "Have you experienced this/these mental health problem(s) in the past 12 months?". In Waves 3 to 6 respondents were only asked the second question. Respondents could select multiple response options/conditions. In all analyses, responses for psychotic disorder and schizophrenia were grouped together.

Lifetime diagnosis with a mental health disorder
All respondents were asked "Have you ever been diagnosed with any of the following?" with response options being "anxiety (including phobia, obsessive-compulsive disorder or panic disorder)", "bipolar disorder or mania or borderline personality disorder", "depression (including dysthymia)", "PTSD", "psychotic disorder (including schizophrenia or dissociative identity disorder)", and "substance use disorder". Respondents who did not select any of the conditions were categorized as 'No lifetime mental health diagnosis.'

Sociodemographic variables
Respondents reported their age, sex-at-birth, ethnicity/race, highest educational achievement, perceived

income adequacy (i.e., whether they are financially able to make ends meet), and province of residence in Canada.

Statistical analyses

A total of 93,933 respondents completed ICPS surveys in Canada between 2018 and 2023. Respondents were excluded if they declined to answer whether they had experienced a mental health problem during the past 12 months (N = 1090; 1.2%). In the regression models, an additional 936 respondents (1.0%) were excluded due to missing data on education, for a final analytic sample sizes of 91,907.

Post-stratification sample weights were constructed based on known population totals by age-by-sex-by-province, education, and age-by-tobacco smoking status groups. A raking algorithm was applied to compute weights that were calibrated to these groupings. The survey weights were subsequently rescaled to each year's analytical sample size.

Descriptive findings are reported for all mental health problems and respondent characteristics. All models were run for each of two dependent variables (past 12-month cannabis use and daily cannabis use). First, adjusted and unadjusted logistic regressions were run with all respondents to test differences in overall cannabis use by mental health status. Models were stratified for mental health conditions, in which the main independent variable in each model was an indicator variable for mental health condition (e.g., 0 = No experience of anxiety in past 12-months, 1 = Anxiety in past 12-months). Second, adjusted and unadjusted logistic regression models were run to test trends in cannabis prevalence by mental health status before versus after legalization of 'recreational' cannabis in Canada. In order to account for potential changes in the prevalence of mental health conditions over time—and particularly during the COVID-19 pandemic period—models were stratified for each mental health problem experienced in the past 12-months to test whether the likelihood of cannabis use changed *among those experiencing each mental health condition*. Survey year served as the independent variable in these models, and was analysed as an indicator variable, with pairwise contrasts reported for 'year-to-year' differences and differences between the pre-legalization baseline (2018) and each subsequent year. Third, a sensitivity analysis was conducted by repeating the models above using the 'lifetime diagnosis' measure instead of 'past 12-month experience' for mental health conditions. Although receiving a formal diagnosis represents a higher threshold for a mental health condition, many individuals experiencing serious mental health problems go undiagnosed. Therefore, this sensitivity analysis was conducted to examine consistency across measures of mental health status. For the sensitivity analysis, respondents were excluded if they refused to answer whether they had been diagnosed with a mental health disorder in the past (N = 1216) and if they did not report the highest levels of education achieved (N = 489), leaving a total sample for the sensitivity analyses to be 91,794. The findings were highly consistent across the two measures; therefore, the findings for 'past 12 month experience' are reported in the Results section and the findings for 'lifetime diagnosis' are reported in Supplementary Tables.

All adjusted logistic regression models included the following covariates: sex-at-birth, age group, ethnicity, education, province, and perceived income adequacy, along with the indicator variable for survey year. All analyses are weighted, and 95% confidence intervals (95%CI) are reported for adjusted (AOR) and unadjusted odds ratios (OR). Analyses were performed using SAS v9.4 (SAS Institute Inc., North Carolina).

Results

Sample description

Table 1 displays the sample characteristics and mental health status of respondents by survey wave from 2018 to 2023. As Table 1 shows, across all waves, more than half of all respondents had used cannabis in their lifetime, with approximately one third reporting experiencing a mental health problem over the past 12 months, and one fifth of respondents reporting 'ever' being diagnosed with a mental health disorder.

Past 12-month cannabis use

Fig. 1 shows past 12-month cannabis use by survey year and mental health status. Across all years, the prevalence of using cannabis in the past 12-months was higher among those experiencing each of the 5 mental health problems (see Supplementary Table S1).

Table 2 shows results from unadjusted and adjusted logistic regression models testing changes in past 12-month cannabis prevalence over time, stratified by mental health status. Among respondents reporting past year experience of anxiety, past 12-month cannabis use increased between 2018 and 2019, the year following legalization (AOR = 1.33, 95% CI = 1.15, 1.53, $p < 0.0001$). Few changes were observed between 2019 and 2023, except a decrease from 2021 to 2022 (AOR = 0.89, 95% CI = 0.81, 0.98, $p = 0.021$); however, past 12-month cannabis use remained higher than 2018 in all subsequent years among those with anxiety. The adjusted and unadjusted models were highly consistent.

Similar trends were observed among individuals with depression. In adjusted models, among respondents reporting past year experience of depression, past 12-month cannabis use increased between 2018 and 2019, the year following legalization (AOR = 1.47, 95% CI = 1.26, 1.73, $p < 0.0001$). Between 2019 and 2020, there was a decrease in past 12-month cannabis

Characteristics	2018 weighted, % (n) N = 10,027	2019 weighted, % (n) N = 15,216	2020 weighted, % (n) N = 15,527	2021 weighted, % (n) N = 16,700	2022 weighted, % (n) N = 15,701	2023 weighted, % (n) N = 19,672	All waves weighted, % (n) N = 92,843
Age							
16–25 years	19.0% (1902)	18.8% (2864)	18.5% (2868)	18.2% (3045)	18.5% (2901)	18.4% (3626)	18.5% (17,206)
26–35 years	20.7% (2076)	20.8% (3171)	21.1% (3268)	21.1% (3520)	21.4% (3360)	21.5% (4221)	21.1% (19,616)
36–45 years	19.6% (1964)	19.8% (3007)	19.9% (3096)	20.3% (3382)	20.4% (3199)	20.4% (4020)	20.1% (18,668)
46–55 years	20.7% (2076)	19.9% (3029)	19.5% (3034)	19.3% (3218)	18.9% (2972)	18.9% (3721)	19.4% (18,049)
56–65 years	20.0% (2009)	20.7% (3145)	21.0% (3261)	21.2% (3535)	20.8% (3270)	20.8% (4084)	20.8% (19,303)
Sex-at-birth							
Male	50.1% (5025)	50.3% (7653)	50.3% (7812)	50.1% (8370)	50.3% (7892)	50.3% (9904)	50.3% (46,655)
Female	49.9% (5002)	49.7% (7563)	49.7% (7715)	49.9% (8330)	49.7% (7809)	49.7% (9768)	49.7% (46,188)
Ethnicity/race							
White/Caucasian	77.4% (7758)	73.2% (11,133)	71.5% (11,099)	68.3% (11,403)	67.3% (10,570)	66.5% (13,077)	70.1% (65,038)
Black	1.6% (161)	3.7% (560)	3.6% (559)	4.1% (676)	5.3% (825)	5.1% (1007)	4.1% (3788)
East/Southeast Asian	8.5% (856)	7.8% (1185)	9.0% (1404)	8.6% (1433)	8.8% (1388)	9.1% (1787)	8.7% (8054)
Indigenous	3.7% (372)	2.3% (353)	1.9% (292)	2.7% (446)	2.4% (372)	2.4% (477)	2.5% (2313)
Latino	0.9% (90)	1.4% (220)	1.9% (288)	2.8% (476)	2.1% (333)	1.6% (323)	1.9% (1729)
Middle Eastern	1.0% (98)	1.3% (198)	1.8% (277)	2.0% (331)	2.1% (335)	2.1% (417)	1.8% (1657)
South Asian	3.1% (309)	3.3% (497)	3.7% (567)	4.4% (735)	4.6% (726)	5.5% (1084)	4.2% (3919)
Other/Mixed/Unstated	3.8% (384)	7.0% (1070)	6.7% (1041)	7.2% (1199)	7.3% (1151)	7.6% (1499)	6.8% (6344)
Education							
Less than high school	15.4% (1543)	15.4% (2347)	15.3% (2376)	15.4% (2566)	13.6% (2142)	13.7% (2692)	14.7% (13,666)
High School Diploma or Equivalent	26.6% (2670)	26.4% (4023)	26.5% (4117)	26.4% (4401)	25.9% (4073)	25.8% (5081)	26.2% (24,366)
Some College/University	32.4% (3251)	32.4% (4932)	32.5% (5040)	32.6% (5445)	30.8% (4828)	30.8% (6060)	31.8% (29,557)
Bachelor's Degree +	24.7% (2482)	24.6% (3740)	24.7% (3835)	24.8% (4134)	28.6% (4491)	28.6% (5635)	26.2% (24,317)
Not stated	0.8% (81)	1.1% (173)	1.0% (158)	0.9% (154)	1.1% (166)	1.0% (204)	1.0% (936)
Income Adequacy							
Very difficult	8.2% (818)	9.6% (1465)	7.6% (1183)	8.8% (1468)	10.6% (1661)	12.1% (2388)	9.7% (8982)
Difficult	20.0% (2003)	22.1% (3366)	18.5% (2866)	19.0% (3180)	22.0% (3461)	23.4% (4605)	21.0% (19,481)
Neither easy nor difficult	35.9% (3604)	34.9% (5314)	37.5% (5828)	35.1% (5853)	34.1% (5348)	33.7% (6634)	35.1% (32,581)
Easy	21.3% (2134)	19.7% (2992)	22.1% (3437)	21.6% (3602)	20.0% (3138)	18.9% (3709)	20.5% (19,012)
Very Easy	11.2% (1124)	9.6% (1456)	10.8% (1673)	12.1% (2018)	10.1% (1590)	9.2% (1819)	10.4% (9679)
Don't know	2.2% (218)	2.2% (337)	2.2% (341)	2.3% (386)	2.2% (351)	1.6% (317)	2.1% (1951)
Refuse to answer	1.3% (127)	1.9% (286)	1.3% (200)	1.2% (194)	1.0% (152)	1.0% (201)	1.2% (1158)
Province							
British Columbia	13.2% (1323)	13.7% (2085)	13.7% (2120)	14.0% (2340)	13.9% (2188)	13.9% (2739)	13.8% (12,795)
Alberta	12.0% (1202)	11.9% (1813)	11.9% (1846)	11.9% (1995)	11.9% (1871)	12.0% (2353)	11.9% (11,081)
Saskatchewan	3.1% (312)	3.0% (462)	3.0% (472)	3.0% (504)	3.0% (466)	3.0% (587)	3.0% (2803)
Manitoba	3.6% (359)	3.6% (547)	3.6% (555)	3.6% (596)	3.5% (554)	3.5% (696)	3.6% (3305)
Ontario	39.0% (3913)	39.2% (5962)	39.3% (6098)	39.2% (6546)	39.4% (6181)	39.4% (7755)	39.3% (36,455)
Quebec	22.6% (2270)	22.2% (3381)	22.2% (3454)	21.9% (3662)	21.9% (3439)	21.8% (4286)	22.1% (20,492)
New Brunswick	2.0% (204)	2.0% (306)	2.0% (311)	2.0% (335)	2.0% (318)	2.0% (397)	2.0% (1872)
Nova Scotia	2.6% (260)	2.6% (390)	2.6% (397)	2.6% (428)	2.6% (410)	2.6% (511)	2.6% (2397)
Price Edward Island	0.4% (41)	0.4% (62)	0.4% (64)	0.4% (70)	0.4% (68)	0.4% (86)	0.4% (391)
Newfoundland & Labrador	1.4% (143)	1.4% (208)	1.4% (210)	1.3% (222)	1.3% (206)	1.3% (262)	1.3% (1251)
Cannabis use							
Never	43.5% (4366)	38.0% (5787)	39.2% (6079)	37.9% (6330)	38.1% (5985)	38.3% (7531)	38.9% (36,078)
Greater then 12 months	29.0% (2909)	26.7% (4060)	26.8% (4161)	25.8% (4312)	26.5% (4168)	26.6% (5240)	26.8% (24,850)
Past 12-month	8.6% (859)	11.4% (1729)	10.3% (1593)	9.4% (1578)	10.3% (1617)	9.6% (1889)	10.0% (9265)
Monthly	4.9% (488)	7.0% (1063)	6.4% (989)	7.2% (1195)	6.9% (1082)	7.3% (1436)	6.7% (6253)
Weekly	5.2% (517)	5.7% (860)	5.7% (880)	6.1% (1013)	6.2% (977)	5.9% (1151)	5.8% (5399)
Daily/almost daily	8.9% (889)	11.3% (1716)	11.8% (1825)	13.6% (2272)	11.9% (1872)	12.3% (2425)	11.8% (10,999)
Past 12-month experience of a mental health problem							
Anxiety	22.5% (2255)	27.3% (4151)	28.9% (4491)	32.2% (5372)	32.5% (5100)	32.7% (6436)	29.9% (27,805)
Bipolar	1.6% (163)	2.7% (411)	3.3% (516)	3.5% (590)	3.9% (606)	3.7% (727)	3.2% (3013)
Depression	17.9% (1799)	21.0% (3203)	23.1% (3587)	25.4% (4247)	25.0% (3919)	25.0% (4920)	23.3% (21,675)
PTSD	4.1% (411)	6.0% (911)	6.5% (1010)	7.3% (1213)	8.6% (1351)	8.4% (1650)	7.0% (6545)
Schizophrenia[a]	1.2% (117)	1.2% (186)	1.9% (290)	2.3% (379)	2.6% (408)	2.6% (509)	2.0% (1888)

(Table 1 continues on next page)

| Characteristics	2018 weighted, % (n) N = 10,027	2019 weighted, % (n) N = 15,216	2020 weighted, % (n) N = 15,527	2021 weighted, % (n) N = 16,700	2022 weighted, % (n) N = 15,701	2023 weighted, % (n) N = 19,672	All waves weighted, % (n) N = 92,843
(Continued from previous page)							
Substance use disorder[b]	2.9% (289)	3.6% (545)	3.8% (585)	3.9% (655)	3.7% (588)	3.7% (722)	3.6% (3384)
None of the above	70.4% (7054)	65.1% (9912)	62.4% (9684)	58.7% (9811)	58.0% (9113)	58.2% (11,449)	61.4% (57,023)
Lifetime diagnosis of a mental health condition							
Anxiety	17.8% (1789)	22.7% (3456)	21.3% (3303)	23.8% (3983)	24.7% (3877)	25.0% (4910)	23.0% (21,318)
Bipolar	1.9% (191)	3.3% (507)	3.5% (542)	3.9% (650)	4.3% (675)	4.1% (814)	3.6% (3379)
Depression	17.6% (1769)	22.1% (3364)	20.9% (3242)	22.2% (3716)	21.9% (3437)	21.9% (4315)	21.4% (19,842)
PTSD	3.6% (364)	6.6% (1004)	6.6% (1026)	7.2% (1196)	8.0% (1261)	7.8% (1544)	6.9% (6396)
Schizophrenia[a]	0.9% (92)	1.2% (185)	1.6% (241)	1.6% (267)	2.0% (320)	1.8% (364)	1.6% (1469)
Substance use disorder[b]	1.5% (155)	2.4% (359)	2.2% (338)	2.4% (401)	2.5% (399)	2.4% (480)	2.3% (2132)
None of the above	74.3% (7450)	67.3% (10,241)	67.9% (10,541)	65.6% (10,947)	64.4% (10,107)	65.1% (12,816)	66.9% (62,102)

[a]Includes experience of 'psychosis'. [b]Includes both alcohol and drug use disorders.

Table 1: Sample characteristics of ICPS respondents in Canada, 2018 to 2023 (N = 92,843).

use (AOR = 0.87, 95% CI = 0.77, 0.99, p = 0.030), which was followed by a moderate increase from 2020 to 2021 (AOR = 1.12, 95% CI = 0.99, 1.25, p = 0.06), followed by another moderate decrease from 2021 to 2022 (AOR = 0.90, 95% CI = 0.81, 1.01, p = 0.06). Overall, past 12-month cannabis use remained higher than 2018 in all subsequent years among those with depression. The results from the unadjusted models were similar to the adjusted models.

As shown in the adjusted models in Table 2, no significant change was observed in past 12-month cannabis use between 2018 and any year post-legalization among those experiencing bipolar disorder, PTSD, or schizophrenia. Between 2022 and 2023, an increase in past 12-month cannabis use was observed among those experiencing bipolar disorder (AOR = 1.46, 95% CI = 1.09, 1.96, p = 0.012) and schizophrenia (AOR = 1.44, 95% CI = 1.00, 2.08, p = 0.05). Adjusted models were highly consistent with the unadjusted models except in the case of PTSD where from 2021 to 2022 there was a significant decrease in past 12 month cannabis use in the
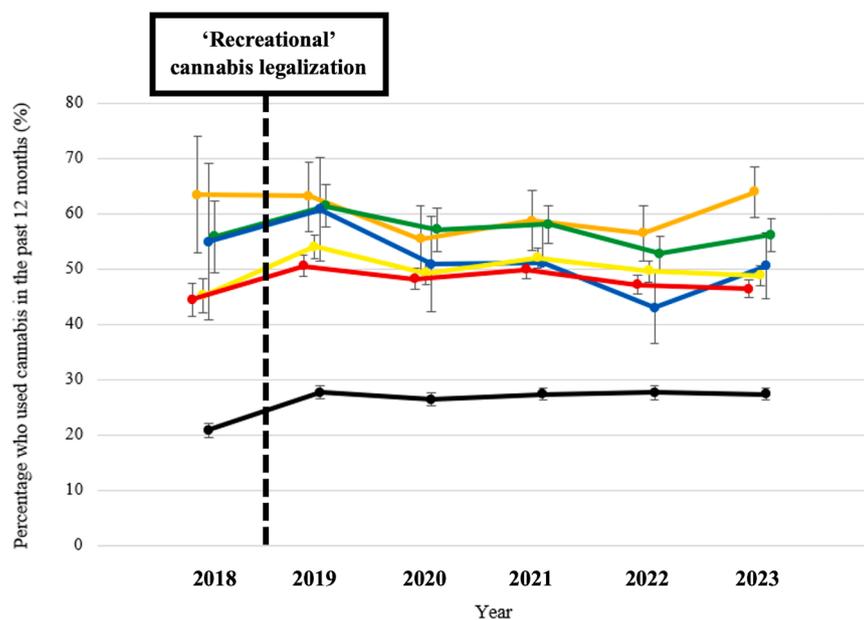
Fig. 1: Past 12-month cannabis use by survey year and mental health status (N = 91,907). Legend: Orange: Bipolar; Green: Post-Traumatic Stress Disorder; Blue, Schizophrenia; Yellow: Depression; Red: Anxiety; Black: None.

Mental health condition[a]	Past 12-month cannabis use % (n)[c]	ADJUSTED[b] Past 12-month use AOR (95% CI)	p value	Unadjusted past 12-month use OR (95% CI)	p value	Daily cannabis use % (n)[d]	Adjusted daily use AOR (95% CI)	p value	Unadjusted daily use OR (95% CI)	p value
Anxiety (n = 27,674)[e]										
2018	44.4% (1001)	Reference		Reference		17.7% (398)	Reference		Reference	
2019	50.5% (2096)	1.33 (1.15–1.53)	<0.0001	1.28 (1.11–1.47)	0.0005	19.2% (797)	1.12 (0.93–1.36)	0.24	1.12 (0.93–1.35)	0.25
2020	48.2% (2164)	1.27 (1.11–1.47)	0.0008	1.17 (1.02–1.34)	0.027	19.2% (863)	1.20 (0.99–1.45)	0.06	1.11 (0.92–1.34)	0.27
2021	49.9% (2678)	1.37 (1.19–1.57)	<0.0001	1.25 (1.09–1.43)	0.0012	21.0% (1127)	1.34 (1.11–1.61)	0.0019	1.24 (1.04–1.49)	0.017
2022	47.1% (2404)	1.22 (1.07–1.40)	0.0043	1.12 (0.98–1.28)	0.10	18.4% (936)	1.15 (0.95–1.38)	0.15	1.05 (0.88–1.26)	0.58
2023	46.3% (2982)	1.18 (1.03–1.34)	0.019	1.09 (0.95–1.24)	0.22	19.2% (1234)	1.19 (0.99–1.42)	0.07	1.11 (0.93–1.33)	0.24
Bipolar disorder (n = 3001)										
2018	63.4% (104)	Reference		Reference		32.8% (53)	Reference		Reference	
2019	63.1% (259)	1.05 (0.60–1.82)	0.87	0.99 (0.59–1.66)	0.96	31.3% (129)	1.00 (0.54–1.86)	1.00	0.93 (0.51–1.72)	0.83
2020	55.4% (286)	0.80 (0.46–1.38)	0.42	0.72 (0.43–1.19)	0.20	24.2% (125)	0.74 (0.40–1.37)	0.33	0.65 (0.35–1.20)	0.17
2021	58.7% (346)	0.87 (0.51–1.49)	0.62	0.82 (0.50–1.36)	0.45	28.4% (167)	0.94 (0.52–1.73)	0.85	0.82 (0.45–1.48)	0.51
2022	56.5% (342)	0.83 (0.49–1.40)	0.48	0.75 (0.46–1.23)	0.26	29.8% (180)	1.02 (0.56–1.85)	0.94	0.87 (0.48–1.57)	0.65
2023	63.9% (465)	1.21 (0.72–2.04)	0.47	1.03 (0.63–1.68)	0.91	30.1% (219)	1.07 (0.59–1.93)	0.82	0.89 (0.49–1.59)	0.68
Depression (n = 21,596)										
2018	45.2% (812)	Reference		Reference		18.8% (338)	Reference		Reference	
2019	54.0% (1728)	1.47 (1.26–1.73)	<0.0001	1.42 (1.22–1.66)	<0.0001	21.7% (695)	1.19 (0.96–1.46)	0.11	1.20 (0.98–1.47)	0.08
2020	49.2% (1764)	1.28 (1.10–1.50)	0.0019	1.18 (1.01–1.38)	0.035	21.0% (753)	1.21 (0.98–1.49)	0.08	1.14 (0.93–1.40)	0.20
2021	52.0% (2208)	1.43 (1.23–1.67)	<0.0001	1.32 (1.14–1.53)	0.0003	23.4% (994)	1.37 (1.13–1.68)	0.0017	1.32 (1.09–1.60)	0.0053
2022	49.6% (1943)	1.29 (1.11–1.50)	0.0011	1.19 (1.03–1.39)	0.020	20.8% (814)	1.18 (0.96–1.44)	0.11	1.13 (0.93–1.38)	0.22
2023	48.8% (2400)	1.25 (1.07–1.45)	0.0040	1.16 (1.00–1.34)	0.05	20.5% (1008)	1.14 (0.94–1.39)	0.19	1.11 (0.92–1.35)	0.29
Post traumatic stress disorder (n = 6522)										
2018	55.8% (229)	Reference		Reference		27.8% (114)	Reference		Reference	
2019	61.3% (559)	1.34 (0.97–1.86)	0.08	1.26 (0.92–1.71)	0.15	30.3% (276)	1.18 (0.81–1.71)	0.38	1.13 (0.79–1.60)	0.51
2020	57.1% (576)	1.18 (0.85–1.63)	0.32	1.05 (0.77–1.43)	0.75	26.0% (262)	0.99 (0.69–1.44)	0.97	0.90 (0.64–1.29)	0.58
2021	58.0% (703)	1.18 (0.86–1.62)	0.30	1.09 (0.81–1.47)	0.56	30.9% (375)	1.26 (0.88–1.80)	0.21	1.17 (0.84–1.63)	0.37
2022	52.7% (712)	1.04 (0.76–1.42)	0.79	0.89 (0.66–1.19)	0.42	25.4% (344)	1.04 (0.73–1.49)	0.83	0.89 (0.64–1.24)	0.48
2023	56.1% (926)	1.15 (0.85–1.56)	0.37	1.02 (0.76–1.36)	0.92	24.8% (410)	0.94 (0.66–1.33)	0.71	0.86 (0.62–1.20)	0.37
Schizophrenia, including psychosis (n = 1882)										
2018	54.9% (64)	Reference		Reference		24.2% (28)	Reference		Reference	
2019	60.7% (113)	1.80 (0.86–3.79)	0.12	1.30 (0.65–2.57)	0.46	34.6% (64)	2.31 (0.97–5.52)	0.06	1.67 (0.75–3.75)	0.21
2020	50.8% (147)	1.27 (0.63–2.57)	0.51	0.85 (0.44–1.63)	0.62	24.5% (71)	1.57 (0.67–3.66)	0.30	1.02 (0.46–2.25)	0.97
2021	51.0% (193)	1.20 (0.62–2.34)	0.58	0.85 (0.46–1.59)	0.61	18.7% (71)	1.00 (0.44–2.30)	0.99	0.73 (0.34–1.57)	0.42
2022	42.9% (175)	0.89 (0.46–1.70)	0.72	0.62 (0.33–1.14)	0.12	15.9% (65)	0.79 (0.35–1.79)	0.57	0.59 (0.27–1.27)	0.18
2023	50.5% (257)	1.28 (0.66–2.46)	0.46	0.84 (0.46–1.55)	0.58	21.5% (109)	1.25 (0.57–2.78)	0.58	0.86 (0.41–1.81)	0.69
No experience of the mental health problems above (n = 56,239)[f]										
2018	20.8% (1465)	Reference		Reference		5.5% (391)	Reference		Reference	
2019	27.6% (2740)	1.52 (1.37–1.68)	<0.0001	1.45 (1.31–1.60)	<0.0001	7.4% (732)	1.34 (1.10–1.62)	<0.0001	1.33 (1.10–1.61)	0.0031
2020	26.4% (2558)	1.45 (1.31–1.62)	<0.0001	1.37 (1.23–1.52)	<0.0001	7.5% (722)	1.44 (1.18–1.75)	<0.0001	1.36 (1.12–1.65)	0.0021
2021	27.3% (2681)	1.55 (1.39–1.71)	<0.0001	1.44 (1.30–1.59)	<0.0001	9.1% (889)	1.79 (1.48–2.16)	<0.0001	1.69 (1.40–2.03)	<0.0001
2022	27.6% (2514)	1.60 (1.44–1.78)	<0.0001	1.45 (1.31–1.61)	<0.0001	8.0% (727)	1.57 (1.29–1.90)	<0.0001	1.45 (1.20–1.75)	0.0001
2023	27.3% (3124)	1.58 (1.43–1.75)	<0.0001	1.43 (1.30–1.58)	<0.0001	8.0% (919)	1.58 (1.31–1.91)	<0.0001	1.47 (1.22–1.77)	<0.0001

[a]Logistic regression models were stratified by mental health condition and including respondents who had experienced the condition in the past 12-months. [b]Adjusted for sex at birth, age group, ethnicity, education, province, and perceived income adequacy. [c]Past 12-month cannabis use is defined as any cannabis use in the past 12 months. [d]Daily cannabis use is defined as cannabis use on 5 or more days per week at the time of the survey. [e]Sample sizes for each mental health problem is the total sample size from 2018 through 2023. [f]No experience of anxiety, bipolar disorder, depression, post traumatic stress disorder, or schizophrenia/psychosis in the past 12 months.

Table 2: Binary logistic regression model of adjusted and unadjusted odds of using cannabis in the past 12 month and daily/near daily between 2018 and 2023 in Canadians reporting a mental health problem, or not, in the past 12 months (N = 91,907).

unadjusted model (OR = 0.81, 95% CI = 0.67, 0.98, p = 0.032) in comparison to the adjusted model (AOR = 0.88, 95% CI = 0.72, 1.08, p = 0.21).

Among respondents reporting 'no experience of any mental health problem' in the past 12 months, there was an increase of past 12-month cannabis use between 2018 and 2019, the year following legalization, (AOR = 1.52, 95% CI = 1.37, 1.68, p < 0.0001). No changes in past 12-month cannabis use were observed between 2019 and 2023, such that past 12-month cannabis use remained higher than 2018 in all subsequent years among those not experiencing a mental health problem in the past year. The adjusted and unadjusted models for respondents reporting 'no experience of any mental health problem' in the past 12 months were consistent.

Daily cannabis use

Fig. 2 displays daily cannabis use by wave and mental health status. Across all years, the prevalence of daily cannabis use was higher among those experiencing each of the five mental health problems (see Supplementary Table S2).

As shown in Table 2, there was no change in daily cannabis use between 2018 and 2019, the year following legalization, among individuals experiencing anxiety, depression, bipolar disorder or PTSD. Among those experiencing anxiety, there was an increase in daily cannabis use between 2018 and 2021 (AOR = 1.34, 95% CI = 1.11, 1.61, p < 0.0019) which was directly followed by a decrease in daily cannabis use in 2022 (AOR = 0.86, 95% CI = 0.76, 0.97, p = 0.017). The same trend was observed among those experiencing depression: there was an increase in daily cannabis use between 2018 and 2021 (AOR = 1.37, 95% CI = 1.13, 1.68, p < 0.0017), followed by a decrease in daily cannabis use from 2021 to 2022 (AOR = 0.86, 95% CI = 0.75, 0.98, p = 0.026). The adjusted and unadjusted models for anxiety, depression, and bipolar disorder were highly consistent.

Among those experiencing PTSD, there was a modest increase in daily cannabis use from 2020 to 2021 (AOR = 1.27, 95% CI = 0.99, 1.62, p = 0.06), but this decreased in 2022 (AOR = 0.83, 95% CI = 0.66, 1.03, p = 0.09), with similar findings in the unadjusted models. Lastly, among those experiencing schizophrenia, there was also a modest increase in daily cannabis use from 2018 to 2019 (AOR = 2.31, 95% CI = 0.97, 5.52, p = 0.06) and 2022 to 2023 (AOR = 1.59, 95% CI = 0.97, 2.59, p = 0.07). The adjusted and unadjusted models for those experiencing schizophrenia were highly consistent as shown in Table 2.

Among respondents reporting no experience of any mental health problem in the past 12 months, daily cannabis use increased between 2018 and 2019, the year following legalization (AOR = 1.34, 95% CI = 1.10, 1.62, p < 0.0001). Few changes were observed between 2019 and 2023, except an increase between 2020 and 2021 (AOR = 1.24, 95% CI = 1.07, 1.44, p = 0.0039), followed by a moderate decrease in daily cannabis use in 2022 (AOR = 0.88, 95% CI = 0.76, 1.01, p = 0.07),
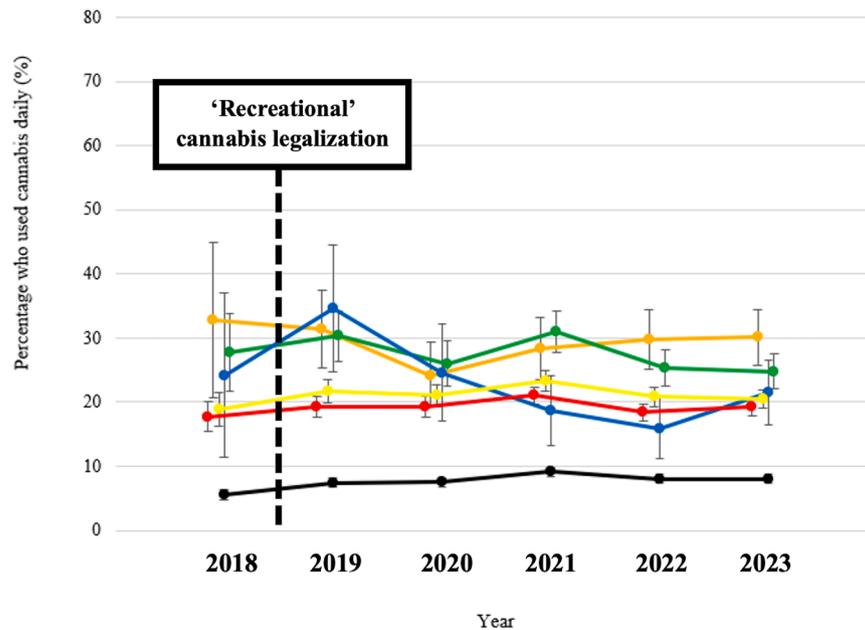

Fig. 2: Daily cannabis use by survey year and mental health status (N = 91,907). Legend: Orange: Bipolar; Green: Post-Traumatic Stress Disorder; Blue, Schizophrenia; Yellow: Depression; Red: Anxiety; Black: None.

with consistent findings in the unadjusted models. Overall, daily cannabis use remained higher than 2018 in all subsequent years among those reporting no experience of a mental health problem in the past 12 months.

As shown in Supplementary Table S2, trends in cannabis use by 'lifetime diagnosis' of mental health conditions was highly consistent with the findings for 'past 12-month experience'.

Discussion

The current study is among the few studies to examine changes in cannabis use associated with cannabis legalization among those experiencing mental health conditions. Overall, modest increases in the prevalence of cannabis use were observed from pre to post legalization in Canada. Past 12-month and daily cannabis use increased the year following legalization, before stabilizing and even declining slightly in recent years. These findings are consistent with trends observed in Canada's two largest national monitoring surveys for cannabis prevalence.[28,29] These increases were more prominent among Canadians who did not report either a recent experience or prior diagnosis for a mental health condition. Notably, fewer changes were observed among those with mental health conditions: short-term increases were observed in past 12-month cannabis use for those experiencing anxiety and depression; however, there was no evidence of sustained increases in either past 12-month or daily cannabis use five years after legalization among those with mental health conditions. After legalization, it is plausible that some Canadians would have been more willing to try cannabis for the first time due to greater access to a regulated 'legal' supply, including those experiencing mental health conditions for the purpose of self-medicating. However, many of these individuals may have found that cannabis did not help or even exacerbated their mental health conditions, and subsequently stopped using cannabis after an initial trial period.[30,31]

With the exception of anxiety and depression, there were no significant changes in past-year or daily cannabis use between pre-legalization and any year post-legalization among those experiencing past year bipolar disorder, PTSD or schizophrenia (including psychosis). The current findings are generally consistent with prior research showing either modest or no evidence of greater increases in cannabis use among those with a history of mental health conditions.[21] Previous analyses from the first 3 years of data from the same study suggested that daily cannabis had significantly increased among those with schizophrenia since the legalization of recreational cannabis in Canada.[32] However, this finding was based on changes in the relative proportion of daily versus non-daily use, and was driven by reductions in non-daily use. In

contrast, the current findings indicate no sustained increase in either past 12 month or daily use over a longer period of time. There is a need for additional studies examining the impact of cannabis legalization at the population-level among vulnerable populations. This is particularly important given studies in Canada and the US showing increased prevalence of CUD and associations with psychosis and other mental health outcomes in hospitalization data.[33]

Irrespective of changes over the time, the current findings highlight substantially higher rates of cannabis use among people experiencing mental health problems. The prevalence of both past 12-month and daily cannabis use was approximately double among those who reported experiencing a mental health disorder in the past 12 months. For example, in 2023, past 12-month cannabis use was reported by 64% of those reporting a bipolar disorder in comparison to 28% of those reporting no mental health disorder. The findings are consistent with national estimates from the United States from 2004 to 2017, in which cannabis use was consistently two to three times higher among those with high anxiety in comparison to those with some or no anxiety.[23] Higher rates of cannabis use among those experience mental health conditions warrants greater attention and illustrates a disconnect between the recommendations from health professionals that cannabis can be harmful to mental health and widespread perceptions among cannabis consumers that cannabis has a positive impact on their mental health.[12] Indeed, almost half of Canadians who use cannabis report that cannabis use is 'somewhat' or 'very beneficial' for their mental health,[34] and consumers with mental health problems are more likely to report that cannabis has had a positive impact on their physical and mental health.[12] There is an immediate need for more research on the use of cannabis among people with mental health conditions to better understand the impact of recent policy changes.

Limitations

This study is subject to limitations common to survey research. ICPS respondents were recruited via non-probability-based sampling; however, the use of post-stratification weights ensures the sample is proportional to the Canadian population using age-by-sex-by-province, education, and age-by-smoking groups. In addition, ICPS estimates of cannabis prevalence are highly consistent in trends over time in Canada's two 'gold standard' national monitoring surveys, the Canadian Community Health Survey (CCHS) and the Canadian Cannabis Survey (CCS).[26,27] Prevalence estimates from the ICPS surveys fall between those of the CCHS and CCS, and demonstrate very similar trends between 2019 and 2023 in terms of the relative change in past 12-month cannabis use (ICPS = 1.0%, CCHS = 0.98%, and CCS = 1.06%).[26,27]

Although the ICPS reports similar cannabis prevalence rates as national monitoring surveys, the prevalence of mental health conditions are higher in the ICPS than the CCHS. For example, in 2023, 25% of ICPS respondents reported 'ever' being diagnosed with an anxiety disorder compared to 15.3% in the CCHS.[27] This discrepancy may reflect differences in question wording and a higher threshold used in the CCHS survey, which asked about "conditions diagnosed by a health professional and that are expected to last or have already lasted 6 months or more", combined with a positive response to current rather than past 12-month mental health status (e.g., "Do you have a mood disorder", "Do you have an anxiety disorder."). Further, those experiencing bipolar disorder and borderline personality disorder were grouped together in the mental health disorder conditions. Although previous research has emphasized the substantial symptom overlap and comorbidity between bipolar disorder and borderline personality disorder, as well as the difficulty in distinguishing them,[35] this represents an important limitation that should be considered when interpreting the results. In addition, although the current measures used to assess mental health conditions were based on those used in national monitoring surveys, single-item self-reported measures have lower validity than in-person clinical assessments and objectively-verified medical diagnoses, and represent a notable limitation.

Conclusion

Cannabis use has increased in Canada since legalization of 'recreational' cannabis; however, few increases were observed among those with either recent experience or a lifetime diagnosis of mental health conditions. Nevertheless, individuals with a history of anxiety, depression, bipolar, PTSD or schizophrenia reported substantially higher prevalence of cannabis use overall, which warrants greater research and future study.

Contributors
All authors contributed to the development of this manuscript. SR wrote the first draft, assisted MI in the analysis of the data, and interpreted the results. MI led all data cleaning, analysis and writing of the statistical analysis section. DH conceptualized the study, contributed to the writing, analysis, and interpretation of the results. All authors had full access to all the data in the study and DH made the final decision to submit for publication.

Data sharing statement
Data is available upon request. Please see our website for more information on how to contact our team and access the data: https://davidhammond.ca/contact/.

Declaration of interests
DH has provided paid expert testimony on behalf of public health authorities in response to legal claims from the tobacco, vaping and cannabis industry. All remaining authors declare no conflicts of interest. The funders played no role in the conceptualization, analysis or interpretation of the study findings.

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