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Predictors of Change in Cannabis Use Status from Pre- to Post-Recreational Cannabis Legalization in Canada: Evidence from a Two-Wave Longitudinal National Survey

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ABSTRACT

Objective: In October 2018, the Government of Canada legalized cannabis for recreational use nationwide. The effects of legalization on cannabis use have been primarily assessed through cross-sectional surveys. **Method:** In the present study, a two-wave longitudinal design was used to explore potential demographic, substance use and behavioral addiction, and mental health predictors of change in cannabis use status following legalization. Canadian online panelists (18+) were initially surveyed about their gambling and substance use in 2018 (i.e., before cannabis legalization). From the original sample, 4,707 (46.2%) were retained in the follow-up survey one year later, post-cannabis legalization. These respondents were the focus of the present study. **Results:** When queried about how legalization would impact their use, 61.8% said, 'I'll never use it', 21.1% stated "I'll use it about the same as I do now," 10.3% indicated, "I may try it for the first time," 5.0% answered, "I'll use it more," and 1.9% responded that, "I'll use it less." Consistent with these sentiments, within the retained sample there was a modest but significant increase in cannabis use from baseline (18.4%) to follow-up (26.1%). Regressions established that younger age, being male, substance use, tobacco or e-cigarette use, problematic gambling, and stated intention to use cannabis were predictors of later cannabis use. **Conclusions:** This national cohort design indicates that cannabis use appears to have increased in Canada following legalization. The present study makes a unique contribution by also identifying variables that statistically forecast movement toward and away from cannabis use.

Key words: = cannabis; marijuana; substance use; Canada; legalization; longitudinal

On October 17, 2018, recreational cannabis use was legalized in Canada for those 19 years and older (18 in Alberta and Quebec, with the age limit increased to 21 in Quebec approximately one year later; Cannabis Act, 2018). One year later, on October 17, 2019, the act was amended to allow for the legalized purchase and sale of cannabis edibles, extracts, and topical products. Data from the annual cross-sectional Canadian Cannabis Survey (CCS) administered by Health Canada

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revealed an initial increase in the past 12-month self-reported cannabis use among Canadians 16 years and older, increasing from 22% in 2017 (Health Canada, 2017a) and to 25% in 2018 (Health Canada, 2018). The latest CCS data from 2023 found a prevalence rate of 26% (Health Canada, 2023).[1]Increased rates of recreational cannabis use in Canada post-legalization have also been identified in a number of other empirical studies (Bahji et al., 2022; Fischer et al., 2021; Pham et al., 2022).

One of the primary concerns with the legalization of cannabis is the possibility for cannabis non-users to experiment with or become regular users of cannabis. Recent cross-sectional studies also investigated changes in cannabis use and prevalence before and after cannabis legalization in 2018. First, comparing data from the 2017 Canadian Tobacco, Alcohol and Drugs Survey (CTADS) to the 2019 Canadian Tobacco and Nicotine Survey, Pham and colleagues (2022) found an increase from 9% to 11% in past 30-day cannabis use. However, the focus and content of these two surveys were somewhat different, and the 2% increase was not confirmed statistically. Being male, being between 20 to 24 years of age, current tobacco use, vaping, and residing in a province that allowed personal cultivation were all associated with cannabis use over non-use. Analyses of the 2018 and 2019 National Cannabis Survey (NCS) also identified predictors of past 3-month cannabis use, including being between 20 to 24 years of age, endorsing poor physical health, and residing outside the province of Quebec (Ashoorion et al., 2023).

To date, far fewer longitudinal studies have been conducted on cannabis legalization. A recent longitudinal examination of legalization in three U.S. states revealed that cannabis use among adolescents (aged 13 to 18) did not meaningfully increase pre- versus post- legalization (Bailey et al., 2023). In Canada, two longitudinal investigations using data from a community sample of 1,502 adults from Hamilton, Ontario, were conducted. In the first, three waves of data (1-month prior to legalization, 6-months post, 12-months post) were collected (Turna et al., 2021). Respondents who were cannabis users before legalization actually evidenced a decrease in their use, frequency, and levels of misuse on average after legalization. In contrast, 24% of the initial cannabis non-users stated that they used cannabis at post-legalization follow-ups, a significant yet small effect. Moreover, 74% of respondents correctly predicted their cannabis use status after legalization. The second longitudinal study in Ontario explored migration from using medicinal cannabis to recreational cannabis after legalization (AminiLara et al., 2023). Among those who reported dual use of cannabis (i.e., medical and non-medical) before legalization, almost 1 in 4 became exclusive users of recreational cannabis after legalization. Predictors of switching to recreational use included being younger, male, and not having approval for medicinal cannabis.

While there has been an increased research focus on the effects of cannabis legalization in Canada, there has never been a national longitudinal cohort study that assesses its impact on Canadians. Examining changes within a national cohort over time is the only unambiguous way of determining whether there has been a genuine change in the prevalence of cannabis utilization that is not an artifact of differing response rates, survey solicitations, or other unique methodological differences that exist between cross-sectional studies. Cohort studies are also the best way to shed light on variables with a potential etiological relationship to cannabis initiation or cessation by virtue of their temporal relationship to subsequent behavior.

This, then, is the purpose of the present study, which analyzes the results of a large-scale national cohort of people who gamble at least once per month. Respondents were assessed in the three months prior to the October 2018 legalization of cannabis and then again one year later in the fall of 2019. The primary objectives of the present study were to (1) identify the overall

[1]The CCS prevalence rates are likely inflated due to the very low response rates (ranging from 11.5% to 21.1%) combined with the survey solicitation asking people to participate in a "survey on knowledge about and use of cannabis", as topic interest is one of the primary determinants of survey response (Groves et al., 2004; Williams & Volberg, 2009). As evidence of this, the CTADS with a 35.7% response rate and without an exclusive focus on cannabis only obtained a 15.0% past year prevalence rate in 2017 (Health Canada, 2017b) compared to 22.0% in the 2017 CCS. Similarly, the apparent decrease in cannabis prevalence in the CCS 2021 may simply be a function of this year having the highest response rate (21.1%) resulting in a more representative (less cannabis-focused) sample

demographic profile of cannabis users and cannabis non-users; (2) describe perceptions of how legalization would influence cannabis use; (3) identify demographic, substance use and behavioral addiction, and mental health predictors of change in cannabis use status after legalization; and (4) identify the change in the prevalence of past-year cannabis use within the cohort from prior to legalization to one-year post-legalization.

METHODS

Sample and Procedure

The data collected in this study were from the online panel survey conducted as part of the Alberta Gambling Research Institute (AGRI) National Study on Gambling (ANP; see https://www.ucalgary.ca/research/national-gambling-study/). Respondents for the surveys were all adults (18 years and over) who were pre-registered with the Leger Opinion's (LEO) online panel. The LEO online panel is comprised of over 400,000 members who are geographically and demographically representative of the population of Canada. All survey respondents were recruited through email and asked to take part in "a very important academic study." However, people were subsequently screened out of the survey unless they had gambled on one or more forms of gambling at least once a month in the past year. Potential participants were emailed repeated solicitations until a sample of at least 10,000 was achieved, with an equal number from each province/region of Canada. Although the primary focus of the survey was on gambling attitudes and behavior, substance use, mental health, and certain aspects of personality were also comprehensively assessed. Moreover, cannabis use and gambling are known to frequently co-occur in population surveys (McGrath et al., 2023; Punia et al., 2021).

The baseline survey was administered between August 16 and October 10 of 2018, with data collection completed prior to cannabis legalization on October 17, 2018. The baseline sample was matched to the 2018 Canadian Community Health Survey (CCHS; Statistics Canada, 2018), such that questions contained the same wording, allowing for survey data to be weighted with the CCHS. All of those who finished the baseline survey were then re-contacted between August 20 and November 30, 2019, to complete the follow-up survey. The survey took an average of 19.5 minutes to complete (range of 14 to 28 minutes). Attention checks were included in the survey to identify any respondents who were not paying sufficient attention to the questions. Individuals who did not pass attention checks were not included in the final dataset. The survey did permit skipped questions, with the exception of portions of the survey that were not applicable to the respondent. Respondents were paid $10 CAD for taking the follow-up survey, as well as additional compensation from Leger. Ethics approval for the entire ANP project was provided by the Human Ethics Review Board at the University of Lethbridge.

A total of 4,707 respondents were retained for the follow-up survey, representing 46.2% of all baseline participants. Attrition analyses were conducted using two forward stepwise logistic regressions with an entry level of $p = .01$ and a removal level of $p = .05$. Nineteen demographic baseline variables were included in the model (i.e., gender, age, income, education, employment, marital status, and ethnicity), and the outcome variable was whether or not a respondent took part in the follow-up survey. Among baseline cannabis non-users, only age ($OR = 1.19$), Indigenous origin ($OR = 0.69$), and African origins ($OR = 0.50$) were significant predictors of retention. The Nagelkerke R-squared was 4.8%. For baseline cannabis users, being single ($OR = 1.30$), age ($OR = 1.28$), and Indigenous cultural origins ($OR = 0.58$) were significant predictors of retention. The Nagelkerke R-squared was 2.8%.

Cannabis Questions

The baseline and follow-up surveys contained six questions pertaining to cannabis use, adapted from the 2018 Canadian Community Health Survey (CCHS; Statistics Canada, 2018) and the 2018 National Cannabis Survey (NCS; Health Canada, 2018). The primary item which served to categorize cannabis users and cannabis non-users was "During the past 12 months, how often did you use marijuana, hashish, or any cannabis product?". Other items included, "What methods did you use in the past 12 months to consume cannabis?". In addition, in the baseline survey, all respondents were asked, "How will the legalization of cannabis for recreational use impact your use of cannabis?".

Demographic Variables

The survey included several questions on demographic variables, including province of residence, regions within provinces, sex, age, income, education, employment, ethnicity, and marital status.

Mental Health Variables, Substance Use and Behavioral Addictions, and Impulsivity

A series of questions were included in both surveys that assessed mental health and addictions. Mental health variables included: number of significant life events in the past 12 months (adapted from the Life Events Questionnaire; Vuchinich et al., 1986), levels of stress, history of child abuse/neglect, and past year post-traumatic stress disorder (PTSD), generalized anxiety (GA), panic disorder (PD), and major depression. Substance use and behavioral addictions variables included: levels of alcohol use, tobacco or e-cigarette use, use of illicit drugs, having a DSM-5 substance use disorder (SUD), presence of any behavioral addiction, and scores on the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). Lastly, scores on the Impulsivity facet of the NEO Personality Inventory—Revised (NEO PI-R; Costa & McCrae, 2008) were included in the baseline survey.

Data Analyses

All analyses were conducted using IBM SPSS Statistics Version 29 (IBM Corp.). First, we assessed baseline cannabis use and then follow-up use one year later. The personal impact of cannabis legalization question asked in the baseline survey was then examined. Next, a series of forward stepwise binary logistic regression analyses were conducted to assess the most relevant potential baseline demographic, substance use, behavioral addiction, and mental health predictors of cannabis use status one year later. Variable selection was largely exploratory, and variables were entered into the model sequentially with forward stepwise conditional criterion.

Baseline variables entered into the regression model included: age (continuous), sex (0 = male, 1 = female), marital status (married, single), level of education (ten categories treated continuously), household income (eight categories treated continuously), employed full-time (no, yes), and ethnic origin (seven categories). A set of substance use and behavioral addiction variables were included: tobacco/e-cigarette use, frequency of alcohol use (continuous), illegal drug use (no, yes), substance use disorder (continuous), having a current behavioral addiction (no, yes), a previous behavioral addiction (no, yes), and scores on the Problem Gambling Severity Index (Ferris & Wynne, 2001). One set of predictors focused on mental health and trauma and included: total number of negative life events, scores on the impulsivity facet of the NEO PI-R (Costa & McCrae, 2008), major depression (no, yes), generalized anxiety disorder (no, yes), post-traumatic stress disorder (PTSD), panic disorder (no, yes), and a history of child abuse/neglect (yes, no). The final set of predictors were the four response options to the question on the personal impact of cannabis legislation (never use, first try, use less, use the same, use more).[2]

The outcome variables of interest in the regression models were focused on change in cannabis use status. They included: baseline non-user that remained a non-user, baseline non-user that changed to user, baseline user that remained a user, and baseline user that changed to non-user.

RESULTS

Cannabis Use in the Baseline Survey

The baseline assessment included a total of 10,199 (53.2% Female, 46.7% Male, 0.1% Other) respondents. Among all respondents, 21.2% confirmed at least some past 12-month use of cannabis, with 78.8% indicating no cannabis use in the past 12 months.[3] Among cannabis users (N = 2,597), 30.3% stated they used cannabis "less

[2]Any 'prefer not to answer' responses were not included in the regression analyses. All binary categorical variables were coded as 0 = No, 1 = Yes.

[3]The proportions reported here represent application of the CCHS survey weights. The unweighted percentages are 25.5% 'cannabis users' and 74.5% 'cannabis non-users'. In this study, the weighting variable was applied to prevalence estimates, but not the remaining analyses (e.g., comparisons between cannabis users and non-users or regression analyses).

than one a month", 11.7% "once a month," 11.9% "2 to 3 times a month," 6.7% "once a week," 10.0% "2 to 3 times a week," 8.2% "4 to 6 times a week," and 21.1% "every day." In terms of routes of administration, the most prevalent were smoking joints (67.5%), edibles (32.7%), handheld pipes (32.5%), vaping (23.3%), and waterpipes (18.7%).

Cannabis Use in the Follow-Up Survey 1 Year Later

Of the original 10,199 respondents, 4,707 (46.2%) were retained and completed the follow-up survey one year later. Of those 4,707 follow-up respondents, 1,028 (18.4%) were baseline past-year cannabis users, and 1,391 (26.1%) were follow-up past-year cannabis users.[4]

Change in cannabis use status from the baseline survey to the follow-up survey was assessed. First, of the 3,679 baseline cannabis non-users, 3,192 (86.8%) were still non-users at the follow-up. However, 487 (13.2%) became cannabis users during the 12 months prior to the follow-up survey. Among these new cannabis users, 45.0% stated, "less than once a month," 13.1% "once a month," 12.7% "2 to 3 times a month," 9.7% "once a week," 7.0% "2 to 3 times a week," 3.1% "4 to 6 times a week," and 9.4% "every day."

Next, among the 1,028 baseline cannabis users retained, 904 (87.9%) reported still using cannabis 12 months later; yet, 124 (12.1%) became cannabis non-users at the follow-up survey. Among the 904 respondents who remained cannabis users, 17.4% stated, "less than once a month," 9.8% "once a month," 10.4% "2 to 3 times a month," 10.4% "once a week," 14.7% "2 to 3 times a week," 12.6% "4 to 6 times a week," and 24.7% "every day."

The prevalence of cannabis use was statistically compared between baseline and follow-up surveys. A McNemar's matched-pairs test was conducted to determine if there was a difference in the number of people who transitioned to cannabis use (n = 487) compared to the number of people who ceased using cannabis (n = 124). As a significant difference was found ($p < .001$), it can be concluded that there was a significant transition to cannabis use at follow-up.

Finally, demographic comparisons were conducted between cannabis users (n = 1,391) and non-users (n = 3,316) who were retained in the follow-up survey (see Table 1 for the complete set of comparisons). Notably, it was found that cannabis users were more likely to be male, younger on average, to be single, have lower household incomes, and were less likely to be retired.

Personal Impact of Cannabis Legislation

Included in the baseline survey was a question about the upcoming legalization of cannabis in Canada: "How will the legalization of cannabis for recreational use impact your use of cannabis?". In the overall sample, the responses were as follows: 61.8% indicated, "It will have no impact, as I'll never use it," 21.1% stated, "No real impact, I'll use it about the same as I do now," 10.3% indicated, "I may try it for the first time," 5.0% answered, "I'll use it more often than I do now," and 1.9% responded that, "I'll use it less than I do now."

Next, the responses of cannabis users and non-users were examined separately. Among baseline cannabis non-users, 11.3% stated that, "I may try it for the first time" and 2.6% indicated, "I'll use it more often than I do now". For baseline cannabis users, the majority (68.7%) stated "no real impact, I'll use it about the same as I do now"; however, 12.0% indicated "I'll use it more often than I do now" and 6.4% said, "I'll use it less than I do now." Among the 487 baseline cannabis non-users who became cannabis users, 283 (58.3%) had previously stated, "It will have no impact, as I'll never use it" in the baseline survey. Notably, 101 (20.7%) respondents had indicated that "I may try it for the first time," and 35 (7.2%) indicated, "I'll use it more often than I do now." For retained baseline cannabis users who later became non-users (n = 124), only 3 stated, "I'll use it less than I do now," whereas 92 (74.2%) stated, "No real impact, I'll use it about the same as I do now."

Baseline Predictors of Cannabis Status at the Follow-up Survey

[4]The proportion reported here represent application of the CCHS survey weights. The unweighted cannabis prevalence was 21.8% at baseline and 29.6% at follow-up.

Four forward stepwise binary logistic regressions were conducted to identify multivariate baseline predictors of cannabis use status at follow-up.

First, we focused on baseline cannabis non-users who *did not change* to cannabis use at the follow-up. The outcome variable was baseline user status at the follow-up (0 = all remaining respondents, 1 = remained a non-user). The final model was statistically significant, $\chi 2$ (8) = 1,871.44, $p < .01$, with 2,822 respondents included in the analysis. Nagelkerke R-squared was 18.8%, with eight significant predictors in the model. The overall classification accuracy was 76.3%, with 98.2% correct classification of baseline non-users who remained non-users (see Table 2). As seen in Table 2, the regression results identified several significant predictors. First, stating, "It will have no impact, as I'll never use it," "I may try it for the first time," and "I'll use it more often than I do now" each predicted stability of not using cannabis over time. Younger age and being male were associated with decreased odds of non-user status over time. Finally, tobacco or e-cigarette use, higher total PGSI scores, and illicit drug use all predicted a lack of stability in non-user status.

A second binary logistic regression was conducted to identify baseline predictors of cannabis non-users who *did change* to cannabis use at the follow-up. The outcome variable was baseline user status at the follow-up (0 = all remaining respondents, 1 = changed to user). The final model was significant, $\chi 2$ (6) = 138.50, $p < .01$. The Nagelkerke R-squared was very low at 9.5%, and overall classification accuracy was 58.5%, with 57.3% of baseline cannabis non-users who changed to cannabis use being correctly classified and 67.9% of the remaining respondents being correctly classified (see Table 3). First, age, stating, "No real impact, I'll use it about the same as I do now," illicit drug use, and indicating, "I'll use it less than I do now" were all negatively associated with changing from non-use to use. Lastly, both tobacco or e-cigarette use and "I may try it for the first time" predicted a greater likelihood of changing from non-use to use.

In the third regression, baseline cannabis users who *did not change* to non-use were assessed. The outcome variable was baseline user status at the follow-up (0 = all remaining respondents, 1 = remained a user). In this case, the final model was statistically significant, $\chi 2$ (2) = 110.09, $p < .01$. The Nagelkerke R-squared was 15.5%, and the overall classification accuracy was 96.8%. As seen in Table 4, there were two significant predictors. Stating, "It will have no impact, as I'll never use it" was associated with changing user status from baseline to follow-up, whereas "No real impact, I'll use it about the same as I do now" predicted remaining a cannabis user at the follow-up.

Finally, the fourth regression examined baseline predictors of cannabis users who *did change* to non-use at the follow-up. The outcome variable was baseline user status at the follow-up (0 = all remaining respondents, 1 = changed to non-user). The final model was found to be statistically significant, $\chi 2$ (9) = 1,910.64, $p < .01$. The Nagelkerke R-squared was 71.4%, and overall classification accuracy was 86.6%, with 97.4% of baseline cannabis users who remained users being correctly classified. As seen in Table 5, indicating, "No real impact, I'll use it about the same as I do now," "I'll use it more often than I do now," "I'll use it less than I do now," tobacco or e-cigarette use, PGSI total, and illicit drug use were all associated with changing to non-user status. In contrast, stating, "It will have no impact, as I'll never use it," older age, and greater alcohol use were each associated with being less likely to change to non-use.

DISCUSSION

Research on the impact of cannabis legalization in Canada on public health is still in its infancy. To date, the majority of studies which have investigated possible predictors of change in cannabis use status following legalization have been cross-sectional in nature. The primary aim of the present study was to expand our knowledge of potential predictive variables of cannabis use in a Canadian national survey, which included two waves of data collected just before and after the legalization of cannabis. To our knowledge, this study represents the first longitudinal assessment of changes in cannabis use status following legalization using a large, national Canadian sample.

The baseline survey indicated that 21.2% had used cannabis at least once in the previous 12 months. This is in line with cannabis prevalence statistics revealed in the 2017 (22%) and 2018 (22%) versions of the CCS. Consistent with cross-

sectional research, within the retained baseline-follow-up sample, there was a significant increase in cannabis use from baseline (18.4%) to follow-up (26.1%), with 13.2% of baseline non-users using at follow-up (and 12.1% of baseline users not using cannabis at follow-up). However, the large majority of both non-users and users retained their same cannabis use status in the follow-up survey, suggesting a sizeable degree of stability over time. In addition, it is also noteworthy that among new cannabis users at the follow-up, a sizeable proportion reported use of "less than once a month" (45.0%) or "less than weekly" (70.8%), indicating relatively infrequent use. This may suggest that respondents who tried cannabis at the follow-up are possibly experimenting with the drug rather than regularly using it. Moreover, the frequency of use among this group is also less than that of respondents who were cannabis users at both the baseline and follow-up surveys, which provides further indications of "less risky" use among people who began using cannabis after legalization.

One of the goals of the study was to identify potential predictors of change in cannabis use status from pre- to post- legalization. To do this, we examined four separate groups of respondents. First, a logistic regression examining stability between not using cannabis at the baseline and remaining a non-user at the follow-up identified several key predictors of stability. For instance, respondents who stated that, "I will never use it" or "I may try it for the first time," were statistically less likely to use cannabis one year later. However, somewhat paradoxically, indicating that, "I'll use it more often than I do now" was also associated with not using cannabis at the follow-up. In contrast, younger age, being male, tobacco or e-cigarette use, higher greater PGSI scores, and illicit drug use were all linked with a lower likelihood of remaining a non-user over time. The second regression focused on the chances of changing from non-use to later cannabis use. In this case, several of the same variables were also associated with later use, such as age, illicit drug use, and tobacco or e-cigarette use.

The final two binary logistic regressions focused on cannabis users who reported remaining users and those who later changed their status to non-users, respectively. First, stating, "I'll never use it" was linked with changing to non-use, and "No real impact, I'll use it about the same as I do now" predicted continued use. In other words, intentions to not use cannabis, as well as those to continue using it, were both aligned with their respective behavioural outcomes. The fourth regression revealed significant predictors similar to those of the previous models. For instance, younger age, gambling severity, illicit drug use, and, this time alcohol frequency, were all associated with continued cannabis use. Interestingly, tobacco or e-cigarette use was statistically predictive of changing to non-use, although this represented only a 6% increase in the odds for later non-use.

When all of the regression results are considered in aggregate, a number of themes emerge. First, being male and younger age are linked with cannabis use, while older age was associated with a decreased likelihood of using cannabis after legalization. This is perhaps unsurprising given that youth and young adulthood, especially in males, have been more commonly associated with greater cannabis use in Canada (Hammond et al., 2021; Kourgiantakis et al., 2022). Yet, despite higher rates of use when compared with other countries, recent surveys of youth in Canada have reported no pronounced increases in cannabis use following the early years of legalization (Haines-Saah & Fishcer, 2021). Disentangling the possible role of cannabis legalization on youth cannabis initiation and concerns around potential lifelong use will require more time to fully assess.

In addition, the results indicate that both substance use as well as problematic gambling largely go hand-in-hand with cannabis use. First, the fact that tobacco and nicotine use was associated with later cannabis use is unsurprising, and this may be linked to the frequent simultaneous co-use of both drugs reported in the literature (Lemyre et al., 2019). Similarly, considerable research evidence indicates correlations between the use of cannabis, alcohol, and other illicit drugs (e.g., Gooding et al., 2023) and that cannabis use frequently co-occurs among individuals who are experiencing problematic gambling (Punia et al., 2021). Our findings further confirm these patterns and demonstrate their influence over time and through legislative changes to cannabis laws.

Overall, the results of this study are generally consistent with those from cross-sectional studies, as well as other longitudinal studies conducted in Canada. For instance, a study which included a community sample from Ontario found a decrease in use among many cannabis users from pre- to post-legalization, yet also found that 24% of initial cannabis non-users later reported use following legalization (Turna et al., 2021). The potential reasons for why these individuals changed their cannabis use status are difficult to determine, as the ANP project was not designed to directly assess this question. However, Turna et al. (2021) speculated that the increased availability of legal cannabis and subsequent reduction in the supply of illicit cannabis may have influenced the decision of some previous cannabis users to discontinue their use. Among at least some baseline cannabis users, the removal of potential consequences associated with use (e.g., potential charges, a criminal record) may have influenced their decision to try cannabis now that it is legal. Interestingly, the 2018 version of the Cannabis Survey (Health Canada, 2018) asked respondents about their willingness to disclose cannabis use. It was reported that 31% stated that they would be more willing to admit to using cannabis if recreational use was legal. Based on these findings, it is conceivable that prevalence estimates of cannabis use prior to legalization were underreported and that the fear of legal ramifications kept some people from using it despite a desire to do so.

This study has several strengths, including a large sample of Canadians recruited from coast to coast. The timing of data collection for both the baseline and follow-up surveys allows for a unique opportunity to assess the potential role of the legalization of recreational cannabis on patterns of use. Furthermore, the survey contained a wide array of demographic, substance use, and mental health variables. This permitted the inclusion of many potential baseline predictors of change in cannabis use status in the follow-up survey. To our knowledge, no other longitudinal dataset includes the same breadth and depth of information on cannabis use in Canada.

This study also contained potential limitations which warrant consideration. First, the original project (Williams et al., 2021; Williams, Shaw, et al., 2023) was primarily designed to assess patterns of gambling behavior in a sample of Canadian gamblers. As part of the inclusion criteria for a larger study of gambling behavior, people were required to gamble at least once a month or more to be included in the study. As a result, the sample was actually comprised of regular "gamblers," which would not be considered representative of cannabis users in Canada. That stated, cannabis use and gambling are known to frequently co-occur in population surveys (Punia et al., 2021). Second, overall attrition from the baseline survey to the follow-up was 46.2%. Given the relatively high rate of attrition over the one-year period, it is possible that change in cannabis use status may not be accurately reflected among the remaining participants. In other words, it is possible that patterns of cannabis use at the follow-up would be different if the entire sample was retained.[5] While the timing of data collection is a strength, it can also be considered a limitation. First, the timing of baseline data collection was very close to the enactment of legalization. Given this, it could be the case that perceptions of whether or not cannabis legalization is beneficial had already been developed long before the survey was conducted. Moreover, given that only one year passed between the two surveys, the longer-term impacts of legalization are still unknown. Also, the legalization of the recreational use of cannabis edibles, extracts, and topical cannabis products took place on October 17, 2019 (Health Canada, 2023), which was immediately following the completion of the follow-up survey. As a result, the extent to which smokeless cannabis products were adequately accounted for in our results is difficult to establish. Finally, although the present study was able to determine the number of respondents who changed their cannabis use status following

[5]That said, attrition is a problem when it is associated with extreme loss of data at the high or low end of a variable, as longitudinal analysis essentially looks at the strength of the relationship between IVs and the dependent variable (DV). Thus, it is important that the IVs and DV retain their *range*, as the strength of the association is largely unaffected by sample size at each point on the range. In the present situation, there is relatively little reason for concern as (a) attrition analysis found relatively little difference in completers versus non-completers, and (b) the large sample size better ensures range retention for each variable.

legalization, the exact reasons why individuals either started using cannabis or abstained from use are not clear. Future research dedicated to exploring these motivations is needed.

Conclusion

To date, longitudinal research dedicated to assessing the role of the legalization of cannabis on patterns of use has been lacking. This study makes an important contribution to the nascent literature on this topic by presenting the results of a longitudinal examination of cannabis use pre- and post-legalization in a large Canadian sample. The findings indicate that a statistically significant portion of baseline cannabis non-users had changed their cannabis use status at the follow-up. Furthermore, there was a significant overall increase in cannabis use within the cohort from baseline to follow-up. Regression results indicate that among baseline cannabis non-users, tobacco or e-cigarette use, age, and anxiety were unique predictors of cannabis use status at the follow-up assessment. Future research that is comprised of a more representative sample of cannabis users and that continues to assess the ongoing role of cannabis legalization in cannabis use patterns is needed.

Table 1. *Demographic Comparisons between Cannabis Users and Cannabis Non-users in the Baseline Survey*

	Cannabis Users (n = 1,391)		Cannabis Non-Users (n = 3,316)		Significance Test	
Variable	*N*	*% / M(SD)*	*N*	*% / M(SD)*	χ^2	*p*
Sex						
Male	726	52.2%	1,561	47.1%	10.41	<.01*
Female	664	47.7%	1,751	52.8%		
Other	1	0.1%	4	0.1%		
Age Group						
18 to 24	61	4.4%	31	0.9%	625.85	<.01*
25 to 34	286	20.6%	188	5.7%		
35 to 44	307	22.1%	333	10.0%		
45 to 54	290	20.8%	650	19.6%		
55 to 64	315	22.6%	987	29.8%		
65 to 74	122	8.8%	868	26.2%		
75 or older	10	0.7%	259	7.8%		
Marital Status						
Single	401	28.8%	529	16.0%	117.61	<.01*
Married/Common law	790	56.8%	2,196	66.2%		
Separated	43	3.1%	82	2.5%		
Divorced	109	7.8%	285	8.6%		
Widowed	38	2.7%	193	5.8%		
Prefer Not to Say	10	0.7%	31	0.9%		
Ethnic/Cultural Origins†						
Western and Northern European	819	58.9%	2,157	65.0%	16.04	<.01*
Eastern European	185	13.3%	431	13.3%	0.08	.78
Indigenous North American	86	6.2%	108	3.3%	21.23	<.01*
Southern European	50	3.6%	86	2.6%	3.50	.06
Chinese	45	3.2%	91	2.7%	0.84	.36
African	32	2.3%	24	0.7%	20.72	<.01*
South Asian	28	2.0%	44	1.3%	3.06	.08
South East Asian	24	1.7%	35	1.1%	3.55	.06
Latin American	18	1.3%	20	0.6%	5.84	<.05*
Middle Eastern and Arab	17	1.2%	11	0.3%	13.14	<.01*
East Asian	12	0.9%	20	0.6%	0.98	.32
Central and Northern Asian	8	0.6%	12	0.4%	1.05	.31
Other	54	3.9%	192	5.8%	7.20	<.01*
Unsure	92	6.6%	199	6.0%	0.63	.43
Prefer Not to Say	50	3.6%	141	4.3%	1.09	.30

Household Income						
Less than $20,000	106	7.6%	180	5.4%	50.10	<.01*
$20,000-$39,000	224	16.1%	479	14.4%		
$40,000-$59,000	242	17.4%	559	16.9%		
$60,000-$79,000	207	14.9%	492	14.8%		
$80,000-$99,000	184	13.2%	410	12.4%		
$100,000-$119,000	136	9.8%	295	8.9%		
$120,000-$139,000	74	5.3%	148	4.5%		
$140,000+	109	7.8%	274	8.3%		
Uncertain	10	0.7%	21	0.6%		
Prefer Not to Say	99	7.1%	458	13.8%		
Employment						
Employed full-time	754	54.2%	1,240	37.4%	313.99	<.01*
Employed part-time	159	11.4%	343	10.3%		
Sick leave, maternity, disability	76	5.5%	83	2.5%		
Homemaker	62	4.5%	121	3.6%		
Unemployed	80	5.8%	98	3.0%		
Full-time student	24	1.7%	20	0.6%		
Retired, not working	219	15.7%	1.359	41.0%		
Prefer Not to Say	17	1.2%	52	1.6%		
Educational Attainment						
Secondary or Less	315	22.6%	781	23.6%	1.41	.84
Some Vocational/post-secondary	358	25.7%	847	25.5%		
Diploma or Bachelor's Degree	571	41.0%	1,332	40.2%		
Professional or Graduate Degree	128	9.2%	320	9.7%		
Prefer Not to Say	19	1.4%	36	1.1%		

Note. $*p < .05$. † In the questionnaire, the item for ethnic origins was worded as follows: 'What are the main ethnic or cultural origins of your ancestors? (check as many as apply)'. As respondents could choose more than one, the response items had to be coded separately. A separate crosstabs analysis was then conducted for each category.

Table 2. *Binary Logistic Regression Predictors of Baseline Cannabis Non-Users Who Remained Non-Users*

Variable	*B*	*SE*	*Wald*	*p*	*Odds Ratio*	*95% Odds Ratio CI* *Lower*	*Upper*
I'll never use it	3.66	.146	629.96	<.01	38.76	29.13	51.58
I may try it for the first time	2.85	.193	217.77	<.01	17.30	11.85	25.26
Tobacco Use or E-cigarettes	-1.23	.121	102.67	<.01	0.29	0.23	0.37
Age	0.41	.045	83.30	<.01	1.50	1.38	1.64
I'll use it more	1.26	.236	28.56	<.01	3.54	2.23	5.62
PGSI Total	-0.08	.018	21.39	<.01	0.92	0.89	0.95
Illicit Drug Use	-1.17	.329	12.55	<.01	0.31	0.16	0.59
Sex	0.34	.120	8.17	<.05	1.41	1.11	1.78

Note. Nagelkerke R squared = 65.3%; overall classification accuracy = 76.3%

Table 3. *Binary Logistic Regression Predictors of Baseline Cannabis Non-Users Who Changed to Users*

Variable	*B*	*SE*	*Wald*	*p*	*Odds Ratio*	*95% Odds Ratio CI* *Lower*	*Upper*
Age	-0.33	.045	53.83	<.01	0.72	0.66	0.79
I'll use it about the same as I do now	-1.04	.171	37.00	<.01	0.35	0.25	0.50
Tobacco Use or E-cigarettes	0.61	.132	21.15	<.01	1.84	1.42	2.38
Illicit Drug Use	-1.02	.311	10.71	<.01	0.36	0.20	0.67
I may try it for the first time	0.49	.171	8.29	<.05	1.64	1.17	2.29
I'll use it less	-2.04	.734	7.72	<.05	0.13	0.03	0.55

Note. Nagelkerke R squared = 9.5%; overall classification accuracy = 58.5%

Table 4. *Binary Logistic Regression Predictors of Baseline Cannabis Users Who Remained Users*

Variable	*B*	*SE*	*Wald*	*p*	*Odds Ratio*	*95% Odds Ratio CI* *Lower*	*Upper*
I'll never use it	-1.96	.456	18.41	<.01	0.14	0.06	0.35
I'll use it about the same as I do now	1.08	.284	14.42	<.01	2.94	1.69	5.14

Note. Nagelkerke R squared = 15.5%; overall classification accuracy = 96.8%

Table 5. *Binary Logistic Regression Predictors of Baseline Cannabis Users Who Changed to Non-Users*

Variable	*B*	*SE*	*Wald*	*p*	*Odds Ratio*	*95% Odds Ratio CI* *Lower*	*Upper*
I'll use it about the same as I do now	3.40	.246	191.02	<.01	29.93	18.48	48.46
I'll use it more	2.47	.287	73.90	<.01	11.77	6.71	20.66
I'll use it less	3.48	.468	55.42	<.01	32.51	13.00	81.31
Tobacco Use or E-cigarettes	1.06	.144	53.92	<.01	2.88	2.17	3.82
PGSI Total	0.11	.019	31.41	<.01	1.10	1.07	1.15
I'll never use it	-1.47	.300	24.04	<.01	0.23	0.13	0.41
Age	-2.04	.052	15.66	<.01	0.82	0.74	0.90
Illicit drugs	0.98	.281	12.09	<.01	2.65	1.53	4.60
How often drink alcohol	-0.13	.043	8.55	<.05	0.88	0.81	0.96

Note. Nagelkerke R squared = 71.4%; overall classification accuracy = 86.6%

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