Gender Differences in Cannabis Use Related Characteristics in High Frequency Using Canadian University Students: An Exploratory Study

Nadine Nakamura1, Simon Fraser University
Meghan Dawe, Centre for Addiction & Mental Health (CAMH)
Fraser McGuire, Centre for Addiction & Mental Health (CAMH)
Katherine Rudzinski, Centre for Addiction & Mental Health & Dalla Lana School of Public Health
Wayne Jones, Simon Fraser University
Jürgen Rehm, Centre for Addiction & Mental Health & Dalla Lana School of Public Health
Benedikt Fischer, Simon Fraser University, Centre for Addiction & Mental Health (CAMH)

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Research suggests that women’s drug use commonly has distinct dynamics and features which require specific understanding. The present study assesses gender differences in cannabis use characteristics among a sample of high frequency cannabis users drawn from a Canadian full-time university student population. 134 respondents (32.8% female), who used cannabis at least three times per week in the past 12 weeks, were recruited from two universities in Toronto, Canada. Women were more likely to have three or more cannabis episodes per day in the past 30 days compared to men (43.2% versus 18.9%) and were also more likely to use cannabis for medical reasons (65.9% versus 46.7%). In this sample, women high-frequency cannabis users indicated more

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intensive use and problem patterns which reflect gendered observations from other studies. These findings highlight the need for more research exploring these gender differences as well as consideration for targeted intervention practices.

Cannabis is the most commonly used illicit drug in Canada with 14.4% of men and 8.6% of women reporting past year use (Health Canada, 2008). However, cannabis use is even more prevalent among adolescents and young adults. In a study of students in grades 7-12 in Ontario (n=9112), 28.8% of males and 22.2% of females reported past year use (Paglia-Boak et al., 2009). In a survey of Canadian university students, 32% reported using cannabis in the past year (Adlaf, Demers & Gliksman, 2005). This indicates that cannabis use is quite normative in young adult populations. A much smaller percentage of youth report high-frequency use. For example, three percent of Ontario grade 7-12 students reported cannabis daily use (Paglia-Boak et al., 2009) and of Canadian university students 3% reported using cannabis 4-7 times per week (Adlaf, Demers & Gliksman, 2005).

While cannabis use can be associated with health harms, not all cannabis use is necessarily harmful and most users engage in use without severe problems (Fischer et al., 2010). Based on available epidemiological data, however, high-frequency use (e.g., daily or near-daily use) stands out as a high-risk form of use potentially leading to harms, and hence deserves particular research attention. Specifically, high frequency use of cannabis is associated with a substantially elevated likelihood of a number of problem symptoms including dependence, anxiety, depression, schizophrenia, psychosis, cognitive impairment, respiratory diseases, and car crash injury (Blows et al., 2005; Hall & Babor, 2000; Hall & Solowij, 1998; Kalant, 2004; Moore et al., 2007; Fischer et al., 2010; Coffey et al., 2002; Block et al., 2002; Fergusson, Horwood & Swain-Campbell, 2003).

Substance use has traditionally been understood from a male perspective, implying that men’s experiences are universal (Greaves, 1996). Earlier research focused on women drug users as social deviants, morally weak or corrupt individuals or even criminals, with a focus on sex workers, injection drug use, and mothers who were drug users (Measham, 2002). In the 1990s, research began to pay attention to recreational drug use among women and the fact that women could use drugs for pleasure, yet also that drug use among women needs to be understood in the wider and distinct socio-cultural and gendered context of female existence (Measham, 2002; Ettore, 2004). Women have also described their substance use as a form of empowerment and as a way to be more sexually uninhibited (Romo et al., 2009). Cannabis use has also been described as a form of “girl-bonding” (Haines et al., 2009).
Research over the past decades has suggested that women’s drug use commonly has distinct dynamics and features which require specific understanding (Measham, 2002). For example, women’s drug use has been observed to more quickly or intensively become problematic than in male comparisons (Prather & Fidell, 1978; Cooperstock, 1979). Also, women have been observed to use substances more commonly for ‘medical’ reasons, e.g. to (self-) medicate or counteract perceived social or psychological problems (Brady & Randall, 1999; Najavits & Lester, 2008). This may imply that women may be using drugs as a means of coping, but also that use can create its own set of problems for women.

For cannabis use specifically, there is a dearth of empirical research examining sex differences (Becker & Hu, 2008). While males tend to begin using cannabis at a younger age and in greater amounts, studies have found, for example, that — among samples of problematic users - females tend to use cannabis for fewer years before entering treatment suggesting that they experience a more rapid progression or a “telescoping” effect in progression of cannabis dependence (Hernandez-Avila, Rounsaville, & Kranzler, 2004). There is also some evidence that reasons for use — and especially problematic use — may differ by gender. For example, in a study of 18-25 year olds in the U.S. (n=4601), social anxiety predicted chronic cannabis use in women, but not in men (Preston, 2006). In a study of U.S. university students (n=123), women, but not men, with more symptoms of social anxiety disorder were especially vulnerable to problematic cannabis use (Buckner et al., 2006). One possible explanation offered is that socially anxious women use cannabis as a way to self-medicate their anxiety (Buckner et al., 2006). In a South African study of university students, past month cannabis use was associated with low self esteem in women, but not in men (Peltzer, Malaka & Phaswana, 2001).

Even though previous studies have reported no gender differences in past year cannabis use by Canadian university students (Adlaf et al., 2003), none have examined other possible gender differences in cannabis use in this population. In addition, no Canadian studies exist to date on the particular risk-population of high-frequency cannabis users among young adults. Understanding whether possible gender differences exist in this particular risk population may aid in developing appropriate interventions to reduce harms. The present study’s objective was to explore possible differences in cannabis use patterns and associated outcomes between male and female users in a sample of high-frequency cannabis users drawn from a Canadian university student population (for details on the original study and data used for this analysis, see Fischer et al. in review).
METHODS

Participants were 134 university students recruited from two universities in Toronto, Canada, between October 2009 and March 2010. Participants were recruited through mass posting - which briefly explained the study purpose and key eligibility criteria - indoors and outdoors on the two university campuses. Prospective study participants from among the university student populations self-identified through a study recruitment telephone line where they were screened for eligibility. To be eligible, participants had to be 18-28 years old, full-time university students, active cannabis users for at least one year, and using at least on 12 days out of the past 30 days. Eligible participants were invited for a full study assessment, which consisted of an interviewer administered questionnaire consisting largely of closed-ended questions about their substance use and use related characteristics, risks and outcomes, and a salivary test to confirm recent cannabis use. Participants gave informed consent and no identifying personal information was collected. After the assessment was completed, participants received an honorarium of $20 for their time and effort. This study was approved by applicable institutional review boards (for more study details, see Fischer et al. in review).

Univariate frequency distributions on select study variables of interest for the purpose of the present analysis were computed to assess characteristics of the study sample. Variables included in these analyses were gender (female=1, male=0), three or more cannabis related episodes per day in the past 30 days (yes=1, no=2), use of cannabis for medical reasons in the past 30 days (yes=1, no=2), and cannabis related problems. Four cannabis-related problems were included in the survey, all with yes or no options: 1) difficulty controlling or limiting cannabis use, 2) cannabis use interfering with educational, social, or professional tasks or obligations, 3) feeling that cannabis was negatively affecting physical or mental health, and 4) cannabis use contributing to financial problems. These four problem measures were also grouped into one categorical variable of two or more cannabis-related problems in the past 30 days (yes=1, no=2).

Bivariate analyses were performed to determine differences by gender in factors associated with cannabis use among the study sample. Bivariate associations for categorical variables and cannabis use were analysed using Pearson’s χ² test. All variables were considered statistically significant at the p < 0.05 level. Step wise discriminant analysis was used to classify cases into the values of a categorical dependent (gender). Specifically, the discriminant analysis approach served to confirm the individual bivariate findings, assess the relative importance of the respective independent variables in classifying women.
versus men, and to discard variables which show little relation to group distinctions when combined with other variables.

RESULTS

Of the total sample, 67.2% were male (n=90) and 32.8% were female (n=44). Participants ranged from 18-27 years in age, with a mean age of 20.4 years. The mean years of university attendance for this sample was 2.5 years. The majority of participants were Caucasian (74.6%). Most participants lived at home with parents or family (32.8%) or off-campus with others not including a partner or children (26.1%). (For more details on overall participant characteristics, see Fischer et al. in review).

Table I provides the analyses of bivariate associations of select cannabis use characteristics by gender for the total sample. Women were more likely to have three or more cannabis episodes per day in the past 30 days compared to men (43.2% versus 18.9%). Women were also more likely to report using cannabis for medical reasons in the past 30 days compared to men (65.9% versus 46.7%).

Table I: Cannabis use Characteristics by Gender (n=134)

<table>
<thead>
<tr>
<th></th>
<th>Men (n=90)</th>
<th>Women (n=44)</th>
<th>χ² test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used cannabis 5 years or more</td>
<td>63.3</td>
<td>63.6</td>
<td>0.973</td>
</tr>
<tr>
<td>Used cannabis daily, past 30 days</td>
<td>25.6</td>
<td>29.6</td>
<td>0.625</td>
</tr>
<tr>
<td>3 or more cannabis episodes per day, past 30 days</td>
<td>18.9</td>
<td>43.2</td>
<td>0.003**</td>
</tr>
<tr>
<td>Setting of cannabis use - alone, past 30 days</td>
<td>22.2</td>
<td>22.7</td>
<td>0.947</td>
</tr>
<tr>
<td>Used cannabis for medical reasons, past 30 days</td>
<td>46.7</td>
<td>65.9</td>
<td>0.036*</td>
</tr>
<tr>
<td>Found it hard to control or limit cannabis use</td>
<td>40.0</td>
<td>54.6</td>
<td>0.112</td>
</tr>
<tr>
<td>Cannabis use interfered with educational, social, or professional tasks or obligations</td>
<td>31.1</td>
<td>43.2</td>
<td>0.169</td>
</tr>
<tr>
<td>Cannabis negatively affected physical or mental health</td>
<td>48.9</td>
<td>59.1</td>
<td>0.267</td>
</tr>
<tr>
<td>Cannabis use contributed to financial problems</td>
<td>16.7</td>
<td>27.3</td>
<td>0.151</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01
Table II presents the discriminant analysis model fit summary statistics. The partial $R$-square shows that three or more cannabis episodes per day in the past 30 days accounted for the most variance explained between men and women (0.07), followed by two or more cannabis problems and use of cannabis for medical reasons in the past 30 days (0.04 and 0.02, respectively). The average squared canonical correlation (ASCC) shows the degree of increase in the overall trend as further indicators were added to the model. These indicators were all significant at the $p < 0.005$ level (using the Wilks's lambda statistic); ASCC values were significant at the same level.

**Table II. Discriminant Analysis of Gender Difference (final model summary statistics; Female=1)**

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Partial $R^2$</th>
<th>Wilk's Lambda</th>
<th>Wilk's lambda P-value</th>
<th>Average Squared Canonical Correlation (ASCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 or more cannabis episodes per day (past 30 days)</td>
<td>0.07</td>
<td>0.93</td>
<td>&lt; 0.0027</td>
<td>0.0662</td>
</tr>
<tr>
<td>2 or more cannabis problems</td>
<td>0.04</td>
<td>0.90</td>
<td>&lt; 0.0008</td>
<td>0.1025</td>
</tr>
<tr>
<td>Used cannabis for medical reasons (past 30 days)</td>
<td>0.02</td>
<td>0.88</td>
<td>&lt; 0.0007</td>
<td>0.1226</td>
</tr>
</tbody>
</table>

* No variable was adjusted in the model

In the final discriminant analysis model, 64.4% of male and 56.8% of female (thus 61.9% of all) subjects were correctly classified. This produces a significant ($p < .005$) female separate-group classification accuracy measure of $z=3.17$ (Huberty, 1984).

**DISCUSSION**

Our study found that there appears to be marked and important gender-differences among young high-frequency cannabis users among university students. Our findings indicate that women users in our sample had more use episodes per day, although there was no significant difference between the total amount used in the past 30 days by men and women. This finding may imply a variety of things. At the frequency of use levels given in the study sample, many users may have developed cannabis ‘dependence’—usually described as predominantly a psychological compulsion to use - which in women may express itself differently than in men (Agrawal & Lynskey, 2007). Specifically, women
may - in part driven by distinct physiology or metabolisms - feel compelled to use more frequently. The distinct use patterns may however also be explained by ecological or opportunistic factors. For example, women may be using in social contexts as a way to connect with friends, but may be using in small amounts more frequently in order to be able to remain functional throughout the day. Women may choose cannabis over other types of substances because they perceive themselves to maintain more control using cannabis than other substances, such as alcohol (Measham, 2002). Additional inquiries—including biological and qualitative-behavioural data—are needed to further examine and explain these differences.

The present study also found that women users reported a higher number of cannabis use related problems compared to men. This may be reflective of the above described “telescoping” effect in progression of problematic cannabis use whereby women’s substance use problems become severe more rapidly compared to men (Hernandez-Avila et al., 2004). ‘Telescoping’ has been widely studied with alcohol use with a belief that this phenomenon reflects biological vulnerabilities and gender differences in hormones and metabolism (Zilberman, Tavares & El-Guebaly, 2003). However, ‘telescoping’ has also been seen in behavioural dependence such as compulsive gambling, which suggests that ‘telescoping’ could also be influenced by psychosocial factors (Zilberman et al., 2003). For example, ‘telescoping’ could be attributed to the higher prevalence rate of trauma history, mood and anxiety disorders in women which may contribute to acceleration of dependence (Hernandez-Avila et al., 2004).

Since cannabis problems in our study were self-reported, another possibility is that women subjectively see problems as drug use related or rate them as more severe than men who might see these problems and their cannabis use as more normative for their gender. This is consistent with previous findings that negative social attitudes about women’s drug use not only delays onset of substance use, but also puts greater pressure on women to enrol in treatment for substance dependence (Blankfield, 1990; Gomberg, 1988). In addition, some of the cannabis problems that participants in our study endorsed (e.g., cannabis use interfering with educational, social, or professional obligations, cannabis negatively affecting physical or mental health, cannabis use contributing to financial problems) may reflect more general problems that women face. For example, women, in general, are more likely to face certain kinds of mental health problems (e.g., emotive problem symptoms (Bland, 1997)) or social problems like unemployment or disadvantages in education or professional lives (Jacques & Walkowiak, 2009), which may not be related to cannabis use per se. Moreover, those who experience gender-related social challenges may also experience
mental health problems (Paul & Moser, 2009) making it difficult to separate out whether heavy cannabis use is related to these problems or whether there are other underlying factors at play.

Another interesting finding of the present study is that high-frequency cannabis using women were more likely to report using cannabis for medical reasons. While this finding may at first glance feed into more traditional stereotypes of women’s drug use (Weiss, Griffin & Mirin, 1992), a number of different dynamics may contribute to these observations. First, women users in our sample may indeed have a higher prevalence of physical or mental health symptoms for which they use cannabis medically or therapeutically. In a study of chronically ill patients in the U.K. (n=2969), male gender was associated with medical cannabis use (Ware, Adams & Guy, 2005). However, Ware and colleagues (2005) had a much older sample with a mean age of 52.7 years and a more than half of their sample reported to have multiple sclerosis. In a younger sample of high school students, poor mental health put females at risk for frequent and heavy cannabis use (Tu, Ratner & Johnson, 2008). Our findings could thus indicate that young women who are heavy cannabis users are self-medicating with cannabis for otherwise untreated ailments, such as anxiety or depression. However, given the subjective nature of question of medical use in our study as well as the generally evolving societal discourses about ‘medical cannabis use’ (Hall & Degenhardt, 2003), it is also possible that female participants in the present study were more likely than men to rationalize or think about their cannabis use as being medical even if they had no discernable physical or mental health problems. The framing of ‘medical use’ may also be a way for female high-frequency users to attempt to distance themselves from the pronounced stigma associated with female drug use (Ettorre, 2004; Simpson & McNulty, 2008).

Our results are further contextualized and enriched in interpretation by additional qualitative data (n = 112\(^2\); 77 males and 35 females) collected at the study assessment and obtained through open-ended questions. These question items specifically asked respondents how they thought their cannabis use would evolve in the future, and what the reasons for possible changes might be. Considering the immediate future (i.e., 1 year in the future), males (n=8) were substantially more likely than females (n=28) to mention education as a factor that would encourage them to decrease their cannabis use at this time. With a view on the long-term (i.e. 5 to 10 years in the future), males (n=13) were somewhat more likely to mention marriage/a serious

\(^2\) The n=112 for the qualitative data reflects only participants who provided responses to both the quantitative and the open ended qualitative questions.
relationship as a factor that would seem them reduce or even terminate their cannabis use, when compared to females (n=3). Meanwhile, in the long-term, females were somewhat more likely to consider parenthood (n=13) and professional career (n=18) as the main motivating factors for reducing or stopping cannabis use, as compared to males (n=25 and n=31, respectively). Some interesting findings emerged with respect to gender when participants were asked about how their cannabis use would evolve in the future and what reasons they might have for possible changes. Women were more likely to cite parenthood and career as reasons for change, while men were more likely to mention education and marriage/serious relationships. For example, one female respondent explained, “I would have a hard time using cannabis thinking that someone would be able to use that against my professional reputation.” (female, age 23). Cannabis use during pregnancy was an issue that females were very opposed to, seeing that their actions may be causing direct harm to their baby. One respondent elaborated: “I don’t see myself like smoking when I’m pregnant or smoking as a mom.” (female, age 23).

Finally, a minority (n=17) of the total sample mentioned the role of medical aspects or effects of cannabis use - specifically its role to relieve anxiety/stress - as a factor for considering continued use in their (both short-term and long-term) future. Women (n=9) however were substantially likely as men (n=8) to mention the relaxing/calming potential of cannabis use as a motivating factor for continued use. A couple of female respondents elaborated on cannabis use's medical use aspects for present and future use: “... being able to maybe meditate or calm my mind more cause that’s basically why I take it” (female, age 26); and “Umm... I guess... I’m gonna try not to use it so much as [...] something I depend on. I just want it to be something I enjoy and that’s on the side. And so I don’t --- from now on I really think I’d like to avoid using weed to calm me down, or to go to sleep or to stimulate my appetite or anything like that, cause that, that really worries me” (female, age 19).

In addition to gender differences, we also found it interesting that men and women did not significantly differ in terms of number of years of use or in the social context in which they use cannabis. More than 63% of men and women reported using cannabis for the past 5 years. Since the mean age of participants was 20.4 years, most participants began using cannabis around age 15. A low percentage of participants (less than a quarter) reported that they smoked cannabis alone. This suggests that both men and women are using cannabis in social settings, which may be useful information for the development and dissemination of interventions targeting high frequency users.

This study has several limitations. The data obtained was based on self-report and there may have been unreliable recall or perceived social desirability effects in responses, although previous studies have
found the validity of self-report data from illicit drug users to be high when assessed in appropriate contexts (Darke, 1998). Another limitation is that participants were self-selected high-frequency users that may not be representative of all high-frequency users but rather just those who are comfortable sharing details about their cannabis use. Because this sample is not representative of cannabis users at large, or even high-frequency cannabis users, its findings cannot be generalized beyond the specific study sample. The study also relied on binary (yes/no) question items for several outcomes of interest, which can lead to crude or simplified assessment results. In addition, medical conditions were not assessed with standardized diagnostic tools in the present study so we cannot draw firm conclusions about medicinal use by our sample. Future studies should include an assessment of which types of medical problems participants are experiencing in order to get a better understanding of why men and women are using cannabis.

This study documented notable gender differences in a sample of high-frequency cannabis users among university students which ought to be further explored by additional research to better understand how men and women may understand cannabis related problems and medical use. Qualitative studies, in particular, may help to elucidate the contextual factors that may influence high frequency cannabis use for men and women. Understanding such gender differences may be informative for targeted intervention development and practices.

REFERENCES


Greaves, L. (1996). History of Canadian Women’s Use of Alcohol, Tobacco and Other Drugs. In M. Adrian, Lundy, C., and Eliany, M. (Ed.). Women’s Use of Alcohol, Tobacco and Other Drugs in Canada (pp. 1-13). Toronto, ON: Addiction Research Foundation.


