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Short Communication

International differences in patterns of cannabis use among youth: Prevalence, perceptions of harm, and driving under the influence in Canada, England & United States

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HIGHLIGHTS

- Study examines patterns of cannabis use among youth in Canada, England and the US
- Substantial differences between CA, EN & US in perceptions and prevalence of use
- Differences may reflect permissiveness of cannabis policies as well as pre-existing trends

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ABSTRACT

Introduction: Cannabis is the most widely used illicit substance in the world. An increasing number of jurisdictions have legalized medical and non-medical cannabis; comparisons across jurisdictions can help evaluate the impact of these policy innovations. The current study examined patterns of cannabis use among youth in Canada (CA), England (EN) and the United States (US). At the time of study, non-medical cannabis use was prohibited federally in all three countries; however, medical cannabis was accessible with varying restrictions in CA, EN and most US states, while non-medical cannabis was legal in four US states.

Methods: Data come from an international online survey conducted in July 2017 (n = 12,064). Youth, aged 16–19, were asked about cannabis consumption, perceived access to cannabis, perceptions of harm, and driving after cannabis use. All estimates represent weighted data.

Results: US youth were more likely to report more frequent cannabis consumption, easier access, lower perceptions of harm, and higher rates of driving after cannabis use than CA and EN youth. CA youth reported more frequent consumption, easier access, and higher rates of driving after cannabis use than EN youth.

Conclusion: CA and US youth had higher prevalence of use, easier access, lower perceived harm and higher driving rates after cannabis use in comparison to EN. These differences may reflect more permissive cannabis policies in CA and US, as well as pre-existing trends. Future waves of the international cannabis study will examine trends over time within the same countries after cannabis legalization in CA and additional US states.

1. Introduction

Cannabis is the most widely used illicit substance in the world, and global estimates suggest the rate of use is increasing (United Nations Office of Drugs and Crime [UNODC], 2015). Cannabis use is most common among youth and young adults, followed by declines among older age groups (UNODC, 2017).

Several jurisdictions have recently liberalized cannabis policy. In 2012, Uruguay became the first country to legalize non-medical cannabis, followed by Canada in October 2018. In the United States (US), nine states have also legalized non-medical cannabis. Alongside the potential benefits of removing criminal sanctions for cannabis use among adults, there are concerns about the impact among youth, such as increased access and lower perceptions of harm, bringing concerns of increased prevalence and drug driving (Hopfer, 2014; Shi, Lenzi, & An, 2015; UNODC, 2017). To date, the existing evidence on the effect of cannabis legalization on youth is mixed, in part because legalization has only recently been implemented in relatively few jurisdictions (Hall & Weier, 2015; Shi et al., 2015; Simons-Morton, Pickett, Boyce, Ter Bogt, & Vollebergh, 2010).

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Table 1
Unweighted (left) and weighted (right) sample characteristics by country.

	Unweighted respondents (n = 12,064)				Weighted respondents (n = 12,064)			
	Canada % (n = 4008)	England % (n = 3970)	US % (n = 4086)	P-value for $\chi 2$	Canada % (n = 4008)	England % (n = 3970)	US % (n = 4086)	p-value for $\chi 2$
Sex				< 0.001				0.004
Female	65.3 (2617)	57.3 (2273)	60.4 (2467)		48.4 (1940)	44.7 (1775)	46.7 (1908)	
Male	34.7 (1391)	42.7 (1697)	39.6 (1619)		51.6 (2068)	55.3 (2194)	53.3 (2178)	
Age				< 0.001				< 0.001
16	15.2 (608)	15.3 (607)	21.6 (884)		19.4 (775)	19.0 (756)	23.0 (938)	
17	23.9 (959)	24.9 (987)	22.3 (909)		28.0 (1123)	30.1 (1194)	23.8 (971)	
18	32.5 (1301)	35.4 (1406)	31.1 (1270)		29.4 (1178)	29.8 (1183)	29.9 (1222)	
19	28.4 (1140)	24.4 (970)	25.0 (1023)		23.2 (931)	21.1 (838)	23.4 (956)	
Ethnicity				< 0.001				< 0.001
White	59.5 (2384)	78.1 (3102)	73.8 (3014)		63.9 (2563)	79.0 (3136)	79.2 (3236)	
Non- white	40.5 (1624)	21.9 (868)	26.2 (1072)		36.1 (1445)	21.0 (834)	20.8 (850)	
No. of Computers				< 0.001				< 0.001
None or one	5.2 (204)	5.64 (219)	9.5 (383)		7.3 (285)	6.2 (240)	10.1 (409)	
Two	14.8 (583)	15.1 (587)	19.1 (774)		15.7 (618)	16.4 (638)	20.9 (844)	
More than two	80.0 (3147)	79.3 (3080)	71.4 (2890)		77.0 (3028)	77.4 (3007)	69.0 (2791)	

The current study examined patterns of cannabis use among youth in three countries: Canada [CA], England [EN] and the US. In Canada, England and the US, cannabis is the most commonly used illicit substance among youth, with some of the highest prevalence levels in developed countries (Statistic Canada, 2016; European Monitoring Centre of Drugs and Drug Addiction [EMCDDA], 2017; UNODC, 2017). In Canada, medical cannabis has been available since 2001 and after new regulations in 2014, it was sold online via commercial licensed producers. In the US, over half of all states had access to medical cannabis through commercial brick-and-mortar stores. In England, the cannabis-based product Sativex for patients with Multiple Sclerosis was legal; however, it is tightly restricted and not available on the National Health Service (NHS). At the time of study, non-medical cannabis use was prohibited at the national level in all three countries. However, non-medical cannabis was legal in four US states (Colorado, Washington State, Oregon and Alaska), and Canada had announced non-medical cannabis would be legalized in 2018 (Government of Canada, 2017a).

The different regulatory frameworks in each country provide an opportunity to conduct 'natural experiments' to examine differences in patterns of cannabis use across countries. The current study explored four primary outcomes: prevalence of use, perceived access to cannabis, perceptions of harm, and driving after cannabis use. This study offers a unique look at a cross-country comparison of Canada, England and US youth, at a time where there are different and changing cannabis contexts. Restrictions in the US vary by state; however, the current study explored patterns of cannabis use at a country level. Differences among US jurisdictions were explored in more depth elsewhere (Wadsworth & Hammond, 2018). We hypothesized higher prevalence, easier access, lower perceived harm and higher rates of driving after cannabis use in Canada and US versus England, due to some permissive cannabis policies, as well as pre-existing trends.

2. Methods

2.1. Study design

Data are from Wave 1 of the International Tobacco Control Policy Evaluation Project (ITC) Tobacco and Youth *E*-cigarette Survey, conducted in Canada, England, and US. Data were collected via self-completed web-based surveys conducted in July/August 2017 with youth aged 16 through 19. A full description of the study design and methodology can be found in the Technical Report [available at: http://davidhammond.ca/projects/tobacco-control/itc-youth-tobacco-ecig/].

2.2. Measures

Socio-demographic measures included country of residence, sex, age, and ethnicity. Income was captured by the number of computers in their home (Hartley, Levin, & Currie, 2016; Torsheim et al., 2016). All measures on cannabis consumption; perceived access to cannabis; perceptions of harm; and driving after cannabis use can be found in the Technical Report, and elsewhere (Wadsworth & Hammond, 2018).

2.3. Statistical analysis

A total of 12,064 respondents were retained for the analytical sample. Sample data were weighted for analysis. All logistic regression models were adjusted for country, age, sex, ethnicity, and number of computers in home. First, sample characteristics were examined and chi-squared tests were used to assess country differences. Second, nominal logistic regression was used to examine any country differences in consumption measures. Third, multinomial logistic regression models were fitted to examine any country differences in access to cannabis, perceptions of harm, and driving variables.

3. Results

Table 1 shows the weighted and unweighted sample characteristics in each country.

3.1. Cannabis consumption

Overall, the majority of youth in CA, EN and US reported never using cannabis (Table 2). EN youth were significantly less likely to report using cannabis more than a month ago (vs. never), compared to US youth (Table 3). EN youth were significantly less likely to have used cannabis in the last month (vs. never), than CA or US youth.

3.2. Perceived access to Cannabis

The majority of CA and US youth reported it would be easy to obtain cannabis if they wanted, compared to a minority of EN youth (Table 2). EN youth were significantly less likely to report it was easy to obtain cannabis than CA or US youth (Table 3).

3.3. Perceptions of harm

Over a third of CA and EN youth reported that people harm themselves "a lot" when they smoke cannabis, compared to under a third of

Table 2
Differences between countries in patterns of use and perceptions (n = 12,064).

	Canada % (n = 4008)	England % (n = 3970)	US % (n = 4086)	p-value for $\chi 2$
CONSUMPTION MEASURES				
When was the last time you used cannabis?				< 0.001
• Never	74.7 (2935)	77.0 (2981)	69.6 (2772)	
• Used, but not in the last month	12.6 (497)	12.8 (495)	16.0 (638)	
• Used in the last month	12.7 (500)	10.3 (398)	14.4 (571)	
ACCESS				
How difficult do you think it would be for you to get cannabis, if you wanted?				< 0.001
• Difficult	40.1 (1420)	54.0 (1873)	39.5 (1460)	
• Easy	60.0 (2123)	46.0 (1593)	60.5 (2236)	
PERCEPTIONS OF HARM				
How much do you think people harm themselves when they SMOKE cannabis?				< 0.001
• A lot of harm	36.5 (1458)	36.6 (1448)	28.2 (1149)	
• Otherwise (Some/Little/No harm/don't know)	63.5 (2538)	63.4 (2504)	71.9 (2934)	
How much do you think people risk harming their MENTAL HEALTH when they use cannabis on a regular basis?				< 0.001
• Great risk	40.4 (1615)	43.6 (1724)	29.1 (1186)	
• Otherwise (Moderate/Slight/No/Don't know)	59.7 (2387)	56.4 (2232)	70.9 (2892)	
Are you worried that using cannabis will damage your health in the future?[a]				< 0.001
• Not at all worried	50.0 (249)	56.9 (226)	65.4 (372)	
• Otherwise (Little/Moderately/Very/Don't know)	50.0 (249)	43.1 (172)	34.6 (197)	
CANNABIS AND DRIVING				
Have you ever driven a car or other vehicle within 2 h of using cannabis?[a]				< 0.001
• No, never	84.6 (835)	90.6 (801)	72.3 (853)	
• Yes	15.4 (152)	9.4 (83)	27.7 (327)	
Have you ever been a passenger in a car or other vehicle driven by someone who had been using cannabis in the last 2 h?				< 0.001
• No, never	82.0 (2975)	88.3 (3246)	74.9 (2776)	
• Yes	18.0 (655)	11.7 (430)	25.1 (931)	
Do you think driving a car or other vehicle within 2 h of using cannabis increases the risk of getting into an accident?				< 0.001
• A lot	53.2 (2129)	56.7 (2242)	43.6 (1779)	
• Otherwise (Somewhat/Little/Not at all/Don't know)	46.8 (1870)	43.3 (1712)	56.4 (2297)	
If someone drives a car or other vehicle within 2 h of using cannabis, how likely are they to be caught by the police?				0.026
• Not at all/A little/Don't know	48.4 (1931)	48.6 (1923)	51.1 (2082)	
• A lot/Somewhat	51.7 (2062)	51.4 (2031)	48.9 (1994)	

[a] Participants are those who had answered "Yes" to using cannabis in the last month.

Table 3
Weighted nominal and binary logistic regression analysis for outcome variables by country (n = 12,064).

	CA vs. EN		EN vs. US		US vs. CA	
	AOR (95% CI)	Sig.	AOR (95% CI)	Sig.	AOR (95% CI)	Sig.
CONSUMPTION MEASURES						
• Used, but not in the last month (vs. never)	1.05 (0.91–1.20)	0.528	0.75 (0.65–0.85)	< 0.001	1.28 (1.12–1.46)	< 0.001
• Used in the last month (vs. never)	1.36 (1.18–1.58)	< 0.001	0.67 (0.58–0.78)	< 0.001	1.09 (0.95–1.25)	0.202
ACCESS						
• Easy (vs. difficult)	1.83 (1.66–2.02)	< 0.001	0.56 (0.51–0.62)	< 0.001	0.98 (0.89–1.08)	0.632
PERCEPTIONS OF HARM						
Harm from smoking cannabis						
• A lot of harm (vs. other)	0.99 (0.90–1.09)	0.879	1.46 (1.33–1.61)	< 0.001	0.69 (0.63–0.76)	< 0.001
Harm to mental health						
• Great risk (vs. other)	0.85 (0.78–0.94)	< 0.001	1.88 (1.71–2.06)	< 0.001	0.62 (0.57–0.69)	< 0.001
Harm to own health[a]						
• Not at all worried (vs. other)	0.73 (0.56–0.96)	0.025	0.71 (0.54–0.93)	0.013	1.93 (1.50–2.48)	< 0.001
CANNABIS AND DRIVING						
You[a]						
• Yes (vs. No, never)	1.75 (1.31–2.34)	< 0.001	0.28 (0.21–0.36)	< 0.001	2.07 (1.66–2.57)	< 0.001
Passenger						
• Yes (vs. No, never)	1.64 (1.43–1.87)	< 0.001	0.41 (0.36–0.47)	< 0.001	1.49 (1.32–1.67)	< 0.001
Risk of accident						
• A lot (vs. other)	0.87 (0.80–0.95)	< 0.003	1.65 (1.51–1.80)	< 0.001	0.70 (0.64–0.76)	< 0.001
Caught by police						
• A lot (vs. other)	0.96 (0.88–1.05)	0.402	1.12 (1.02–1.22)	0.014	0.93 (0.85–1.02)	0.111

[a] Participants are those who had answered "Yes" to using cannabis in the last month.

US youth (Table 2). US youth were significantly less likely to report that people harm themselves "a lot" when they smoke cannabis than CA or EN youth (Table 3).

Just under half of CA and EN youth reported that regular cannabis use presents a "great risk" to mental health, compared to under a third of US youth. EN youth were significantly more likely to report a "great risk" to their mental health than CA or US youth. US youth were significantly less likely to report a "great risk" their mental health than CA youth.

Of those who had used cannabis, over half of all youth were "not at all" worried that cannabis will damage their health in the future. US youth were significantly more likely to be "not at all" worried about damaging their health in the future than CA or EN youth. CA youth were significantly less likely to be "not at all" worried about damaging their health in the future than EN youth.

3.4. Driving after cannabis use

A minority of youth in CA, EN and US reported ever driving a car within two hours of using cannabis (Table 2). EN youth were significantly less likely to have driven a car within two hours of using cannabis than CA or US youth, while US youth were significantly more likely than CA youth (Table 3).

Similar proportion of youth in CA, EN and US reported they had been a passenger in a car within two hours of the driver using cannabis. EN youth were significantly less likely to have been a passenger in a car that has been driven by someone who has used cannabis within two hours than CA or US youth, while US youth were significantly more likely than CA youth.

Approximately half of CA and EN youth reported that driving within two hours of using cannabis increased the risk of an accident by "a lot", compared to less than half of US youth. EN youth were significantly more likely to report that driving a car within two hours of using cannabis increases your risk of getting into an accident by a lot (vs other) than CA or US youth, while US youth were significantly less likely than CA youth.

Around half of youth in all countries reported that driving a car within two hours of using cannabis, they are "a lot" or "somewhat" likely to get caught by the police. EN youth were significantly more likely to report that using cannabis within two hours of driving will mean you are "a lot" or "somewhat" likely to be caught by the police than US youth.

4. Discussion

The overall findings from this study show that Canadian and US youth had higher prevalence of use, easier access to cannabis, lower perceived harm to mental health, and higher driving rates when under the influence of cannabis in comparison to English youth.

The lower rates of cannabis use among English youth and higher rates among Canadian and US youth are consistent with government surveys in each country. While the comparability of these surveys are limited due to methodological differences, past month cannabis use in England (and Wales) was estimated at 8% among 16–24 year olds (Home Office, 2016). This is compared to Canadian estimates of 26% among 16–19 year olds for past month use, and 16% and 23% between 10th and 12th graders for past month use (Government of Canada, 2017b; National Institute on Drug Abuse, 2017). Whilst government surveys collect data on their own country, the current study used the same methodology in each country, allowing for direct comparisons in cannabis use and perceptions.

English youth were somewhat less likely to report it was easy to get cannabis than Canadian or US youth. This may reflect lower prevalence of use and exposure among peers. It may also be due to less exposure to cannabis retail outlets. In England, access to medical cannabis is tightly regulated: only Sativex has been approved and only for treating the symptoms of Multiple Sclerosis (UK Government, 2013). Furthermore, it is not available on the NHS, nor does it get approval from national guidelines (National Institute for Health and Care Excellence, 2014). In contrast, both Canada and many US states had a medical cannabis market. In Canada, in addition to licensed sources of medical cannabis, many cities had unlicensed storefronts selling cannabis to non-medical users (Mahamad & Hammond, 2018). In the US, over half of jurisdictions have a medical cannabis market with brick-and-mortar stores (Pacula, Powell, Heaton, & Sevigny, 2015). Regardless of whether youth can access cannabis directly from these outlets, the greater visibility of cannabis stores may explain the easier perceived availability of cannabis (Harpin, Brooks-Russell, Ma, James, & Levinson, 2017).

US youth reported lower perceptions of physical and mental harms from cannabis compared to youth in Canada or England. The current findings are reflective of a trend over the past 25 years towards lower perceptions of risk from cannabis use among US high school students (Terry-McElrath, O'Malley, Patrick, & Miech, 2017). Interestingly, youth in Canada and England reported similar perceptions of risk, despite differences on most other measures. This may reflect greater national dialogue in Canada on the risks of cannabis leading up to cannabis legalization.

US youth were approximately twice as likely to report driving a car or being a passenger in a car within two hours of the driver using cannabis. While this may reflect a greater prevalence of use among US youth, it may also reflect lower risks perceptions: indeed, US youth were less likely to report that driving within two hours of cannabis use was risky. These results are potentially explained by drug-driving laws surrounding the three countries, and the message that they send to youth. In England, it is illegal to drive when impaired by cannabis and there is a low threshold of content in the blood (2 μg/L), which would be detected by roadside oral fluid drug screeners (Governors Highway Safety Association, 2017; UK Government, 2017). In the US, although some states have begun to use roadside oral fluid drug screeners, the majority do not. This means that the police must show grounds of impaired driving before testing, which by that time the cannabis may metabolized in the body. (Compton, 2017). Furthermore, there are wide variations in drug-driving laws across the US, potentially sending mixed messages to youth (Compton, 2017). At the time of study, Canada's laws were more akin to the US; however, legislation (Bill C-46) was being created to implement laws similar to England (Health Canada, 2017; Royal Canadian Mounted Police, 2017).

4.1. Limitations

This study has several limitations. Self-report data are subject to memory recall and social desirability biases. Non-medical cannabis use remains illegal for youth in all three countries; therefore, patterns of cannabis use may be under-reported. Another limitation of the study is that countries were treated as a single jurisdiction, which has the potential to mask important sub-national differences. This is particularly true in the US, in which US states have very different cannabis policies (Wadsworth & Hammond, 2018). Finally, respondents were recruited from a commercial sample, rather than probability-based methods. However, respondents were recruited using the same standardized methods in each country, and the post-stratification survey weights were used to adjust for sociodemographic differences.

4.2. Conclusion

The current study represents one of the few to compare cannabis use among youth in different countries. The findings indicate substantial differences between Canada, England and US in perceptions and prevalence of use. However, further longitudinal research is needed to determine whether these differences are causally associated with policy frameworks or simply well-established secular trends. Cannabis legalization in Canada—and an increasing number of US states—provides an

excellent opportunity to study changes over time in cannabis among youth and its association with policy.

Conflict of interest

No conflict declared.

Funding & conflict of interest statement

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