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Research

Cannabis-related driving and passenger behaviours among high school students: a cross-sectional study using survey data

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Abstract

Background: Many youth report driving under the influence of cannabis (DUIC) and riding with a cannabis-impaired driver (RWCD), and many perceive that cannabis causes limited impairment. We examined associations of perceived risk of regular cannabis use with DUIC and RWCD, exploring differences by sex and rural setting.

Methods: In a cross-sectional study, we examined DUIC and RWCD among high school students in grades 11 and 12 who participated in the 2016–2017 Canadian Student Tobacco, Alcohol and Drugs Survey. Private and public schools across 9 Canadian provinces were included. New Brunswick and the 3 territories were not included. Multinomial logistic regression models generated adjusted and unadjusted models for the associations.

Results: A total of 52 103 students in grades 7–12, from 117 school boards and 699 schools, participated in the survey. The survey response rate was 76.2% (n = 52 103/68 415). In total, 14 520 students in grades 11 and 12 participated in the survey. Greater perceived risk of regular cannabis use was associated with reduced risk of DUIC and RWCD in a dose–response manner. Students perceiving that regular cannabis use posed great risk had an adjusted relative risk (RR) of 0.06 (95% confidence interval [CI] 0.04–0.10) of DUIC in the past 30 days compared with students perceiving that regular use posed no risk. Students perceiving that regular cannabis use posed great risk had an adjusted RR of 0.09 (95% CI 0.07–0.12) of RWCD in the past 30 days compared with students perceiving no such risk. Associations were consistent for male and female students and for those living in urban and rural areas.

Interpretation: Students perceiving minimal risk from cannabis use reported greater engagement in cannabis-related risky driving behaviours. Given the importance of youth perceptions in shaping driving and passenger behaviours, efforts must be made to disseminate appropriate information regarding cannabis-related driving risks to high school students.

In light of Canada's legalization of recreational cannabis in 2018, driving under the influence of cannabis (DUIC) is becoming increasingly relevant to public health and safety. Although there are concerns that legalization will increase the prevalence of cannabis use and DUIC among Canadians, mixed evidence from legalization experiences in the United States[1–4] makes it difficult to determine the long-term effects. Δ-9-Tetrahydrocannabinol, the main psychoactive component of cannabis, affects driving ability by impairing cognitive and psychomotor performance.[5,6] Although some studies have found a twofold increase in risk of a motor vehicle collision with recent cannabis use,[5,6] other studies have not found increased collision risk after adjustment for age, sex, race and blood alcohol concentration.[7–9] Nevertheless, cannabis remains the second most frequently detected drug in Canadians who are injured and killed in motor vehicle collisions.[10–14]

In a 2012 survey, over 2% of Canadian drivers reported DUIC in the past 30 days.[15] In 2012, DUIC was most prevalent among Canadians aged 18–19 years, followed by those aged 15–17 years.[16,17] Many Canadian youth also report riding with a cannabis-impaired driver (RWCD). In a national survey conducted in 2014–2015, 20% of high school students reported ever RWCD.[18] Although male students and students living in rural areas are more likely to report DUIC,[18–22] there are few data concerning cannabis-related passenger behaviour among students.

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Many youth perceive that cannabis has limited effects on driving.[23,24] Psychological models theorize that demographic characteristics, sociopsychological factors (e.g., autonomy) and prior exposure to a condition influence risk perception.[25–27] Youth perceptions of the risk of cannabis use and DUIC may also be influenced by cognitive factors, including comparative optimism bias,[28] which is a cognition that leads people to estimate their own risk of a negative event as being lower than that of others.[29] Few studies have explored risk perception's role in DUIC and RWCD among youth.[30–33]

Our primary objective was to examine associations of perceived risk of regular cannabis use with DUIC and RWCD among high school students in Canada before legalization. We aimed to determine whether these associations were dose-related, with greater perceived risk associated with reduced risk of DUIC and RWCD, and whether these associations differed by sex and rural setting.

Methods

Study design

We examined cross-sectional survey data collected through the Canadian Student Tobacco, Alcohol and Drugs Survey, a biennial school-based survey administered to students across Canada.[34] The survey was conducted by the University of Waterloo (Propel Centre for Population Health Impact) on behalf of Health Canada. The survey used a stratified single-stage cluster design. Strata were based on health region rate of cigarette smoking and school type. Schools were randomly selected from strata, and all eligible students within selected schools were surveyed. This sampling design was not used in Quebec because the 2016–2017 survey was conducted in partnership with the Quebec Health Survey of High School Students. Information on Quebec's sampling strategy is found in the survey's publicly available microdata file.[34]

Each provincial study lead hired a research coordinator to execute the survey at the school board, school and student level. Research coordinators received standardized training by Propel Centre staff at the University of Waterloo and were supported throughout the study by staff and online resources. Following school board requirements, parental permission for their child to participate in the survey was obtained via either active parent permission or active information–passive permission protocols. Permission was also obtained from students, and students could opt out at any time. Students completed the survey during class time. The survey included questions on topics related to substance use and general health and well-being, and it was available in English and French (www.canada.ca/en/health-canada/services/canadian-student-tobacco-alcohol-drugs-survey.html).

Setting and participants

The survey was administered between October 2016 and June 2017 in private and public schools attended by students in grades 7–12 (secondary I–V in Quebec) across 9 Canadian provinces. Schools in New Brunswick (which declined to participate) and the 3 territories (Northwest Territories, Nunavut and Yukon) were not included.

Given that Canadian adolescents cannot operate motor vehicles without adult supervision before 16 or 17 years of age, our study included only students in grades 11 and 12 (secondary V in Quebec).

Outcome variables

DUIC was determined from responses to this question: "Have you driven a vehicle (e.g., car, snowmobile, motorboat or all-terrain vehicle) within 2 hours of using marijuana or cannabis?" Response options were "No, never," "Yes, in the last 30 days" and "Yes, more than 30 days ago." DUIC was coded 0 for "No, never," 1 for "Yes, in the last 30 days" and 2 for "Yes, more than 30 days ago."

RWCD was determined from responses to this question: "Have you ever been a passenger in a vehicle (e.g., car, snowmobile, motorboat or all-terrain vehicle) driven by someone who had been using marijuana or cannabis in the last 2 hours?" Response options were "No, never," "Yes, in the last 30 days," "Yes, more than 30 days ago" and "I do not know." To avoid having more than 3 categories, we coded RWCD 0 for "No, never" and "I do not know," 1 for "Yes, in the last 30 days" and 2 for "Yes, more than 30 days ago."

Independent variable

Perceived risk of regular cannabis use was assessed by asking "How much do you think people risk harming themselves when they smoke marijuana or cannabis on a regular basis?" Response options were "No risk," "Slight risk," "Moderate risk," "Great risk" and "I do not know." The variable was coded 0 for "No risk" (the reference), 1 for "Slight risk," 2 for "Moderate risk," 3 for "Great risk" and 4 for "I do not know" and not stated.

Covariates

Covariates included respondents' sex (male or female), school grade, rural setting, province of residence and autonomy. School grade served as a proxy for age (Health Canada did not permit an age measurement).

Rural setting was determined by assessing whether respondents' schools were in an urban or rural location. Urban and rural categories were determined from school postal codes that were based on Statistics Canada's Statistical Area Classification system. Province of residence was coded 0 for Ontario (the reference); numbers between 1 and 8 were assigned to the remaining provinces.

Autonomy was measured using 6 items to capture students' overall autonomy in the past week (e.g., "I feel free to express myself at home"). The scale's Cronbach α was 0.95. Response options for the 6 items were "Really false for me," "Sort of false for me," "Sort of true for me," and "Really true for me." An autonomy scale (scored from 0 [least autonomy] to 3 [most autonomy]) was created for each of the items, with a total score ranging from 0 (lowest autonomy) to 18 (highest autonomy). The autonomy score was divided into quartiles: high (the reference), moderate, low and very low.

Statistical analysis

Survey weights were used to adjust for sample selection at the school and grade level and nonresponse at the school, grade and student level. Survey weights were also used to derive meaningful population estimates from the survey sample in terms of the grade and sex distribution of the total population. Bootstrap weights were used to calculate confidence intervals (CIs) of prevalence estimates in regression analyses, to account for the effects of the survey design on variance estimates and to estimate sampling error more precisely.

Multinomial logistic regression was used to examine associations between perceived risk of regular cannabis use and cannabis-related driving behaviours. To determine whether associations differed by sex and rural setting, multinomial logistic regression was employed, with 2 stages of testing. In the first stage, effect modification was tested using a sex by perceptions interaction term (and a rural setting by perceptions term) to determine if we should proceed with stratification (stage 2) by sex or rural setting or both.

To test the robustness of the main findings, we performed a sensitivity analysis that tested the association between perceived risk and DUIC separately for grade 11 and 12 students who had used cannabis at least once in the past year. Participants with missing data were omitted using listwise deletion because fewer than 5% of data were missing for each outcome (range from 2% [RWCD] to 3% [DUIC]). All multinomial logistic regression analyses were performed using Stata/IC 15.0.

Ethics approval

Ethics approval for the survey was obtained from the University of Waterloo Office of Research Ethics, the Health Canada Research Ethics Board, the ethics review boards of the affiliated provincial institutions, and school board ethics review committees.

Results

In total, 52 103 students in grades 7–12 (secondary I–V in Quebec), from 117 school boards and 699 schools, participated in the survey. The survey response rate was 76.2% (n = 52 103/68 415). In total, 14 520 students in grades 11 and 12 participated in the survey and were included in our analyses. Nearly 10% (n = 14 520) of the respondents reported DUIC in their lifetime, and over 20% (n = 14 520) reported RWCD (Table 1). In total, 40.7% of respondents (n = 14 520) perceived great risk associated with regular cannabis use; 11.9% (n = 14 520) perceived no risk (Table 1). After we accounted for missing data, the sample was reduced to 14 147 students for analyses of DUIC and to 14 170 students for analyses of RWCD.

Driving under the influence of cannabis

Table 2 presents unadjusted and adjusted results of a multinomial logistic regression model of DUIC by perceived risk of regular cannabis use among grade 11 and 12 students, including results for covariates. Adjusted results showed a dose–response pattern, with greater perceived risk of regular cannabis use associated with a reduced risk of DUIC. Students perceiving that regular cannabis use posed great risk had an adjusted relative risk (RR) 0.06 (95% CI 0.04–0.10) of DUIC in the past 30 days and an adjusted RR of 0.11 (95% CI 0.08–0.15) of DUIC more than 30 days ago compared with students perceiving no risk. Adjusted estimates also indicated that male students (DUIC in past 30 days: adjusted RR 1.74, 95% CI 1.25–2.41; DUIC more than 30 days ago: adjusted RR 1.50, 95% CI 1.17–1.93) and grade 12 students (DUIC in past 30 days: adjusted RR 1.91, 95% CI 1.51–2.42; DUIC more than 30 days ago: adjusted RR 1.83, 95% CI 1.42–2.36) had an increased risk of DUIC compared with female students and grade 11 students.

After adjustment, rural students had a significantly increased risk of DUIC in the past 30 days (adjusted RR 1.70, 95% CI 1.30–2.24) but not more than 30 days ago (adjusted RR 1.24, 95% CI 0.90–1.71), compared with urban students. Some provincial variation in DUIC was observed. Adjusted results showed that students with very low autonomy scores had an increased risk of DUIC more than 30 days ago (adjusted RR 1.37, 95% CI 1.02–1.84). A sensitivity analysis demonstrated the same trend as the main analysis, but with less robust effect sizes. The unadjusted and adjusted results of the main analysis were consistent.

Riding with a cannabis-impaired driver

Table 3 displays unadjusted and adjusted results of a multinomial logistic regression model of RWCD by perceived risk of regular cannabis use among grade 11 and 12 students, along with results for covariates. Adjusted estimates showed a dose–response pattern, with greater perceived risk of regular cannabis use being significantly associated with a reduced risk of RWCD. Students perceiving that regular cannabis use posed great risk had an adjusted RR of 0.09 (95% CI 0.07–0.12) of RWCD in the past 30 days and an adjusted RR of 0.24 (95% CI 0.19–0.29) of RWCD more than 30 days ago compared with students perceiving no risk. The adjusted results showed that compared with female students, male students had a significantly reduced risk of RWCD more than 30 days ago (adjusted RR 0.77, 95% CI 0.63–0.94) but not in the last 30 days (adjusted RR 0.90, 95% CI 0.74–1.10). Adjusted estimates also indicated that grade 12 students had an increased risk of RWCD (RWCD in past 30 days: adjusted RR 1.49, 95% CI 1.17–1.89; RWCD more than 30 days ago: adjusted RR 1.60, 95% CI 1.37–1.85) compared with grade 11 students.

Rural students had a significantly increased risk of RWCD in the past 30 days (adjusted RR 1.34, 95% CI 1.05–1.72) but not more than 30 days ago (adjusted RR 1.17, 95% CI 0.86–1.60) relative to urban students. Some provincial variation in RWCD was observed. Results for self-reported autonomy were not significant. The unadjusted and adjusted results presented in Table 3 were generally consistent.

Interaction models for DUIC and RWCD by sex and by rural setting were tested but were not significant (Appendix 1, available at www.cmajopen.ca/content/8/4/E754/suppl/DC1).

Table 1: Sociodemographic and other characteristics of Canadian grade 11 and 12 students who participated in the 2016–2017 Canadian Student Tobacco, Alcohol and Drugs Survey

Variable	No. of respondents *n* = 14 520	Weighted % (95% CI)
Sex		
Female	7262	48.9 (48.1–49.7)
Male	7258	51.1 (50.3–51.9)
School grade		
11	8257	51.2 (50.4–52.0)
12	6263	48.8 (48.0–49.6)
Rural setting		
No	10 799	82.6 (82.0–83.2)
Yes	3721	17.4 (16.8–18.0)
Province		
Ontario	3557	51.8 (51.0–52.6)
Quebec	675	9.6 (9.1–10.1)
British Columbia	1929	14.0 (13.4–14.6)
Alberta	2590	12.0 (11.5–12.5)
Saskatchewan	802	3.5 (3.2–3.8)
Manitoba	983	4.5 (4.2–4.8)
Nova Scotia	1070	2.8 (2.5–3.1)
Prince Edward Island	1133	0.4 (0.3–0.5)
Newfoundland and Labrador	1781	1.4 (1.2–1.6)
Square transformation of autonomy score		
High	2565	18.3 (17.7–19.0)
Moderate	3895	28.5 (27.8–29.3)
Low	3373	23.2 (22.5–23.9)
Very low	4687	30.0 (29.2–30.7)
Perceived risk of regular cannabis use		
No risk	2092	11.9 (11.4–12.4)
Slight risk	2454	15.6 (15.0–16.2)
Moderate risk	3488	24.9 (24.2–25.6)
Great risk	5245	40.7 (39.9–41.5)
Don't know or not stated	1241	6.9 (6.5–7.3)
DUIC		
No, never	12 480	88.9 (88.4–89.4)
Yes, in the last 30 days	907	4.9 (4.6–5.3)
Yes, more than 30 days ago	760	3.9 (3.6–4.2)
Missing	373	2.3 (2.1–2.6)
RWCD		
No, never	10 137	74.8 (74.1–75.5)
Yes, in the last 30 days	2008	11.6 (11.1,12.1)
Yes, more than 30 days ago	2025	11.5 (11.0–12.0)
Missing	350	2.1 (1.9–2.3)

Note: CI = confidence interval, DUIC = driving under the influence of cannabis, RWCD = riding with a cannabis-impaired driver.

Table 2: Multinomial logistic regression of driving under the influence of cannabis among Canadian students in grades 11 and 12 who participated in the 2016–2017 Canadian Student Tobacco, Alcohol and Drugs Survey

Variable	Respondents who reported DUIC *n* = 14 147		RR (95% CI)		Adjusted RR* (95% CI)	
	No.	Weighted %†	DUIC in past 30 days v. never	DUIC more than 30 days ago v. never	DUIC in past 30 days v. never	DUIC more than 30 days ago v. never
Perceived risk of regular cannabis use						
No risk (reference)	2061	12.1	1.00	1.00	1.00	1.00
Slight risk	2430	15.7	0.54 (0.39–0.75)	0.65 (0.49–0.85)	0.56 (0.39–0.80)	0.67 (0.51–0.88)
Moderate risk	3458	25.3	0.17 (0.13–0.22)	0.30 (0.23–0.39)	0.19 (0.14–0.27)	0.34 (0.26–0.44)
Great risk	5205	41.4	0.05 (0.03–0.08)	0.09 (0.06–0.12)	0.06 (0.04–0.10)	0.11 (0.08–0.15)
Don't know or not stated	993	5.5	NA	NA	NA	NA
Sex						
Female (reference)	7126	49.2	1.00	1.00	1.00	1.00
Male	7021	50.8	2.17 (1.56–3.02)	1.80 (1.39–2.33)	1.74 (1.25–2.41)	1.50 (1.17–1.93)
School grade						
11 (reference)	8043	51.2	1.00	1.00	1.00	1.00
12	6104	48.8	1.91 (1.48–2.47)	1.86 (1.44–2.39)	1.91 (1.51–2.42)	1.83 (1.42–2.36)
Rural setting						
No (reference)	10 516	82.6	1.00	1.00	1.00	1.00
Yes	3631	17.4	2.17 (1.59–2.95)	1.72 (1.12–2.65)	1.70 (1.30–2.24)	1.24 (0.90–1.71)
Province						
Ontario (reference)	3475	51.7	1.00	1.00	1.00	1.00
Quebec	670	9.8	0.66 (0.34–1.30)	0.72 (0.37–1.40)	1.59 (0.81–3.13)	1.50 (0.78–2.89)
British Columbia	1882	14.0	1.36 (0.78–2.37)	1.58 (0.86–2.89)	1.25 (0.72–2.17)	1.51 (0.81–2.84)
Alberta	2533	12.0	1.70 (1.12–2.57)	2.16 (1.32–3.53)	1.37 (0.99–1.91)	1.90 (1.23–2.95)
Saskatchewan	788	3.5	3.08 (1.94–4.88)	3.55 (2.19–5.74)	2.10 (1.34–3.29)	2.91 (1.82–4.67)
Manitoba	962	4.5	1.47 (0.94–2.31)	2.32 (1.41–3.81)	1.04 (0.74–1.47)	1.88 (1.20–2.96)
Nova Scotia	1033	2.7	3.39 (2.41–4.77)	3.61 (2.32–5.60)	2.59 (1.88–3.58)	2.89 (1.90–4.39)
Prince Edward Island	1103	0.4	2.13 (1.29–3.51)	2.44 (1.50–3.97)	1.44 (1.07–1.93)	2.02 (1.23–3.31)
Newfoundland and Labrador	1701	1.4	2.28 (1.39–3.74)	2.67 (1.71–4.16)	1.82 (1.14–2.89)	2.22 (1.45–3.43)
Square transformation of autonomy score						
High (reference)	2536	18.4	1.00	1.00	1.00	1.00
Moderate	3864	29.0	1.09 (0.75–1.58)	1.15 (0.87–1.52)	0.99 (0.69–1.43)	1.05 (0.78–1.40)
Low	3317	23.4	1.05 (0.72–1.54)	1.44 (1.04–2.01)	0.87 (0.58–1.30)	1.21 (0.88–1.68)
Very low	4430	29.2	1.91 (1.27–2.87)	1.76 (1.30–2.39)	1.39 (0.90–2.14)	1.37 (1.02–1.84)§
F statistic					$F(36–464) = 48.13$, $p < 0.001$	

Note: CI = confidence interval, DUIC = driving under the influence of cannabis, NA = not applicable, RR = relative risk.
*Adjusted for perceived risk of regular cannabis use, sex, school grade, rural setting, province and square transformation of autonomy score.
†The weighted prevalence estimates are based on 14 147 cases.

Interpretation

Adjusted results showed that greater perceived risk of regular cannabis use was associated with reduced risk of DUIC and RWCD in a dose–response manner. These findings replicate results from recent empirical studies examining cognitive risk factors for driving after cannabis use among youth.[31–33] No evidence of effect modification by sex or rural setting was observed. Associations were found to be significantly protective for both sexes, and for urban and rural students.

Table 3: Multinomial logistic regression of riding with a cannabis-impaired driver among Canadian students in grades 11 and 12 who participated in the 2016–2017 Canadian Student Tobacco, Alcohol and Drugs Survey

	Respondents who reported RWCD *n* = 14 170		RR (95% CI)		Adjusted RR* (95% CI)	
Variable	No.	Weighted %†	RWCD in past 30 days v. never	RWCD more than 30 days ago v. never	RWCD in past 30 days v. never	RWCD more than 30 days ago v. never
Perceived risk of regular cannabis use						
No risk (reference)	2066	12.0	1.00	1.00	1.00	1.00
Slight risk	2436	15.8	0.55 (0.45–0.68)	0.84 (0.66–1.06)	0.57 (0.46–0.69)	0.87 (0.69–1.10)
Moderate risk	3463	25.3	0.28 (0.23–0.34)	0.51 (0.41–0.64)	0.28 (0.23–0.35)	0.52 (0.42–0.65)
Great risk	5206	41.3	0.08 (0.06–0.11)	0.22 (0.18–0.28)	0.09 (0.07–0.12)	0.24 (0.19–0.29)
Don't know or not stated	999	5.6	NA	NA	NA	NA
Sex						
Female (reference)	7143	49.4	1.00	1.00	1.00	1.00
Male	7027	50.6	1.18 (0.98–1.44)	0.92 (0.77–1.10)	0.90 (0.74–1.10)	0.77 (0.63–0.94)
School grade						
11 (reference)	8062	51.2	1.00	1.00	1.00	1.00
12	6108	48.8	1.46 (1.16–1.85)	1.51 (1.31–1.73)	1.49 (1.17–1.89)	1.60 (1.37–1.85)
Rural setting						
No (reference)	10 538	82.6	1.00	1.00	1.00	1.00
Yes	3632	17.4	1.62 (1.22–2.15)	1.51 (1.05–2.17)	1.34 (1.05–1.72)	1.17 (0.86–1.60)
Province						
Ontario (reference)	3480	51.8	1.00	1.00	1.00	1.00
Quebec	672	9.7	1.01 (0.66–1.54)	1.22 (0.88–1.68)	1.90 (1.19–3.04)	2.04 (1.45–2.86)
British Columbia	1874	13.9	1.36 (0.91–2.04)	1.25 (0.84–1.86)	1.31 (0.89–1.93)	1.26 (0.84–1.91)
Alberta	2541	12.0	1.53 (1.06–2.21)	2.19 (1.48–3.23)	1.32 (0.98–1.76)	2.07 (1.44–2.98)
Saskatchewan	788	3.5	1.87 (1.10–3.18)	2.74 (1.86–4.02)	1.45 (0.82–2.57)	2.48 (1.56–3.96)
Manitoba	963	4.5	1.55 (1.06–2.26)	1.56 (1.15–2.12)	1.21 (0.85–1.73)	1.40 (1.04–1.88)
Nova Scotia	1043	2.8	3.52 (2.66–4.67)	3.27 (2.54–4.20)	2.77 (2.15–3.56)	2.88 (2.24–3.71)
Prince Edward Island	1107	0.4	1.86 (1.26–2.77)	2.10 (1.62–2.72)	1.49 (1.10–2.01)	1.93 (1.40–2.67)
Newfoundland and Labrador	1702	1.4	2.24 (1.69–2.96)	2.28 (1.73–3.00)	1.86 (1.41–2.44)	2.09 (1.57–2.78)
Square transformation of autonomy score						
High (reference)	2545	18.6	1.00	1.00	1.00	1.00
Moderate	3870	29.0	1.06 (0.78–1.44)	1.33 (1.03–1.72)	0.95 (0.68–1.31)	1.22 (0.93–1.60)
Low	3331	23.4	1.43 (1.03–1.99)	1.24 (0.88–1.73)	1.25 (0.87–1.79)	1.14 (0.82–1.58)
Very low	4424	29.0	1.50 (1.14–1.98)	1.53 (1.18–2.00)	1.15 (0.86–1.53)	1.32 (0.97–1.79)
F statistic					$F(36–464) = 39.27$, $p < 0.001$	

Note: CI = confidence interval, NA = not applicable, RR = relative risk, RWCD = riding with a cannabis-impaired driver.
*Adjusted for perceived risk of regular cannabis use, sex, school grade, rural setting, province and square transformation of autonomy score.
†The weighted prevalence estimates are based on 14 170 cases.

Heightening the risk perceptions of students who perceive that regular cannabis use poses no risk at all may help reduce both DUIC and RWCD after legalization. This assumes that increasing perceptions of risk will engender behaviour change. This assumption is central to various health psychology models including the Health Belief Model[25] and is supported by research.[35] Education is considered the best practice for changing youth perceptions of the risk of cannabis. In January

2015, the Colorado Department of Public Health and Environment launched the Good to Know campaign to educate Colorado residents and visitors about responsible cannabis use.[36] Early evaluations showed that after the launch of the campaign, risk perceptions of cannabis use increased significantly, and understanding of the risks of DUIC increased by 23%.[36] Social marketing campaigns targeting youth at risk of DUIC or RWCD may also heighten risk perceptions and decrease the prevalence of both behaviours after legalization. However, a single initiative such as this will not be most effective. Instead, a multipronged approach akin to those leading to reductions in drinking and driving is needed — a combination of public health policy and regulation, education, social marketing and effective enforcement approaches.[37,38] Allocating a share of Canada's cannabis tax revenues to fund public education and social marketing campaigns highlighting the risks of DUIC may be cost effective in achieving this goal.

This study examined associations with perceived risk of regular cannabis use and DUIC and RWCD before legalization of cannabis in Canada. Future work should aim to determine whether legalization has an effect on these associations.

Limitations

This study has limitations. First, data were cross-sectional and therefore a cause-and-effect relationship between risk perception and cannabis-related driving behaviours cannot be inferred. Although we showed that risk perceptions and risky driving are associated, we cannot assess whether changing an individual's attitude toward risk would reduce engagement in DUIC or RWCD. Second, data collected during this brief period may not reflect the patterns of cannabis-related driving and passenger behaviours after legalization in Canada. Third, cannabis-related driving behaviours were self-reported and it is probable that there was under- and over-reporting because of social desirability bias.[39,40] The degree of misreporting is not clear, nor is it clear whether misreporting was related to risk perceptions. Fourth, our risk perception measure focused on perception of the risk of cannabis use rather than of DUIC and RWCD. Finally, because our study was school-based (and thus home-schooled and absent students did not participate), and because New Brunswick and the 3 territories were excluded, the results may not be generalizable to all Canadian students.

Conclusion

This study indicates that perceptions of risk matter for young people: greater perceived risk of cannabis use was associated with reduced risk of cannabis-related driving and passenger behaviour in a dose–response manner. Given these associations, school and community efforts are required to disseminate appropriate information regarding cannabis use and cannabis-related driving risks to high school students.

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Data sharing: The data that support the findings of this study are available from the following resources available in the public domain: Health Canada and the Propel Centre for Population Health Impact at the University of Waterloo.

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