Risk Perceptions Associated with Driving Under the Influence of Cannabis:

Examining Differences between Medical and Non-Medical Cannabis Users

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camh

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Perception of Risk and Health Behaviour Change: Road Safety

Perceived Risk of:

- Injury
- Apprehension by law enforcement

- Use of seat belts ⇧
- Distracted driving ⇩
- Driving after drinking ⇩

CHAUDHARY et al. The relationship between perceived risk of being ticketed and self-reported seat belt use. J Safety Res, 35, 383-390, 2004. **WEINSTEIN et al.** Increasing automobile seat belt use: An intervention emphasizing risk susceptibility. J Appl Psychol, 71(2), 285-290, 1986. **DIONNE et al.** Predicted risk perception and risk-taking behavior: The case of impaired driving. J Risk Uncertainty, 35, 237-264, 2007. **NGUYEN-PHUOC et al.** Mobile phone use among car drivers and motorcycle riders: The effect of problematic mobile phone use, attitudes, beliefs and perceived risk. Accident Anal Prev, 143, 105592, 2020.

Perception of Risk and Driving Under the Influence of Cannabis (DUIC)

Perceptions:

DUIC is risky/dangerous → DUIC ⇩

Less consistent

- Likelihood of enforcement
- Knowledge of legislation

ARTERBERRY et al. Empirical profiles of alcohol and marijuana use, drugged driving, and risk perceptions. J Stud Alcohol Drugs, 78, 889–898, 2017. **DAVIS, et al.** Correlates of marijuana drugged driving and openness to driving while high: evidence from Colorado and Washington. PLoS One 11, e0146853, 2016. **MCDONALD et al.** Driving under the influence of cannabis risk perceptions and behaviour: A population-based study in Ontario, Canada. Prev Med, 153, 106793, 2021.

Perception of Risk and DUIC: McDonald et al. 2021

DUIC Risk Statements

- Driving under the influence of cannabis increases the risk of being involved in a motor vehicle collision (MVC);
- It is safer to drive under the influence of cannabis than under the influence of alcohol, and
- The chances of getting caught by police for drinking and driving are higher than for using cannabis and driving.

MCDONALD et al. Driving under the influence of cannabis risk perceptions and behaviour: A population-based study in Ontario, Canada. Prev Med, 153, 106793, 2021.

Perception of Risk and DUIC: McDonald et al. 2021

Disagree that DUIC increases motor vehicle collision (MVC) risk

Agree that DUIC is safer than driving under influence of alcohol (DUIA)

Agree that risk of being caught by police for DUIA is higher than for DUIC

→ DUIC ↑

MCDONALD et al. Driving under the influence of cannabis risk perceptions and behaviour: A population-based study in Ontario, Canada. Prev Med, 153, 106793, 2021.

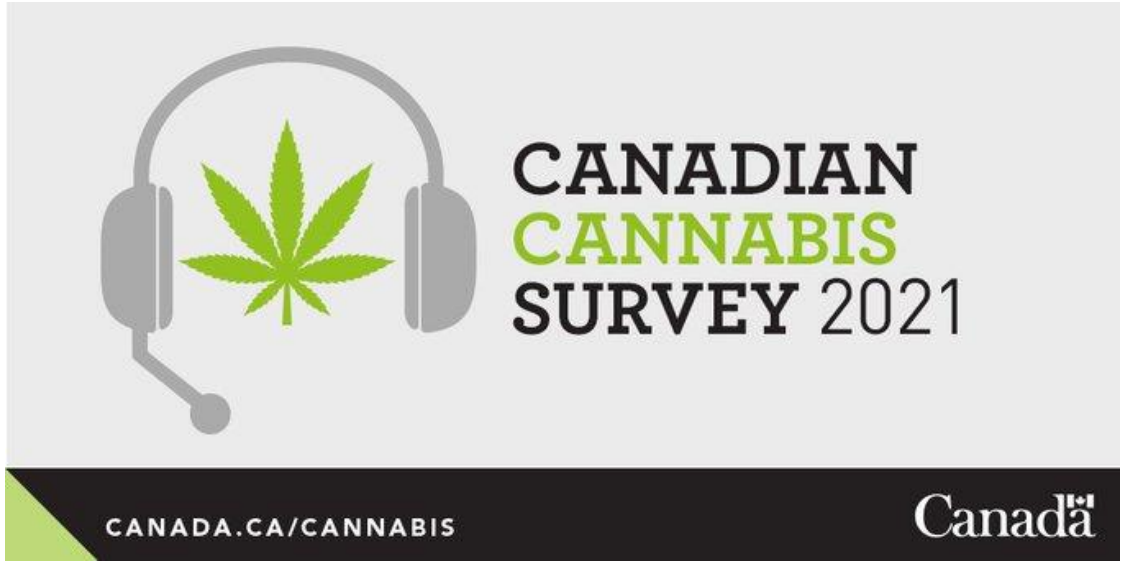
Driver Education and Public Awareness Campaigns

- Interventions must be:
  - Targeted at the appropriate audience
  - With the most relevant content
  - With the most convincing type of appeal

Non-medical (Recreational) and Medical Cannabis Use

2021 Canadian Cannabis Survey

- 25% of Canadians aged 16+ years used cannabis for non-medical (i.e., recreational) purposes in past 12 months
- 14% used cannabis for medical purposes in past 12 months



Recreational-only and Medical Cannabis Use

Relative to recreational-only users, medical cannabis users:

- Older
- Lower income
- Poorer health and mental health
- More frequent use of and problems with cannabis
- Less use of and problems with alcohol
- Less use of combustion and vaporization and more use of ingestion and topicals for cannabis administration

Correlates of DUIC:

- Poorer health and mental health
- More frequent use of and problems with cannabis

CHOI et al. Nonmedical versus medical marijuana use among three age groups of adults: Associations with mental and physical health status. Am J Addiction, 26, 697-706, 2017. **GOULET-STOCK et al.** Comparing medical and recreational cannabis users on socio-demographic, substance and medication use, and health and disability characteristics. Eur Addict Res, 23, 129-135, 2017. **LIN et al.** Comparing adults who use cannabis medically with those who use recreationally: Results from a national sample. Addict Behav, 61, 99-103, 2016. **TURNA et al.** Overlapping patterns of recreational and medical cannabis use in a large community sample of cannabis users. Compr Psychiat, 102, 152188, 2020. **HAMILTON et al.** Therapeutic use of cannabis: Prevalence and characteristics among adults in Ontario, Canada. C J Public Health, 10(3), e282-e287, 2017. **LANKENAU et al.** Health conditions and motivations for marijuana use among young adult medical marijuana patients and non-patient marijuana users. Drug Alcohol Rev, 37, 237-246, 2018. **ROTERMANN & PAGÉ.** Prevalence and correlates of non-medical only compared to self-defined medical and non-medical cannabis use, Canada, 2015. Health Reports 29(7), 3-13, Statistics Canada, Catalogue no. 82-003-X, 2018 **ROY-BYRNE et al.** Are medical marijuana users different from recreational users? The view from primary care. Am J Addiction, 24, 599-606, 2015. **SUBBARAMAN & KERR.** Alcohol use and risk of related problems among cannabis users is lower among those with medical cannabis recommendations, though not due to health. J Stud Alcohol Drugs, 79, 935-942, 2018. **WARDELL et al.** Prevalence and correlates of medicinal cannabis use among adolescents. J Adolescent Health, 68, 103-109, 2021. **SHI, Y.** Heterogeneities in administration methods among cannabis users by use purpose and state legalization status: findings from a nationally representative survey in the United States, 2020. Addiction, 116, 1782-1793, 2021. **ASBRIDGE et al.** Motor vehicle collision risk and driving under the influence of cannabis: Evidence from adolescents in Atlantic Canada. Accident Anal Prev, 37, 1025-1034, 2005. **SALAS-WRIGHT et al.** Prevalence and correlates of driving under the influence of cannabis in the U.S. Am J Prev Med, 60(6), e251-e260.

DUIC Risk Perceptions in Recreational, Medical and Dual-Purpose Cannabis Users

Cuttler et al. 2018

- Online survey of cannabis users in U.S. aged 16+ years
- Compared participants who reported using cannabis for recreational, medical, or both reasons
- No difference in % of participants who believed DUIC is safe

Wardell et al. 2021

- Examined data from a population-based study of secondary school students (grades 9-12) in classrooms across Ontario, Canada
- Compared recreational-only cannabis users with medical or dual-purpose users.
- Medical or dual-purpose users of cannabis perceived use of the drug as less harmful than did non-medical users.

CUTTLER et al. Driving under the influence of cannabis: An examination of driving beliefs and practices of medical and recreational cannabis users across the United States. Cannabis 1(2), 1-13, 2018. **WARDELL et al.** Prevalence and correlates of medicinal cannabis use among adolescents. J Adolescent Health, 68, 103-109, 2021.

Purpose

To explore perceived risk of DUIC among non-medical versus medical or dual-purpose cannabis users.

Sample

- 2017 cycle of CAMH Monitor
- Respondents who reported past-year use of cannabis and answered questions regarding DUIC risk perceptions (included in only one of two panels) were selected (unweighted n=259; weighted n=343).
- A repeated cross-sectional telephone survey of Ontario adults aged 18 years and older.
- Employs random-digit-dialling methods via Computer Assisted Telephone Interviewing, by which it accesses landline and cellular telephones, including newly listed and unlisted numbers.
- Uses regional stratification and consists of independent quarterly samples of approximately 750 completions each.
- The response rate was 35%.

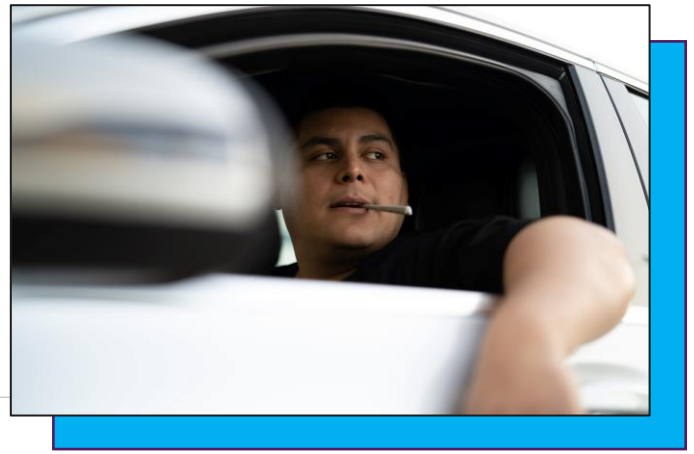
Outcome Variables: DUIC Risk Perceptions

(1) "Driving under the influence of cannabis increases the risk of being involved in MVC."

(2) "It is safer to drive under the influence of cannabis than under the influence of alcohol."

(3) "The chances of getting caught by police for drinking and driving are higher than for using cannabis and driving."

- Rate agreement on a 5-point scale (strongly disagree, disagree, don't know, agree, strongly agree).
- Responses were dichotomized to contrast high and low DUIC risk perception.
  - Statement 1: Strongly/somewhat disagree vs. strongly/somewhat agree or don't know
  - Statements 2 & 3: Strongly/somewhat agree vs. strongly/somewhat disagree or don't know



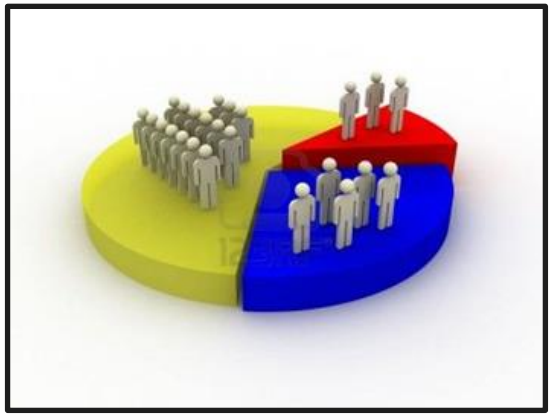
Primary Predictor Variable

- Purpose of Cannabis Use
  - “How often, if ever, have you used cannabis, marijuana or hash during the past 12 months?”
  - “In the past 12 months have you ever used cannabis, marijuana or hash to manage pain, nausea, glaucoma, the symptoms of multiple sclerosis, or any other medical condition?”
- Responses were combined and recoded to create two groups:
  - Non-medical/Recreational cannabis use only
  - Medical cannabis use or dual-purpose use
- A group of medical-only users could not be created due to limitations of the existing items in the CAMH Monitor.
  - Grouping medical-only with combined purpose cannabis users is common and consistent with the finding that recreational cannabis use is common among medical users

TURNA et al. Overlapping patterns of recreational and medical cannabis use in a large community sample of cannabis users. Compr Psychiat, 102, 152188, 2020. **MOREAN & LEDERMAN.** Prevalence and correlates of medical cannabis patients’ use of cannabis for recreational purposes. Addict Behav, 93, 233-239, 2019.

Covariates

- Sociodemographics
  - Sex (female, male)
  - Age (18-29 years, 30-39 years, 40-49 years, 50-64 years, 65+ years)
  - Education (less than high school, completed high school, some post-secondary, completed university)
  - Rurality (rural, non-rural)
- Past-year alcohol use frequency (never, less than monthly, monthly, weekly, daily)
- Past-year cannabis use frequency (dichotomized to less than weekly, at least weekly user)



Analyses

- We conducted three multivariable modified Poisson regression models.
- Using a directed acyclic graph, a minimal set of confounding variables to be adjusted for was identified and used in the final models.
- Individuals with missing data were excluded listwise.
- All percentages reported were based on the weighted sample size.
- Statistical tests corrected for the sampling design.
- All statistical analyses were conducted using SAS software, Version 9.4.

SPIEGELMAN & HERTZMARK. Easy SAS calculations for risk or prevalence ratios and differences. Am J Epidemiol, 162(3), 199-200, 2005. **SAS INSTITUTE INC.** SAS Software. Version 9.4. SAS Institute Inc, 2016.

Univariate Results

Cannabis Use:

- Recreational-only Cannabis Users: 62.3%
- Medical Cannabis Users: 37.7%

DUIC Risk Perceptions:

- Disagree that DUIC Increases Collision Risk: 14.9%
- Agree that DUIC Safer than DUIA: 55.1%
- Agree that Risk of Being Caught by Police for DUIA Higher than DUIC: 74.9%

Multivariable Modified Poisson Regression Models

	Disagree that DUIC Increases Collision Risk			Agree that DUIC Safer than DUIA			Agree that Risk of Being Caught by Police for DUIA Higher than DUIC		
	APR	95% CI		APR	95% CI		APR	95% CI	
Type of cannabis use									
Non-medical use only	Ref	-	-	Ref	-	-	Ref	-	-
Medical or dual-purpose	1.14	0.47	2.82	**1.45****	**1.10**	**1.91**	0.87	0.68	1.12

Notes: APR=Adjusted prevalence ratio; Ref=reference category; 95% CI=95% confidence interval.
Wald chi-square statistical significance: *p<0.05 **p<0.01 ***p<0.001.
All models were re-weighted.
Adjusted for sex, age, education, rurality, past-year alcohol and cannabis use frequency.

Discussion: DUIC Increases MVC Risk

- Majority (77.2%) agreed that DUIC increases MVC risk;
  - Suggests education and awareness campaigns successful in communicating driving-related impact of cannabis impairment.
- No significant difference between medical and non-medical cannabis users.
  - Further efforts may target cannabis users generally, regardless of user type.
- Future research might consider refining risk perception statement to assess one's *own* collision risk.
  - A recent interview study found cannabis users perceived an increase in MVC risk following others' cannabis use, particularly among less experienced users, but not following their own cannabis use.

WICKENS et al. Exploring perceptions among people who drive after cannabis use: Collision risk, comparative optimism, and normative influence. Drug Alcohol Rev, 38, 443-451, 2019.

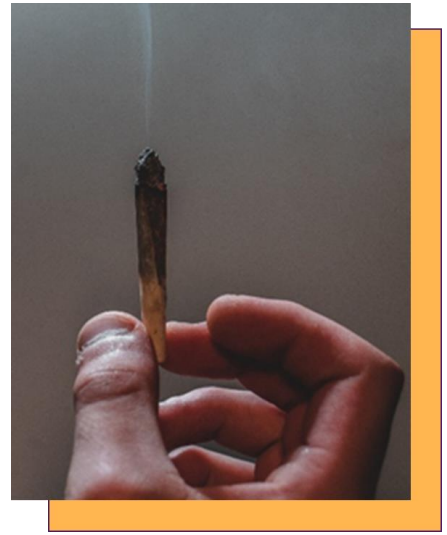
Discussion: DUIC is Safer than DUIA

- The increase in MVC risk following cannabis is not as severe as the increase in MVC risk after alcohol.
- Yet, only 55.1% of cannabis users correctly agreed that DUIC is safer than DUIA.
- McDonald et al. (2021) showed that those who correctly agree that DUIC is safer than DUIA are more likely to engage in DUIC.
- Here, we found that medical or dual-purpose users were more likely to agree that DUIC is safer than DUIA.
  - Consistent with our previous finding that medical or dual-purpose users are more likely to DUIC.

WETTLAUFER. et al. Estimating the harms and costs of cannabis-attributable collisions in the Canadian provinces. Drug Alcohol Depend, 173, 185–190, 2017. **MCDONALD et al.** Driving under the influence of cannabis risk perceptions and behaviour: A population-based study in Ontario, Canada. Prev Med, 153, 106793, 2021. **WICKENS et al.** Driving under the influence of cannabis among recreational and medical cannabis users: A population study. J Transport Health, in press.

Discussion: DUIC is Safer than DUIA

- The shift in public perception of DUIA as a high-risk and socially unacceptable behaviour was key in battle against DUIA.
- Thus, the following strategies could aid education and awareness campaigns to specifically target medical or dual-purpose users:
  - Emphasizing that like DUIA, DUIC is a high-risk behaviour.
  - Highlighting similarities in dangers of DUIA and DUIC (e.g., impaired lane control)
  - Stressing that effects of cannabis are similar to effects of low BAC



BERGER & MARELICH. Legal and social control of alcohol-impaired driving in California: 1983-1994. J Stud Alcohol, 58, 518–523, 1997. **ELDER et al.** Effectiveness of mass media campaigns for reducing drinking and driving and alcohol-involved crashes: a systematic review. Am J Prev Med, 27, 57–65, 2004. **YANOVITZKY & BENNETT.** Media attention, institutional response, and health behavior change. The case of drunk driving. Commun Res, 26, 429–53, 1999. **SIMMONS et al.** The effects of cannabis and alcohol on driving performance and driver behaviour: a systematic review and meta-analysis. Addiction, 2022 in press.

Discussion: Risk of Being Caught by Police for DUIA is Higher than DUIC

- 2019 CAMH Monitor: prevalence of past-year DUIA was 25% higher than DUIC.
- Canadian Police Stats: # of impaired driving incidents involving alcohol was 10 times higher than # involving drugs.
- Thus, police disproportionately apprehended drivers who engage in DUIA vs DUIC.
- Majority (74.9%) correctly agreed that the risk of being apprehended by police for DUIA is higher than DUIC.
- No significant difference between medical and non-medical users was found.

stop Drugged Driving

NIGATU et al. CAMH Monitor e-Report: Substance Use, Mental Health and Well-Being Among Ontario Adults, 1977–2019. Toronto, ON: Centre for Addiction and Mental Health, 2020. Available at: http://www.camh.ca/camh-monitor. **STATISTICS CANADA.** Juristat Article — Police-reported crime statistics in Canada, 2019. https://www150.statcan.gc.ca/n1/en/pub/85-002-x/2020001/article/000 10-eng.pdf?st=Kmr0GGwY, 2020.

Discussion: Risk of Being Caught by Police for DUIA is Higher than DUIC

- Breathalyzer technology revolutionized deterrence of DUIA, facilitating legislation and allowing for increased confidence that police could successfully detect and convict alcohol-impaired drivers.
- Although detection of THC in oral fluid or saliva is currently approved in Canada, it is not being extensively used. This may be due to:
  - Drivers' use of both alcohol and cannabis
  - High threshold for THC in oral fluid for roadside detection set by the CCC (25 ng/mL)
  - Time to obtain test results (3 to 12 min)
  - Cost of the technology and training to operate it
- Improved technology to detect DUIC and communication of this technology could augment deterrence and should be equally effective for medical and non-medical users.

WICKENS et al. Alcohol control measures in traffic. In P. Boyle, P. Boffetta, A.B. Lowenfels, H. Burns, O. Brawley, W. Zatonski, J. Rehm (Eds.), Alcohol: Science, policy and public health (pp. 378-388). United Kingdom: Oxford University Press, 2013. **CHAMBERLAIN & SOLOMON.** Canada's new federal drug-impaired driving provisions: Challenges in enforcement and prosecution. Proceedings of the 22nd International Council on Alcohol, Drugs and Traffic Safety Conference, Edmonton, Canada, 2019. Downloaded 6March2022 from https://vpp-seidl.de/ueberuns/t2019/content_117567/ICADTS_T2019_ConferenceProceedings.pdf #page=57. **MCDONALD et al.** Driving under the influence of cannabis risk perceptions and behaviour: A population-based study in Ontario, Canada. Prev Med, 153, 106793, 2021.

Limitations

- Analyses may have been underpowered
- Correlational self-report data, which cannot support cause-and-effect conclusions and may be subject to social desirability bias
- Could not analyze medical users separately from dual-purpose users
- Non-English speakers and individuals without telephone access (e.g., homeless, institutionalized) were excluded

Strengths

- Addressed the intersection of two understudied topics
- Based on population-level data with stratified random sampling
- Provides guidance for DUIC education and awareness campaigns
- Supports further research examining the strength of association between risk perceptions and DUIC by type of cannabis user

Thank you.

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