

Driving Under the Influence of Opioids in the Ontario Adult Population: Prevalence, Impact on Collision Risk, and Characterization of the Drivers



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Prescription Opioid Use in Canada

- Canada is the world's second largest per capita consumer of POs (e.g., morphine, oxycodone, fentanyl) (International Narcotics Control Board, 2016)
- Social policy changes and strong media coverage of the PO crisis in Canada appeared to reduce overall dispensing of potent POs from 2010 to 2013
- However, there was a continued increase in overall PO-related mortality (Fischer et al., 2015)
- In 2014, the overall number of prescriptions dispensed for opioids in Canada totaled approximately 21.7 million (Weeks & Howlett, 2016)



PO Use and Motor Vehicle Collision Risk

- In a California study, individuals diagnosed with an opioid substance use disorder had a risk of dying in a MVC 2.8 times higher than the general population (Callaghan et al., 2013)
- In a recent meta-analysis, use of opiates was found to be associated with:
 - nearly a five-fold increase in the odds of a property-damage only collision ($OR=4.76$)
 - nearly a two-fold increase in the odds of a crash involving an injury ($OR=1.91$) or a fatality ($OR=1.68$) (Elvik, 2013)



Estimating the Prevalence of Driving Under the Influence of Opioids

- **Toxicological Testing of Drivers Injured/Killed in a MVC:** have provided estimates of opioid-impaired driving ranging from 4% to 20% (Asbridge et al., 2015; Keller et al., 2009; Papadodima et al., 2008)
- **Roadside Surveys:** able to detect DUIO that does not result in MVC
 - Using urine, blood, or oral fluid sampling, have found opioid-positive results for up to 1.6% of drivers (Behrendorff & Steentoft, 2003; Beirness & Beasley, 2010; Dussault et al., 2000; Gjerde et al., 2008, 2013; Gómez-Talegón et al., 2012; Krüger et al., 1995)
- **Self-Report Surveys:** able to detect DUIO that does not result in MVC
 - Most surveys measure prevalence among selected populations (e.g., high rates of drug-impaired driving among illicit drug users)
 - BUT important for government policy and planning to examine prevalence of DUIO across the broader population

Rationale & Purpose

- Given:
 - Differences across jurisdictions in opioid prescribing practices, public drug plans, and negative opioid-related outcomes
 - That there has been a continued rise in PO-related mortality despite a reduction in the dispensing of potent POs
- It is important to examine trends in use and associated harms at the local, provincial, and federal levels to further our overall public health strategy



- Purpose:
 - Estimate the prevalence of DUIO in Ontario
 - Measure the hypothesized association between DUIO and MVC risk
 - Characterize drivers who engage in DUIO

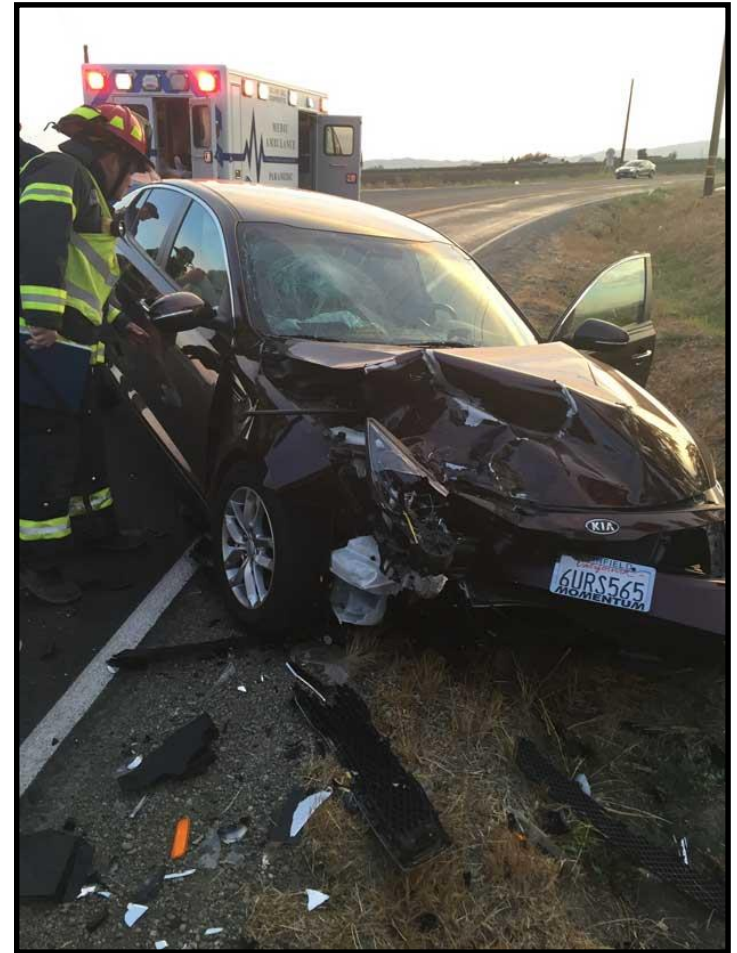
Sample: CAMH Monitor

- 2011-2015 cycles of CAMH Monitor
- 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.
- Each annual cycle consists of independent quarterly samples of approximately 750 completions each.
- Uses regional stratification
- The response rate varied from 41 to 51%
- Sample included responses from 7,876 respondents who reported having driven a vehicle in the past year



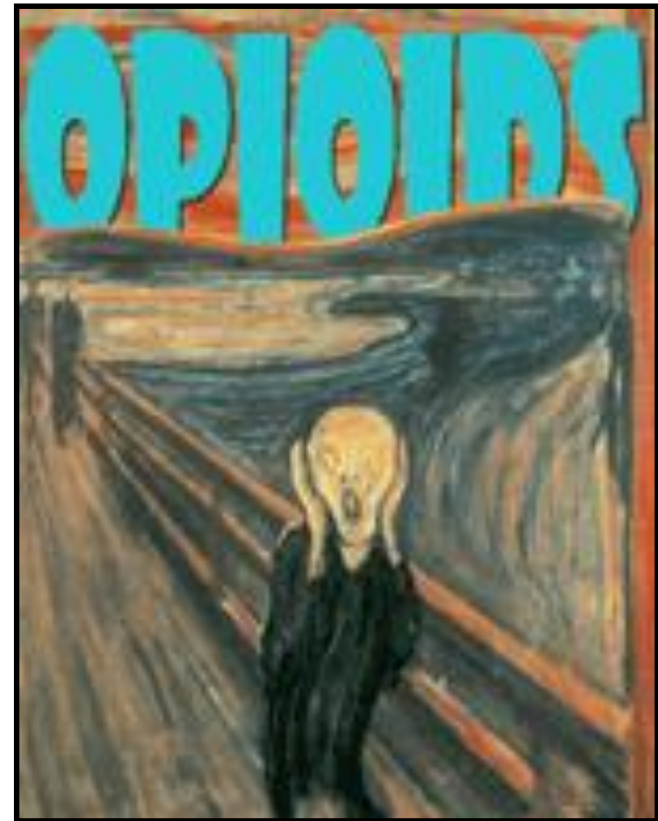
Outcome Variable

- Self-Reported Collision Involvement:
 - “During the past 12 months, how many times, if at all, were you involved in an accident or collision involving any kind of damage or injury to you or another person or vehicle while you were driving?” (coded no/yes)



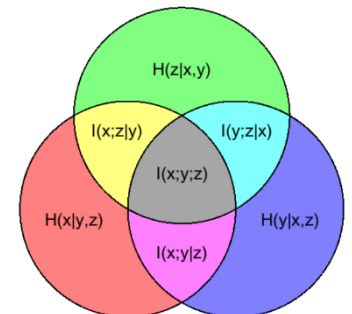
Key Predictor Variable: DUIO in Past Year

- Interviewers first asked respondents about their use of pain relievers obtained by a prescription from a doctor or dentist (e.g., Percocet, Percodan, Demerol, OxyContin, Tylenol #3, or other)
- Respondents were specifically instructed not to consider over the counter pain relievers that can be bought in drug or grocery stores without a doctor's prescription.
- Subsequently, participants were asked: "During the past 12 months, have you driven a motor vehicle after taking any prescription pain relievers in the previous hour?" (coded no, yes)



Covariates

- Demographics (sex, age, marital status, education, income, region of residence)
- Weekly driving distance
- Alcohol Use Disorders Identification Test (AUDIT) to measure hazardous or harmful drinking (coded no=score <8/yes=score of 8+)
- Driving after drinking: “During the past 12 months, have you driven a motor vehicle after having two or more drinks in the previous hour?” (coded no/yes)
- Poor mental health: “In general, would you say your overall mental health is excellent, very good, good, fair, or poor?” (coded good to excellent/poor or fair)



Analyses

- Design-based analyses were conducted using Taylor Series Linearization found in STATA13 software. Thus, all estimates and statistical tests were corrected for the sampling design.
- Item missing data (i.e., “don’t know” responses and refusals) were excluded listwise from all analyses.
- The weighted sample size was used when reporting percentages
 - The estimates are representative of the population surveyed.



Univariate Results

	n	Collision Involvement %Yes	95% CIs
TOTAL	7876	6.5	5.8, 7.3
DEMOGRAPHIC VARIABLES:			
Age		***	
18-34 years	913	8.3 ←	6.5, 10.6
35-54 years	2822	7.6	6.4, 8.9
55+ years	3989	3.9	3.3, 4.6
Marital Status		*	
Married/partner	5232	5.9	5.2, 6.8
Previously married	1573	6.4	4.8, 8.4
Never married	979	8.5 ←	6.5, 11.0
DRIVING EXPOSURE:			
Km driven-typical week (100s)		**	
Mean (SD) Collision ^a No	6652	2.81 (4.48)	2.68, 2.93
Collision ^a Yes	398	3.66 (4.77) ←	3.05, 4.28

- Prevalence of collision involvement: 6.5%
- Prevalence of driving within 1 h of using prescription pain relievers: 2.8%

Univariate Results

	n	Collision Involvement %Yes	95% CIs
DEMOGRAPHIC VARIABLES (cont'd):			
Education		<i>p</i> =.06	
< high school	787	3.6	2.4, 5.5
Completed high school	1643	5.6	4.3, 7.4
Some post-secondary	2814	6.8	5.6, 8.3
University degree	2538	7.1	6.0, 8.5
OTHER RISK FACTORS:			
Driving after Prescription Opioid Use		<i>p</i> =.05	
No	7579	6.3	5.6, 7.1
Yes	249	11.0	6.2, 18.7

- Collision involvement appeared to be more prevalent among those with a university degree and among drivers who reported driving after using POs,
 - BUT these findings only approached statistical significance.

Multivariate Results

	Collision Involvement	
	OR	95% CIs
DEMOGRAPHIC VARIABLES:		
Age (ref. = 18-34 years)	***	
35-54 years	.88	.59, 1.30
55+ years	.50*** ←	.33, .76
Education (ref. = < high school)	<i>p</i> =.07	
Completed high school	1.69	.93, 3.07
Some post-secondary	1.76*	1.01, 3.06
University degree	2.10** ←	1.21, 3.64
DRIVING EXPOSURE:		
Km driven-typical week (100s)	1.03** ←	1.01, 1.05
OTHER RISK FACTORS:		
Driving after prescription opioid use (ref = no)	2.22* ←	1.15, 4.28

- Adjusting for all other variables, respondents who reported driving after using prescription opioids faced significantly greater risk of MVC involvement.

Who Are These Drivers?

	n	%Yes	DUIO
			95% CIs
TOTAL	7876	2.8	2.4, 3.2
DEMOGRAPHIC VARIABLES:			
Sex		**	
Female	4526	2.2	1.8, 2.8
Male	3308	3.3	2.7, 4.1
Age		**	
18-34 years	906	1.3	0.7, 2.4
35-54 years	2812	3.4	2.7, 4.3
55+ years	3980	3.2	2.6, 3.9
Education		**	
< high school	782	4.8	3.1, 7.5
Completed high school	1635	3.2	2.2, 4.5
Some post-secondary	2809	3.0	2.3, 3.8
University degree	2529	2.0	1.5, 2.7

Who Are These Drivers?

	n	%Yes	DUIO 95% CIs
Income		***	
<\$30,000	671	4.9	3.1, 7.7
\$30,000-\$49,999	922	4.1	2.8, 5.8
\$50,000-\$79,999	1438	2.8	2.0, 3.8
\$80,000+	3049	3.0	2.4, 3.8
Don't know/refused to respond	1754	1.3	0.8, 2.2
Region		**	
Toronto	1129	1.3	0.8, 2.1
Central East	1326	2.9	2.0, 4.0
Central West	1347	3.4	2.4, 4.8
West	1346	3.8	2.8, 5.0
East	1339	2.5	1.8, 3.5
North	1347	3.2	2.3, 4.4

Who Are These Drivers?

	n	%Yes	DUIO 95% CIs
OTHER RISK FACTORS:			
Hazardous or Harmful Drinking			
		**	
AUDIT score < 8	6814	2.5	2.1, 3.0
AUDIT score ≥ 8	815	4.3	3.0, 6.1
Driving after Drinking			

No	7443	2.4	2.0, 2.8
Yes	383	9.0	6.1, 12.9
Poor Mental Health			

Good to excellent	7333	2.6	2.2, 3.0
Poor or fair	483	6.6	4.6, 9.4

Limitations

- Data are derived from a cross-sectional population survey; cause-and-effect conclusions cannot be drawn.
- Data were collected through self-report, which may have introduced bias:
 - Underreporting of problematic drinking or driving after drinking/PO use due to socially desirable responding
 - BUT surveys are recognized as a strong and necessary measure of the nature and extent of drug use in a population (Harrison, 1997)
- Telephone surveys are limited by the unavoidable exclusion of certain groups



Implications & Future Directions

- It is important that we understand precisely *how* opioids are impacting driver behaviour
 - Extensive analysis of potential mediators and moderators of opioid effects (e.g., type of opioid, formulation, dosage, tolerance effects)



Implications & Future Directions

- Results of these future studies will help to identify the most appropriate measure to reduce the impact of POs on roadway safety
 - **Instructions to patients to avoid driving**
 - For the full duration of time they are taking their PO, only until they are familiar with how the PO affects them, or until tolerance develops?
 - Instructions must be evidence-based; different POs may affect driving in different ways



Implications & Future Directions

– Public education campaigns

- Need to identify motivation for PO use most typically associated with DUIO
- E.g., Among students in Atlantic provinces, those who use POs for *both* medical and recreational purposes more likely to DUIO (Asbridge et al., 2015)



Implications & Future Directions

– Per Se Laws

- Strong interest in oral fluid testing and setting appropriate *per se* limits for drug-impaired driving
- A diversity of *per se* limits set for opioid medications across jurisdictions
- Need to better identify the level at which POs begin to impair driver behaviour



