

Navigating the absence of alcohol information in road traffic studies: a systematic review of quasi-experimental studies

Junon Joseph, Pablo Martínez, Ph.D., and José Ignacio Nazif-Munoz, Ph.D.

Université de Sherbrooke

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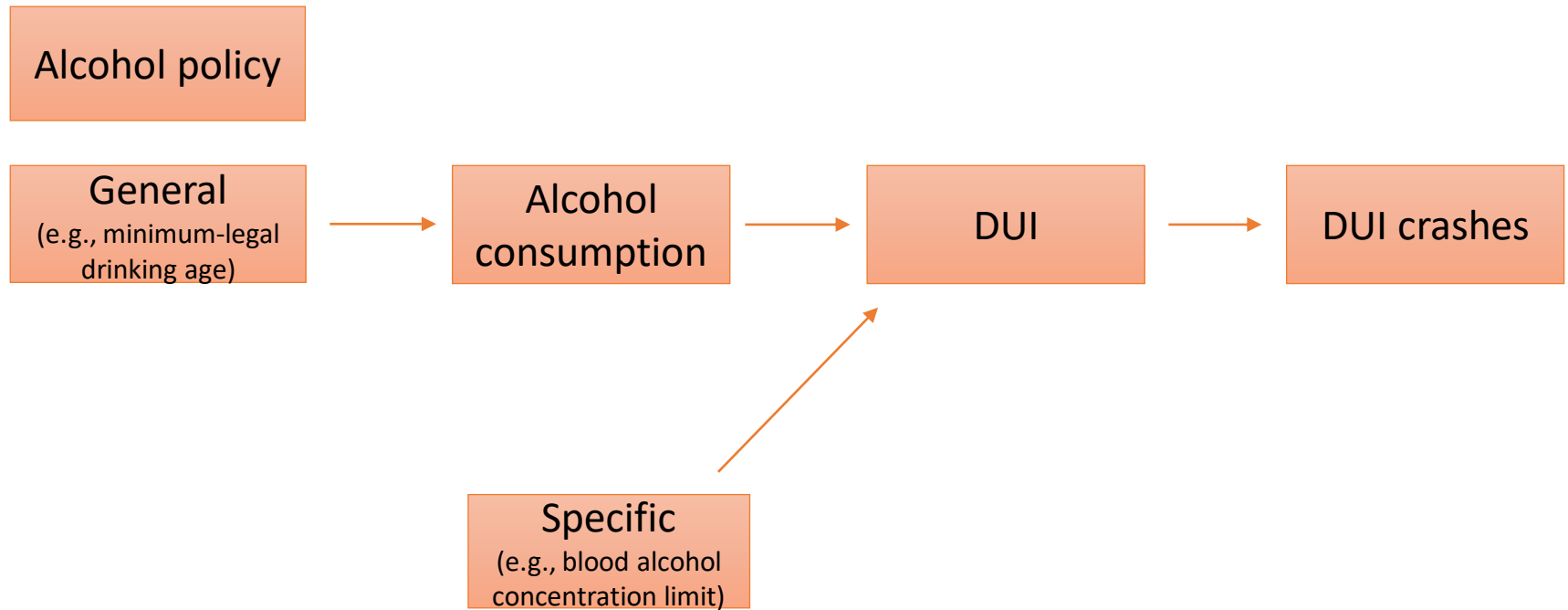
Collaborating on the United Nations' (UN) Decade of Action for Road Safety



Introduction

- Road traffic crashes are a leading cause of death among young people.
- Alcohol abuse is a serious public health issue.
- The fight against alcohol-related harms joins road safety efforts.
 - Alcohol use impairs driving skills.
 - Alcohol-impaired driving is associated with serious injuries and deaths on the road.
 - Driving under the influence (DUI) is predictable and preventable.

The policy spectrum



The problem

- There are challenges in understanding DUI and the role of alcohol policies.
 - DUI data: availability, accuracy, and reliability.
 - Are observed changes linked to policy?
- Our **aim** was to conduct a systematic review of methods used to assess alcohol policies in attention to road traffic results when alcohol information for the outcomes is missing.

Methods: Systematic review without meta-analysis

- **Study eligibility criteria:**

- **Population:** All road traffic users.
- **Intervention:** Exposure to a general or specific alcohol policy.
- **Comparator:** Control or active control, population as its own control.
- **Outcomes:** Road traffic crashes, injuries, and fatalities.
- **Study design:** quasi-experimental studies.

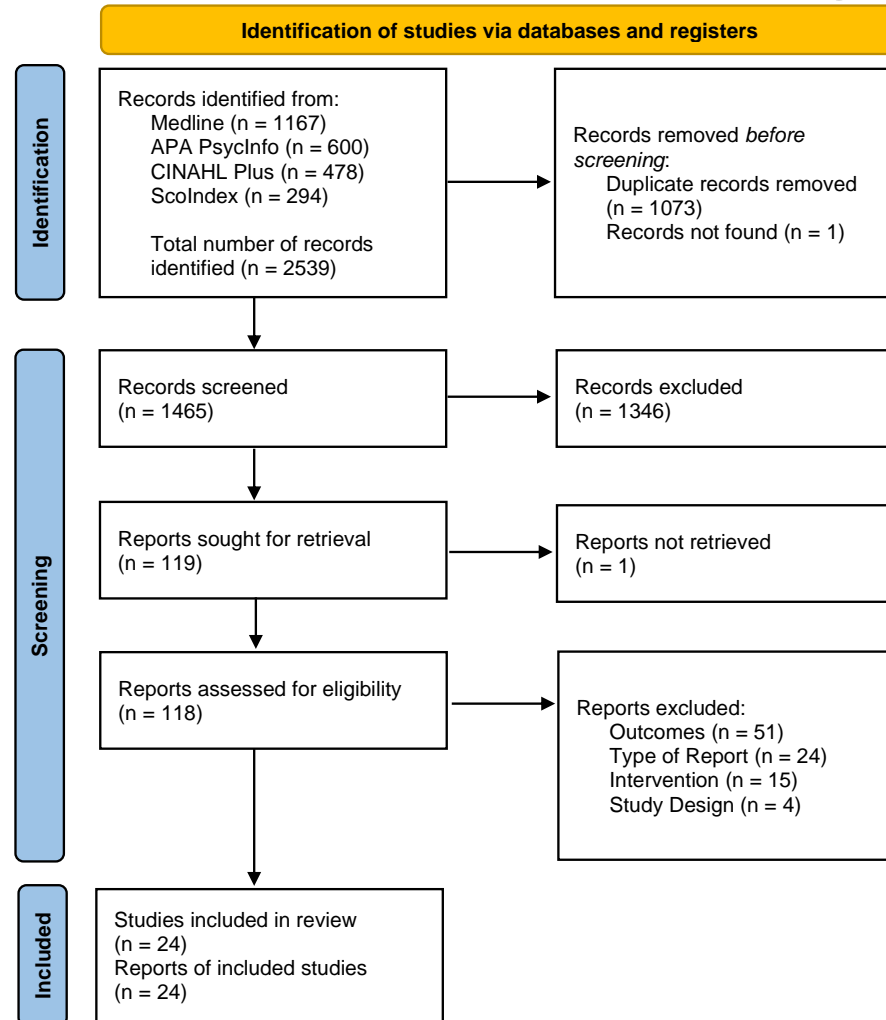
Methods: Systematic review without meta-analysis

- **Report eligibility criteria:** publication year 2000-2001, English or French, with original results.
- **Information sources:** MEDLINE, APA PsycInfo, CINAHL, SocINDEX via EBSCOhost.
- **Search strategy:** “Alcohol” AND “Traffic crashes”.
- **Selection process and data collection** conducted independently and in duplicate, with disagreements solved through third-party involvement.

Methods: Systematic review without meta-analysis

- **Risk of bias assessment:** “Quality assessment tool for before-after studies with no control group” applied independently and in duplicate... *not ideal, but a general approach.*
- **Synthesis methods:**
 - Synthesis without meta-analysis (SWiM) approach.
 - Tabular format for study characteristics.
 - Direction of effects as standardized metrics (regardless of p), effect direction plot to graph results.

Results: PRISMA Flow diagram



Results: Study characteristics

Population	Type of road users	
	Drivers	4
Drivers, passengers, and pedestrians	4	
Drivers and passengers	1	
Non-motorists	1	
Motorcyclists	1	
Not reported	13	
Population	Age	
	15 years or older	4
	16 years or older	1
	17 to 39 years	1
	21 years or older	1
	Not reported	17

Interventions	Type of policy*		
	General		
	Alcohol (de)regulation	9	
	Minimum-legal drinking age	2	
	Adult responsibility	1	
Specific			
	BAC limit	8	
	Sobriety checkpoints	6	
	DUI penalties	4	
	Alcohol in transport	1	
	Community awareness	1	
	Subsidized ridesharing	1	
Interventions	Places		
		Australia	4
		Bostwana	1
		Brazil	1
		Canada	4
		Japan	2
		Mexico	1
		New Zealand	1
		Norway	1
		Russia	1
		Uruguay	1
		USA	7

* A total of 33 interventions were counted at the policy level. Thirteen studies evaluated specific policies, eight studies evaluated general policies, and three studies evaluated a mixture of policies.

Results: Study characteristics

Comparators	Type of policy	
	BAC limit	7
	Alcohol (de)regulation	6
	DUI penalties	2
	Minimum-legal drinking age	1
	Not specified	8
	Type of comparison	
Not external, pre-intervention	19	
External	5	

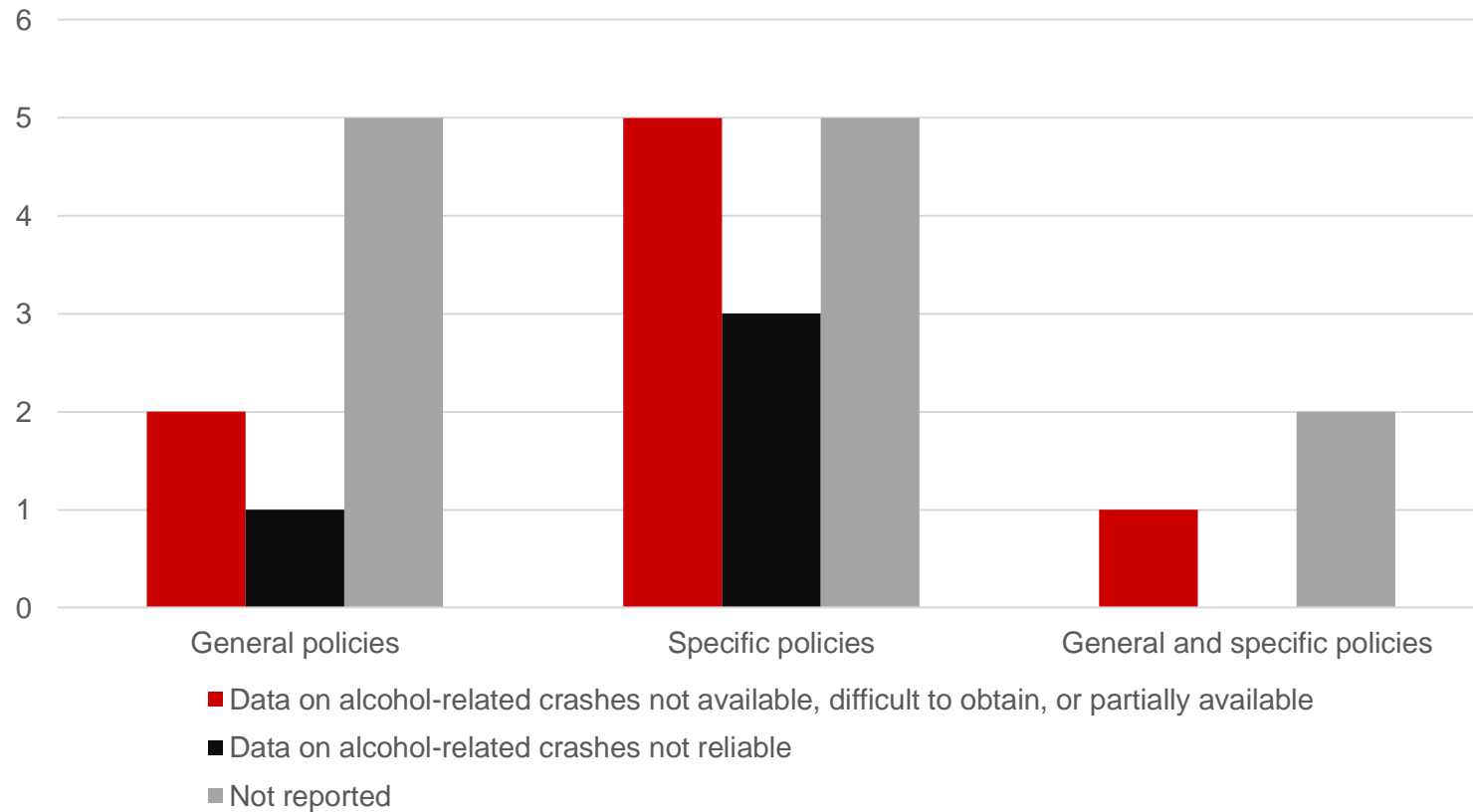
Study design	Interrupted time-series	15
	Controlled interrupted time-series	6
	Before-and-after	3

Results: Study characteristics

Outcomes	Road traffic outcome	
	Fatal crashes	18
	Injury crashes	9
	Crashes	4
	Type of crash	
	Night-time crashes	12
	Single-vehicle crashes	6
	Weekend crashes	2
	Day-time crashes	2
All crashes	17	

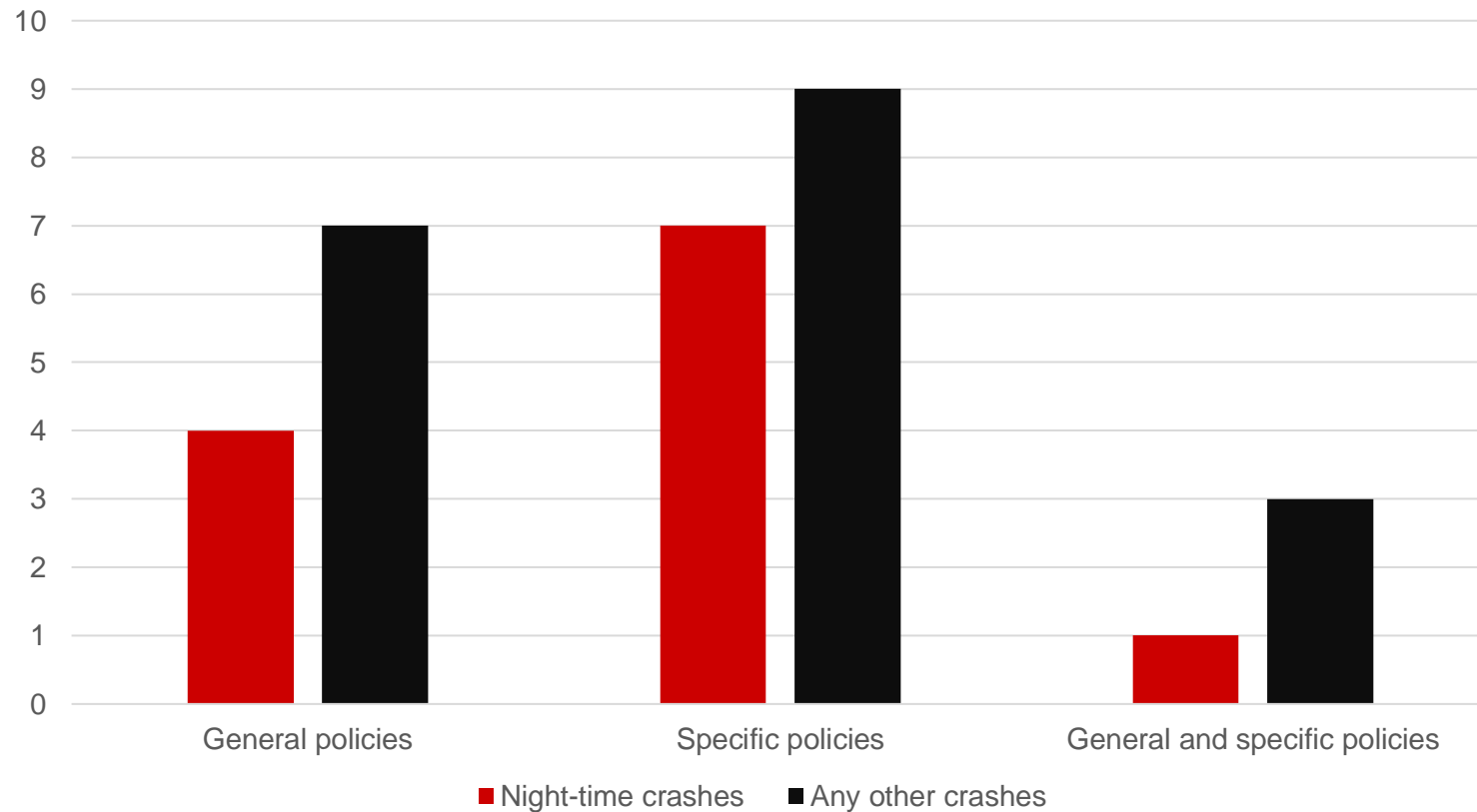
Why not using alcohol data for the outcomes?	
Data on alcohol-related crashes not available, difficult to obtain, or partially available	8
Data on alcohol-related crashes not reliable	4
Not reported	12

Results: Types of policies and alcohol data *



* p-value for Fisher's exact test = 1.000

Results: Types of policies and night-time crashes ^{*}



* p-value for Fisher's exact test = .888

Note. Studies may have been counted more than twice (e.g., a study may have considered night-time crashes and any other crashes).

Results: Study results for general alcohol policies

Study	Intervention	Time points	Crashes	Injuries	Fatalities	Bias
Desapriya, 2012	Alcohol deregulation	16	-	▼3	◀▶3	Low
Stockwell, 2001	Alcohol regulation	50	-	▼	▼	Low
Desapriya, 2009	Alcohol deregulation	18	-	-	▼4	Low
Han, 2015	Alcohol deregulation	69	▼6	-	-	Low
Pridemore, 2013	Alcohol regulation	132	-	-	▼2	Low
Jiang, 2015a	Lowering minimum-legal drinking age	60	-	-	▲18	Some concern
Vingilis, 2007	Alcohol deregulation	84	-	▼4	-	Some concern
Notrica, 2020	Increasing minimum-legal drinking age	17	-	-	▼8	Some concern
Notrica, 2020	Adult responsibility	17	-	-	▼4	Some concern
Sen, 2016	Alcohol deregulation	13	-	▼	▼	Some concern
Trolldal, 2005	Alcohol deregulation	49	-	-	▼	Some concern

63% of outcomes assessed experienced a reduction following general alcohol policies

65% of outcomes assessed came from studies with some concern for risk of bias

Results: Study results for specific alcohol policies

Study	Intervention	Time points	Crashes	Injuries	Fatalities	Bias
Assum, 2010	Lowering BAC limit	12	-	◀2	▲5	Low
Voas, 2008	Sobriety checkpoints	48	▼2	-	-	Low
Miller, 2004	Sobriety checkpoints	43	-	-	▼12	Low
Davenport, 2021	Lowering BAC limit	60	-	▼9	▼9	Low
Colchero, 2020	Sobriety checkpoints	228	-	-	▼2	Low
Bernat, 2004	Lowering BAC limit	72	-	-	▼	Low
Jiang, 2015b	Sobriety checkpoints	83	-	-	▼10	Low
Andreuccetti, 2011	Lowering BAC limit	114	-	▼2	▼2	Low
Nghiem, 2016	Lowering BAC limit	50	-	-	◀4	Low
Nghiem, 2016	Sobriety checkpoints	50	-	-	▼2	Low
Nghiem, 2016	Community awareness	50	-	-	▼	Low
Humphreys, 2020	Subsidized ridesharing	9	▼4	-	-	Low
Jiang, 2015a	Sobriety checkpoints	60	-	-	▼12	Some concern
Brubacher, 2017	DUI penalties	156	▼	-	-	Some concern
Notrica, 2020	DUI penalties	17	-	-	▼28	Some concern
Notrica, 2020	Lowering BAC limit	17	-	-	▼8	Some concern
Notrica, 2020	Alcohol in transport	17	-	-	▼4	Some concern
Mader, 2014	Lowering BAC limit	11	-	-	▼	Some concern
French, 2009	Lowering BAC limit	16	-	▲2	▲2	Some concern
French, 2009	DUI penalties	16	-	▲	▲	Some concern

87% of outcomes assessed experienced a reduction following specific alcohol policies

χ^2 test for difference between general vs. specific alcohol policies = 13.2 ($p < .001$)

47% of outcomes assessed came from studies with some concern for risk of bias

χ^2 test for difference between general vs. specific alcohol policies = 4.9 ($p = .026$)

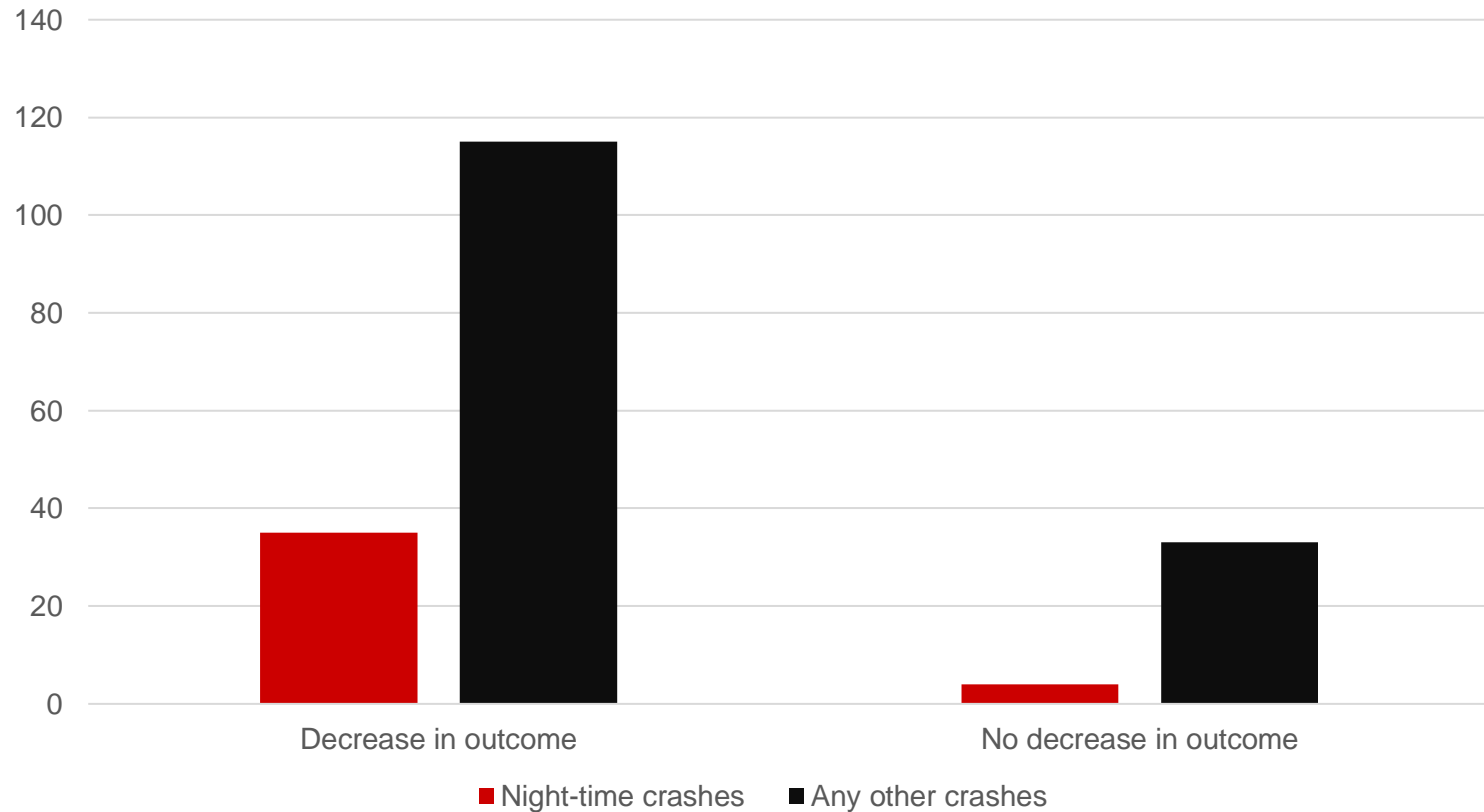
Results: Study results for general and specific alcohol policies

Study	Intervention	Time points	Crashes	Injuries	Fatalities	Bias
Sebego, 2014	Alcohol regulation and DUI penalties	96	▼ ₂	-	▼ ₂	Low

A single study tested the joint effects of general and specific alcohol policies

In this case, the specific contribution of each policy could not be determined

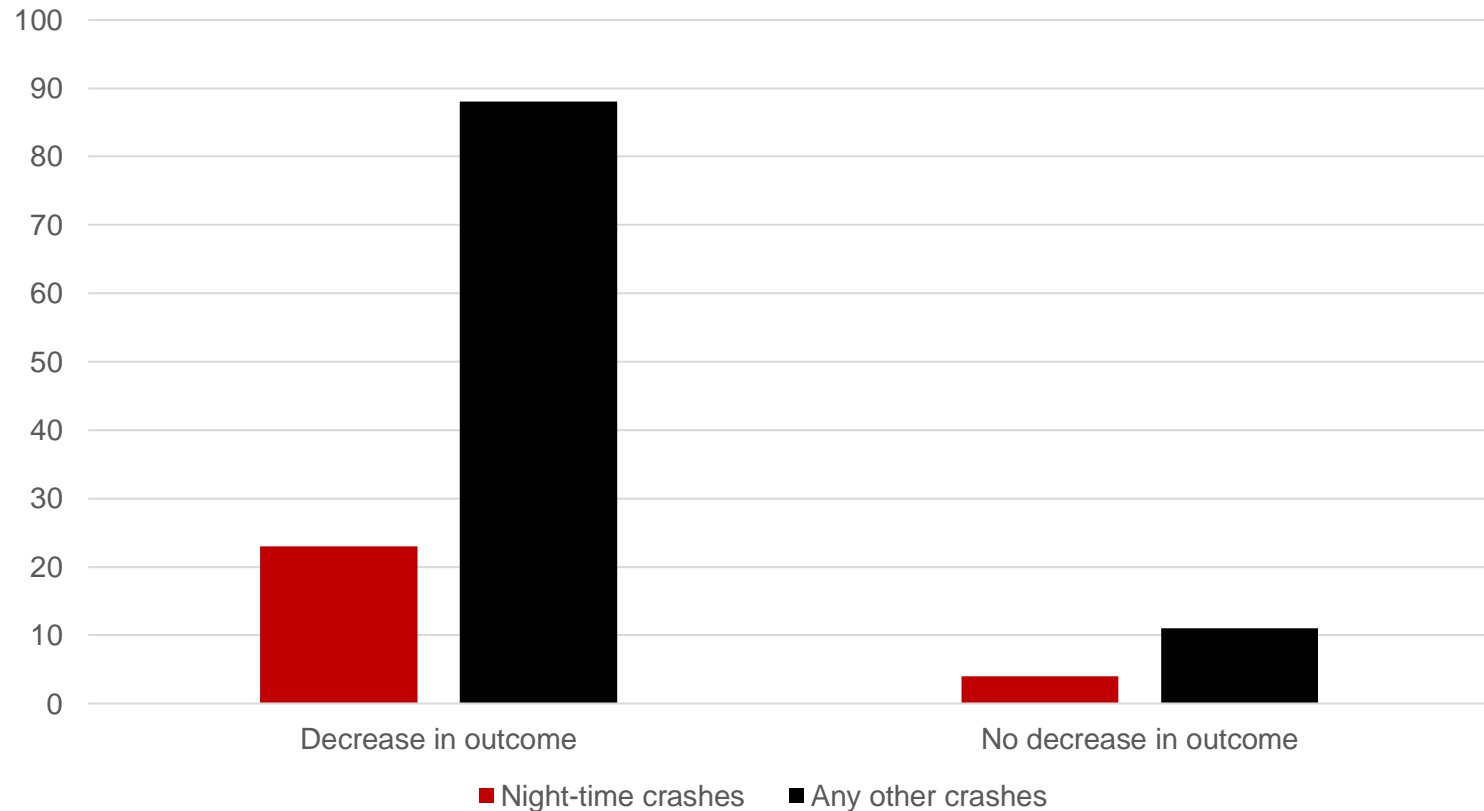
Results: Night-time vs. any other crashes, any policy *



* p-value for Fisher's exact test = .115

Note. Analysis at the outcome level (N = 187).

Results: Night-time vs. any other crashes, specific alcohol policies*



* p-value for Fisher's exact test = .737

Note. Analysis at the outcome level (N = 126).

Results: Risk of bias assessment

Dimension of assessment	Low risk (%)
Study question	100%
Eligibility criteria	100%
Representativeness	83%
Participant's enrollment	100%
Sample size	54%
Intervention implementation	50%
Outcomes measures	100%
Statistical analysis	100%
Multiple outcome measures	100%

- Some studies used specific populations to draw general conclusions about policy effectiveness.
- Median number of time points used (49.5) just below the N recommended for well-powered time series analyses.
- Policy implementation is complex: heterogeneous over time and space; presence of co-interventions.

Discussions

- The basics... reporting of study characteristics is essential.
- When not using DUI data...
 - Night-time crashes were often used as a proxy measure.
 - Studies do not report reasons for not using alcohol data.
- Data suggest that...
 - Decreases in road traffic outcomes may be related to alcohol policy specificity.
 - Regardless of alcohol policy specificity, the use of night-time crashes appears no to be associated with changes in road traffic outcomes.

Conclusions

- Can we rely on studies that do not report why alcohol data are missing?
- May the results observed for the different types of policies be related to the risk of bias?
- What directions should we explore?

Many thanks!





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