



## Public attitudes towards the preventability of transport and non-transport related injuries: Can a social marketing campaign make a difference?

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### ABSTRACT

Substantial efforts devoted to decreasing the burden of transport-related injuries (TRIs) in Canada, including public awareness campaigns aiming to influence attitudes and behaviors, may lead the public to perceive other types of injuries differently. This study examined the relationship between public perception of the preventability of injuries and the type of injury (TRIs vs. non-transport unintentional injuries (NTUIs)); and assessed whether exposure to a social marketing campaign (*Preventable*) influenced this association. A cross-sectional study design employed survey data collected by *Preventable* between 2015 and 2016 from 1501 British Columbians aged 25–54 years. A multiple linear regression model was applied to examine the relationship between the type of injury (TRIs vs. NTUIs) and attitudes towards preventability, controlling for socio-demographic variables. Exposure to the campaign was tested as an effect modifier. On a scale from 1 to 10, respondents perceived TRIs to be 1.08 points more preventable than NTUIs (95% CI: 1.00 to 1.16,  $p$ -value < 0.0001). Campaign-exposed participants scored 0.31 points higher on preventability of injuries overall (95% CI: 0.16 to 0.47,  $p$ -value < 0.0001); and recorded a smaller difference between the perceived preventability of TRIs and NTUIs, relative to those not exposed to the campaign ( $B = -0.163$ , 95% CI:  $-0.28$  to  $-0.04$ ,  $p$ -value = 0.008). While respondents believed that most injuries are preventable, exposure to considerable road traffic interventions in Canada may have influenced public attitudes towards a higher perceived preventability of TRIs. Social marketing may be a useful tool to emphasize the preventability of all injuries to further reduce their burden in Canada.

### 1. Introduction

In Canada, injuries are the leading cause of death among 1–44-year-olds, representing a major public health issue that incurred \$26.8 billion in costs to the healthcare system in 2010 (Parachute, 2015). In that single year, > 15,000 Canadians lost their lives due to injuries, and many others were left with impairments and disabilities (Parachute, 2015). More specifically, transport-related injuries, including motor vehicle, pedestrian and cycling crashes, were the leading cause of indirect costs of injuries, resulting in 290,782 emergency room visits, 28,350 hospitalizations and 2620 deaths across Canada in 2010 (Parachute, 2015).

Given the significance of this burden, substantial public resources

have been invested in prevention of transport-related injuries. Strategies to address road safety in Canada include, among other things, seat belt legislation, airbags engineering, traffic-calming measures, and young driver's educational programs (Public Health Agency of Canada, n.d.; Gemmill et al., 2015), which encompass the three pillars of injury prevention – Education, Engineering, and Enforcement – to create change at the population, community, and individual level (Groff, 2015). Initiatives targeting the Education pillar, which aims to influence individuals' ability to prevent injury through increased knowledge and awareness (Groff, 2015), are particularly important to reduce transport-related injuries. Indeed, beliefs and attitudes have been shown to influence risk behavior, which in turn is associated with injury occurrence (Stanojević et al., 2013; Rundmo, 1999; Iversen and

**Abbreviations:** TRIs, transport related injuries; NTUIs, non-transport unintentional injuries; *Preventable*, The Community Against Preventable Injuries

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Rundmo, 2004). Therefore, numerous public awareness campaigns and social marketing efforts targeting transport-related injuries have been launched in Canada within the past several years. Examples include Project Red Ribbon and Campaign 911, initiated by the Mothers Against Drunk Driving (MADD Canada) to raise the general population's attention towards the preventability of impaired driving crashes and related serious injuries and deaths (El-Guebaly, 2005; Awareness Campaigns – MADD Canada, n.d.). The progressive reduction observed in the rates of road traffic-related death and serious injuries over recent decades demonstrates that these unrelenting, targeted efforts have had an impact and have brought the issue of transport-related injuries to the forefront of public consciousness (Gemmill et al., 2015). As a consequence, public beliefs about the preventability of transport-related injuries may now be different to beliefs about the preventability of non-transport-related injuries.

Given that any type of injury can have negative impacts on the health and well-being of individuals, families and communities, attitudes and behaviors towards non-transport unintentional injuries (NTUIs) are also important to address to effectively reduce the overall burden of injuries, even if these injuries do not dominate the injury statistics. In British Columbia, The Community Against Preventable Injuries (*Preventable*) is an innovative social marketing campaign that tackles all types of serious injuries using integrated advertising through TV, radio, print materials, out-of-home (e.g. billboards, bus shelters) guerrilla marketing activities, and the Preventable.ca website. It reaches approximately 60% of the adult population of British Columbia annually and utilizes messages such as, “Before you think only other swimmers drown, have a word with yourself.” in strategic locations to influence people's attitudes and behaviors by encouraging an internal conversation regarding their beliefs. While this approach has shown to have an overall positive influence on attitudes and behaviors related to the prevention of serious injuries (Pike et al., 2016; Smith et al., 2018); little is known about the magnitude of the campaign's effect on public attitudes towards individual injury mechanisms, given that public perception of the preventability of various types of injuries may initially be different.

Consequently, the objectives of this study were: 1) to examine the relationship between the type of injury – transport-related injuries (TRIs) or NTUIs – and the attitudes of British Columbians towards the preventability of these types of injuries; and 2) to determine if this potential association between the type of injury and the perceived preventability of injury is modified by exposure to the *Preventable* social marketing campaign.

## 2. Methods

A cross-sectional study design employed secondary analysis of survey data collected by *Preventable*. This social marketing campaign has been active in British Columbia (BC), Canada, since June 2009, and the impact on public attitudes, beliefs, awareness, and behaviors related to injuries is evaluated periodically through online surveys among British Columbian adults aged 25–54. Participant eligibility and the sampling strategy have been published previously (Smith et al., 2018; Karl et al., 2017). Survey data collected between August 2015 and 2016 were included in this study.

A mixed-effects multiple linear regression model was applied to examine the relationship between the type of injury (TRIs vs. NTUIs) and the attitude towards potential preventability, controlling for socio-demographic variables. Exposure to the campaign was defined as answering ‘yes’ to any question on the survey about awareness of *Preventable* as an organization, knowledge of the website or having seen any advertisement prior to the date of survey, which was tested as an effect modifier. Perceived preventability of injury, defined as a continuous variable on a scale from 1 to 10, was set at the outcome variable. Type of injury, whether related or not to transport, was set as the primary explanatory variable. Data were extracted from question A10

**Table 1**  
Demographic characteristics of respondents, British Columbia, 2015–2016.

Characteristics	N (%)
Gender	
Female	806(53.7)
Male	695(46.3)
Age group	
25–34 years	477(31.8)
35–44 years	438(29.2)
45–55 years	586(39.0)
Marital status	
Single (never married)	485(32.3)
Married/In domestic partnership <sup>a</sup>	867(57.8)
Widowed/divorced/separated <sup>a</sup>	149(9.9)
Being a parent in the household	729 (48.6)
Educational attainment	
Graduated high school or lower	271(18.1)
Some trade school/associate degree/college or university	467(31.1)
Graduated college/university/post graduate	763(50.8)
Employment status	
Employed	1198(79.8)
Unemployed	95(6.3)
Student/retired/homemaker	208(13.9)
Household income	
< \$60,000	617(41.1)
\$60,000 or more	669(44.6)
Prefer not to answer	215(14.3)
Caucasian/European ethnicity <sup>b</sup>	1087(72.4)
Asian ethnicity <sup>b</sup>	290(19.3)
Other ethnicities <sup>b</sup>	140(9.3)
Year of survey	
2015	752(50.1)
2016	749(49.9)

<sup>a</sup> Some categories of the original variables were collapsed to facilitate description and analysis.

<sup>b</sup> Subjects could choose more than one ethnicity

of the survey: “Using a scale from 1 to 10, where 1 means not at all and 10 means entirely, how preventable do you think the following injuries are?” Items were later categorized into two groups: TRIs (4 items) and NTUIs (7 items). Four injury statements were not included, as they were either overlapping with other statements, including components from both TRIs and NTUIs, or targeting injuries less relevant to adults included in this study. Statistical Package for the Social Sciences Version 25 was used for statistical analysis; a *p*-value of 0.05 was considered statistically significant.

## 3. Results

A total of 1501 survey respondents were included in the study (752 in 2015, response rate 28%; 749 in 2016, response rate 25%). Almost half (46.8%) were exposed to the *Preventable* campaign. Details of demographic and socio-economic characteristics appear in Table 1. The mean and standard deviation of perceived preventability of TRIs and NTUIs were  $8.67 \pm 1.58$  and  $7.66 \pm 1.52$ , respectively. Table 2 displays the descriptive statistics of the perceived preventability of TRIs and NTUIs.

The multiple linear model showed that TRIs scored on average 1.08 points higher than the NTUIs for perceived preventability, adjusting for campaign exposure, gender, age group, marital status, education level, employment status, family income, being a parent and ethnicity (95% CI: 1.00 to 1.16, *p*-value < 0.0001) (Table 3). Campaign exposed participants scored on average 0.31 points higher on preventability of injuries overall, relative to those not exposed to the campaign (95% CI: 0.16 to 0.47, *p*-value < 0.0001). Exposure to the campaign was also associated with a smaller difference between the perceived preventability of TRIs and NTUIs (*B* = -0.163, 95% CI: to, *p*-value = 0.008).

**Table 2**  
Means, standard deviations and median scores of perceived preventability of transport-related and non-transport unintentional injuries, British Columbia, 2015–2016.

Category	Mean	SD	Median
<b>Transport-related injuries</b>			
Motor vehicle crashes from driving while distracted (e.g. cell phone, texting, DVD player, reading)	8.83	1.74	10.00
Motor vehicle crashes from falling asleep at the wheel	8.37	1.82	9.00
Injuries resulting from jaywalking	8.64	1.83	9.00
Injuries due to operating machinery or a motor vehicle while under the influence of drugs or alcohol	8.83	1.83	10.00
<b>Non-transport unintentional injuries</b>			
Poisonings	7.58	1.99	8.00
Drownings	7.50	1.90	8.00
Falls from ladders	7.77	1.84	8.00
Workplace injuries	7.48	1.80	8.00
Burns in the home from fire flames & hot substances	7.65	1.85	8.00
Electrocution	7.72	1.82	8.00
Falls due to distractions	7.96	1.89	8.00

**Table 3**  
Results of the multiple linear regression model examining the association between perceived preventability of injuries and the type of injuries and campaign exposure, British Columbia, 2015–2016.

Variables	Estimate	95% Confidence interval	p-Value
Intercept	7.29	6.70–7.87	< 0.0001*
Transport-related injuries (TRIs)	1.08	1.00–1.16	< 0.0001*
Exposed to the preventable campaign	0.31	0.16–0.47	< 0.0001*
TRIs × campaign-exposure (interaction)	−0.16	−0.28 to −0.04	0.008*
Female	0.25	0.10–0.39	0.001*
45–55 years			
35–44 years	−0.15	−0.33 to −0.02	0.091
25–34 years	−0.43	−0.62 to −0.25	< 0.0001*
Single			
Married or in domestic partnership	0.08	−0.11–0.27	0.418
Widowed, divorced or separated	0.14	−0.14–0.41	0.324
Employed			
Unemployed	0.14	−0.16–0.45	0.361
Student, retired, homemaker	0.12	−0.10–0.33	0.294
High school or lower			
Some university education	0.29	0.08–0.50	0.008*
Graduated from university, post graduated	0.26	0.05–0.47	0.014*
Annual income less than \$60,000			
\$60,000 or more	0.12	−0.06–0.29	0.191
Prefer not to answer	−0.11	−0.34–0.12	0.349
Parent in the household-no	−0.09	−0.26–0.07	0.273
Caucasian, European ethnicity-yes	−0.13	−0.42–0.16	0.376
Asian-yes	0.12	−0.19–0.44	0.440
Other ethnicities-yes	−0.09	−0.39–0.21	0.569

\* Statistically significant at  $\alpha < 0.05$ .

**4. Discussion**

This study showed that 25–54-year-old British Columbians believe that injuries are highly preventable but consider TRIs to be more preventable than NTUIs. Furthermore, participants who were exposed to the *Preventable* social marketing campaign viewed injuries as more preventable overall and perceived a smaller difference between the preventability of TRIs versus NTUIs, than participants who had not been exposed to the campaign.

The results of our study suggest that exposure to substantial road traffic interventions in Canada may have influenced British Columbians' attitudes towards a higher perceived preventability of TRIs. Public health approaches to injury prevention generally tend to be directed by

specific types of injuries, target population groups, or environmental contexts (Pike et al., 2015). This effective and acknowledged way of addressing injuries may naturally lead to contextually specific injury attitudes and beliefs developing in isolation of each other, creating gaps between the perceived preventability of different types of injuries among the public. The impact of such gaps is unknown. However, our findings raise a question as to whether campaigns addressing the overarching commonalities of serious injuries should be added to traditional injury specific interventions, in order to relay the message that all injuries are highly preventable, and thus generate a high perceived preventability of all types of injuries in the population.

Understanding public attitudes towards the preventability of injuries is essential to the development of successful public education and social marketing interventions that will contribute to the reduction of the burden of injury in Canada (Grier and Bryant, 2005). Attitude is a complex concept defined as representing “our evaluations, preferences or rejections based on the information we receive” (Anon, n.d.-a). It is influenced by social factors, education, and personal experience (Anon, n.d.-b), and encompasses risk perception and beliefs about the preventability of injury. While studies have examined the effect of risk perceptions on injury occurrence (Titchener et al., 2011; Agha, n.d.), little is known about public perceived preventability of injury. Yet, Peterson et al. showed that people's beliefs about the preventability of injury were important to consider, as stronger beliefs towards preventability were associated with safer behaviors (Peterson et al., 1990).

Perceived preventability of different types of injuries has been explored in a few published studies. Titchener et al. (2011) found that 70% of respondents rated their perceived preventability of injuries occurring at home, at work, on roads, and on the water to be 8 or more on a scale ranging from 1 to 10 where 10 meant a highly preventable injury. Although these are similar to the results here, the study revealed that Queenslanders perceived injuries occurring on roads to be least preventable, and injuries occurring at work to be most preventable. In another study conducted in New Zealand (Hooper et al., 2003), the majority of those interviewed also considered most injuries to be preventable, but with higher perceived preventability for home injuries followed by work-related injuries.

These two studies, in the context of the results of the present study, may imply that public attitudes towards the preventability of injury are influenced by social, cultural and societal factors. The available literature shows that Canadians have been exposed to many interventions regarding transport-related-injuries within recent decades. Child restraints, speed limits and enforcement, blood alcohol concentration limits, helmet use or roundabout use are only a few of the many road traffic interventions that have been implemented and are now integrated into citizens' daily lives (Gemmill et al., 2015). Canada's Road Safety Strategy also emphasizes the intensive efforts undertaken to prevent transport-related injuries (Hughes et al., 2016; Anon, 2016). This national initiative, has evolved since 2001, and provides road safety stakeholders an inventory of road safety initiatives to be adopted, including public awareness campaigns such as “Leave the phone alone” (Anon, n.d.-c). While public education and social marketing interventions play an important role in preventing injury together with engineering and enforcement strategies, most of these interventions address one specific injury type at a time.

Given that public attitudes towards the preventability of injury seem to be modified by ongoing prevention efforts, public awareness and social marketing campaigns encompassing different types of injury should be considered in order to emphasize that any serious injury, regardless of its incidence, can have devastating effects, but can be predicted and avoided. The *Preventable* social marketing strategy provides a broad view of injury prevention and runs its public campaigns to motivate people to make more responsible choices regarding injuries (Smith et al., 2018). The campaign is theoretically based upon the Health Action Process Approach (HAPA) model of behavior change, which suggests that individuals go through a cognitive process from a

pre-intentional motivation stage to post-intentional volition before engaging in the actual health behavior (Schwarzer, 2008; Schwarzer and Luszczynska, 2008). *Preventable* “calls attention to that little voice inside an individual’s head” to encourage the internal conversation and thereby influence individual attitudes and behaviors with regard to injury prevention (Anon, n.d.-d). By integrating strategies addressing different types of injuries that can potentially be encountered in daily life, *Preventable* raises awareness that injury risks may occur countless times in a day but can be considerably decreased by adopting thoughtful attitudes and behaviors. Thus, social marketing campaigns can positively influence attitudes towards the preventability of all injuries, and if associated with existent injury specific interventions, may be a promising avenue to move forward in the effort to achieve a safe and injury-free country.

While *Preventable* is an innovative and unique social marketing campaign showing promising effects in addressing all types of injuries in British Columbia, we believe that our findings are generalizable to the Canadian context. Most road safety interventions employed in British Columbia including legislation enforcement, education, and engineering have been similar across provinces. For instance, daytime running lights, seat belt legislation, graduated licensing programs and prohibition of hand-held cell phone use while driving are in effect in British Columbia as well as in many other provinces (Public Health Agency of Canada, n.d.). Thus, we might expect that the observed gap between perceived preventability of TRIs and NTUIs would also prevail in other parts of Canada. Assuming that public perceived preventability of TRIs and NTUIs may be alike across provinces; implementation of integrated social marketing campaigns in other parts of Canada could yield similar beneficial results through positively influencing public attitudes towards the preventability of all injuries.

Our study had some limitations. First, as the main purpose of the *Preventable* survey was to assess the impact of the campaign as a whole, the items included within the questionnaire to assess and compare perceived preventability of TRIs and NTUIs were not exhaustive. Second, some injury statements provided in the survey were more explicit than others, which may have influenced participants’ scores of perceived preventability. However, these explicit injury statements were present in both transport and non-transport related injury categories. Third, the distribution of the outcome variable was not perfectly normal. However, given the adequate model fit and the large sample size, it was deemed acceptable for use in the linear regression.

## 5. Conclusion

While British Columbians believe that most injuries are preventable, there is a discrepancy between perceived preventability of road traffic injuries, relative to other types of preventable injuries. Substantial public health efforts and investment in road safety have had a positive impact on road traffic injuries; however, a focus on road safety in the public health domain may have created a gap in public perceptions about preventability of other types of unintentional injuries. Future research is needed to explore the implications of this gap and the impact of social marketing campaigns to promote injury prevention-related behaviors.

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## Competing interests

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