Canadian Centre on Substance Abuse
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The Impact and Effectiveness of Minimum Legal Drinking Age Legislation in Canada

Alcohol is the leading psychoactive substance used by Canadian youth and young adults ages 15–24 years. In 2014, 41.8% of 12–19 year olds reported having consumed alcohol in the past year and 27.8% engaged in heavy episodic drinking[1] at least once per month (Statistics Canada, 2014).

Globally, alcohol is the leading cause of morbidity and mortality among youth and young adults ages 10–24 years (Gore et al., 2011).There is evidence that drinking alcohol can harm physical and mental development, particularly in adolescence and early adulthood, although certain patterns of use are riskier than others. It is for this reason that youth and young adults are encouraged to delay drinking as long as possible (Canadian Centre on Substance Abuse, 2014).

In seeking to reduce alcohol consumption and related harm experienced by young people, many countries have implemented minimum legal drinking age (MLDA) legislation, sometimes referred to as the minimum legal purchasing age. MLDA legislation restricts the purchase, consumption and possession of alcohol among those below a certain age.

A Brief History of MLDA Changes in Canada

In the 1970s, all Canadian provinces and territories lowered the MLDA from 20 or 21 to either 18 or 19 to align more closely with the age of majority, the age at which an individual is legally an adult. Following this initial reduction in the MLDA, in the late 1970s, Ontario and Saskatchewan raised their MLDA from 18 to 19 years of age in response to increased underage alcohol consumption among high school students and increased alcohol-related harms among youth and young adults (Callaghan, Sanches, Gatley, & Stockwell, 2014). More recently, in 1987, P.E.I. increased their legal drinking age from 18 to 19 years; since this time there have been no further changes to the MLDA in Canada. Currently, the MLDA is 18 years of age in Alberta, Manitoba and Quebec, and 19 years in the rest of the Canadian provinces and territories.

MLDA Evidence

The majority of research about MLDA has been conducted in the United States with reviews examining evidence from 1960 to 2006. Comprehensive literature reviews examining high-quality studies on the effectiveness of MLDA as a policy measure for reducing alcohol-related harms indicate that there is an inverse relationship between the MLDA and various alcohol-related outcomes. Specifically, as the MLDA increases, traffic crashes are reduced, alcohol consumption among youth decreases, and the long-term negative outcomes drinkers might experience in adulthood become less prevalent. Also discussed in this body of research are contextual factors that influence the effects of MLDA, such as

[1] Heavy episodic drinking refers to five or more drinks for males and four or more drinks for women.

the availability of alcohol, impaired-driving laws, alcohol marketing and evidence-based prevention efforts that target drinking on college and university campuses (Wagenaar & Toomey, 2002; DeJong & Blanchette, 2014).

Most of the early Canadian MLDA research drew upon natural experiments designed around legislative changes to the MLDA. A series of Canadian studies took place in in the 1970s and '80s, when changes to the MLDA last occurred in Canada. Since that time, a number of changes to the alcohol policy context have occurred in Canada, such as the implementation of graduated licensing programs and zero tolerance laws, as well as changes in norms around impaired driving. More recent evidence gathered within this context might better inform current policy debates.

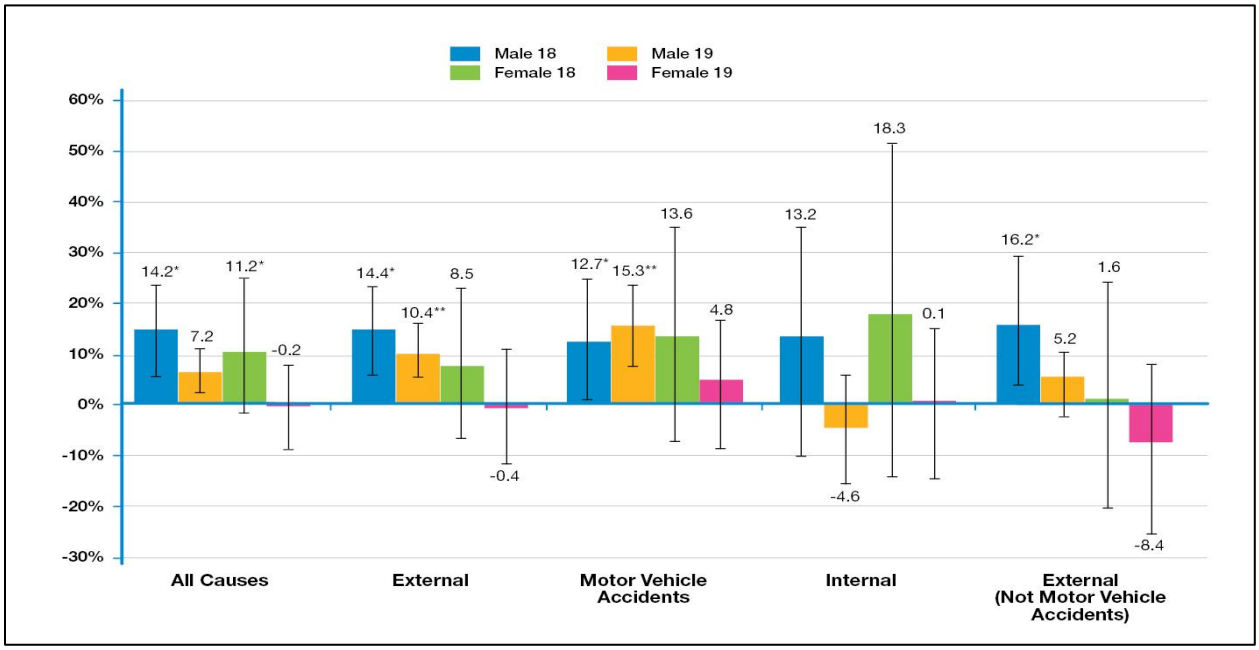
A recent wave of Canadian research examines the impact of MLDA on a series of alcohol-related harms including **mortality** (Callaghan, Sanches, Gatley, & Stockwell, 2014), **morbidity** (Callaghan, Sanches, & Gatley, 2013; Callaghan, Sanches, Gatley, & Cunningham, 2013; Callaghan, Sanches, Gatley, Liu, & Cunningham, 2014), **motor vehicle collisions (MVCs)** (Callaghan, Gately, Sanches, & Asbridge, 2014; Callaghan, Gatley, Sanches, Benny, & Asbridge, 2016), and **crime** (Callaghan, Gately, Sanches, & Benny, 2016; Callaghan, Gatley, Sanches, Asbridge, & Stockwell, 2016; Gatley, Sanches, Benny, Wells, & Callaghan, in press; Benny, Gatley, Sanches, & Callaghan, in press). The work by Callaghan and colleagues for the most part uses a regression-discontinuity approach where trends in alcohol-related harms are compared at ages just below the MLDA to those just above the MLDA. This method is a type of quasi-experimental approach that statistically estimates the causal effect of drinking-age legislation on alcohol-related outcomes.

MLDA and Mortality

Canada's drinking-age laws have a significant effect on youth mortality, the most serious and most costly alcohol-related harm. Callaghan, Sanches, Gatley and Stockwell (2014) examined the causes of death of Canadians ages 16–22 years from 1980 to 2009, and compared the number of deaths among people just older than the legal drinking age to those just younger than the legal drinking age. For males just older than the MLDA there were immediate, sharp and significant increases in mortality, especially from MVCs (12.7–15.3%) and injuries (10.4–16.2%). Increases in mortality also occurred for females just after the legal drinking age, but these increases were not significant. Figure 1 provides a graphical summary of these findings.

Based on these findings, Callaghan, Sanches, Gatley and Stockwell (2014) estimate that if the MLDA were to be raised to 19 years across all jurisdictions, approximately seven 18-year-old males would be prevented from dying each year. Alternatively, if the MLDA was raised to 21 across Canada an estimated 32 annual deaths among males 18–20 years of age could be prevented (Callaghan, Sanches, Gatley, & Stockwell, 2014). This research suggests that increasing the MLDA might serve as a powerful policy change to prevent alcohol-related deaths among young people.

Figure 1. Summary of effects of the MLDA on mortality rate changes (%) in fatalities immediately following the MLDA: males and females across provincial groupings with an MLDA of 18 or 19 years old



The percentage rate change was calculated as: [(post-MLDA regression Y intercept value - pre-MLDA regression Y intercept value) / pre-MLDA regression Y intercept value]. For example, the rate change for all causes of mortality for males in provinces with the MLDA of 18 years of age (first bar) is: [(243.24–212.95) / 212.95] = 14.2% "jump" after attaining the MLDA.
Statistical significance, $^{*}p < 0.05$; $^{**}p < 0.001$
Reproduced from Callaghan, Sanches, Gatley, & Stockwell, 2014, with permission from Elsevier.

MLDA and Morbidity

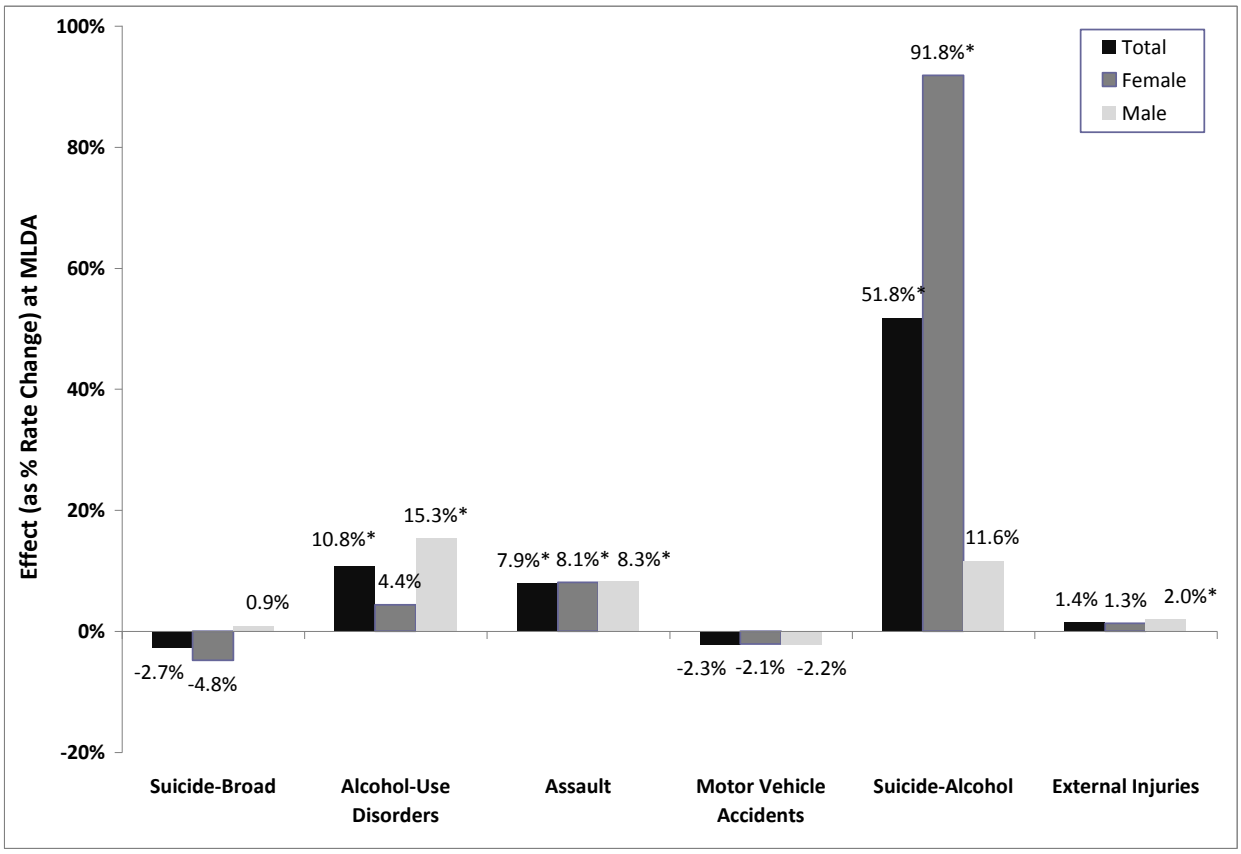
In a series of four studies looking at the impact of the MLDA on alcohol-related morbidity in Ontario (Callaghan, Sanches, Gatley, Liu, & Cunningham, 2014; Callaghan, Sanches, Gatley, & Cunningham, 2013), Quebec (Callaghan, Gatley, Sanches, & Asbridge, 2014), as well as across the Canadian provinces, except for Quebec (Callaghan, Sanches, & Gatley, 2013), Callaghan, Sanches, Gatley and Stockwell (2014) found the MLDA to have protective effects against alcohol-related morbidity.

Drinking to celebrate one's birthday is associated with alcohol-related emergency room (ER) presentations and hospital admissions. An analysis of hospital and ER service use in Ontario found that alcohol-related presentation increased during birthday weeks across several ages (12–30 years), but was most pronounced during the week of 19th birthdays. Additionally, aging past the MLDA was associated with an overall increase (1.8%) in alcohol-related hospital service use across the total sample (Callaghan, Sanches, Gatley, Liu, & Cunningham, 2014).

More specifically, in comparing young adults slightly older than the MLDA with those slightly younger than the MLDA, Callaghan, Sanches, Gatley, and Cunningham (2013) found that those just older than the Ontario MLDA of 19 years demonstrated a jump in ER visits and hospital admissions for alcohol use disorders (10.8%), assaults (7.9%), and suicide (51.8%) (Callaghan, Sanches, Gatley, & Cunningham, 2013). Similarly, those just older than the MLDA across the Canadian provinces, except for Quebec, demonstrated a jump in ER visits and hospital admissions for self-inflicted injuries (9.6%) and alcohol use disorders and alcohol poisonings (16.3%) (Callaghan, Sanches, & Gatley, 2013). In Ontario, females showed a 91.8% increase in alcohol-related suicides once they reached the legal drinking age. However, this finding might be a result of the relatively low number of these

outcomes (Callaghan, Sanches, Gatley, & Cunningham, 2013). Males just above the MLDA also showed a spike in ER presentations and hospital admissions due to external injuries (2.0–4.4%) (Callaghan, Sanches, Gatley, & Cunningham, 2013; Callaghan, Sanches, & Gatley, 2013) and injuries resulting from MVCs (9.2%) (Callaghan, Sanches, Gatley, 2013). See Figures 2 and 3 for a detailed breakdown of the impacts of MLDA on hospital service use in Ontario and Canada respectively.

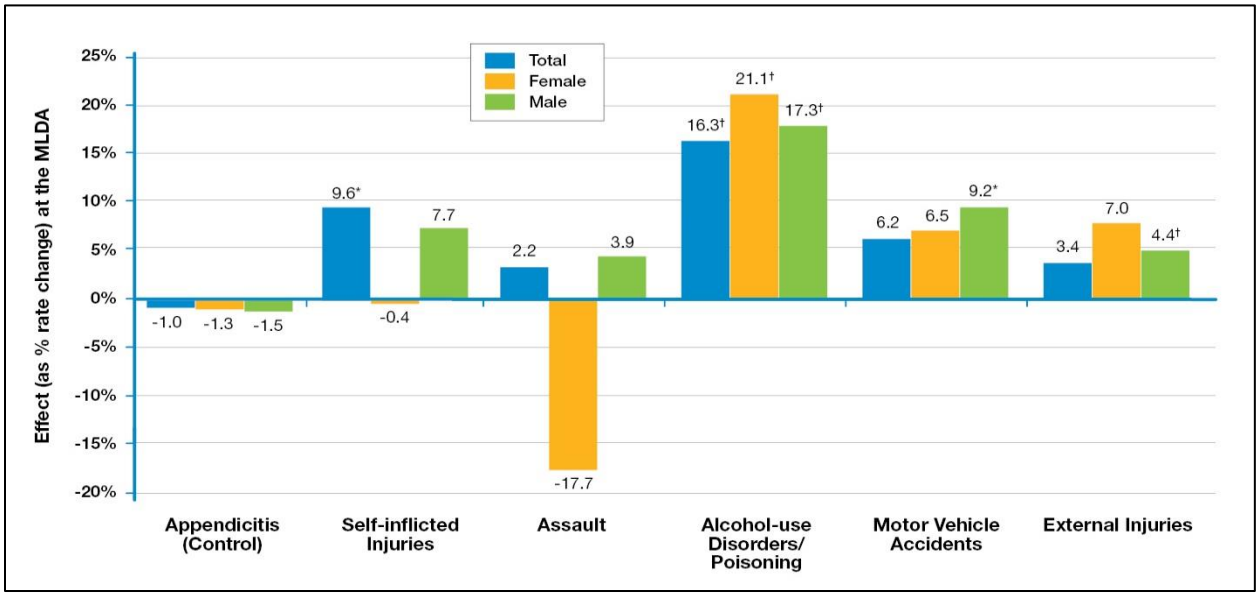
Figure 2. Rate changes in alcohol-related hospital events at the minimum legal drinking age (MLDA): Ontario, 2002–2007[2]



The rate change (in %) was calculated as: [(post-MLDA regression Y intercept value - pre-MLDA regression Y intercept value) / pre-MLDA regression Y intercept value]. For example, the rate change (in %) for alcohol-use disorders for the total sample (see Figure 1B) was: [(15.44 – 13.94)/13.94] = 10.8% "jump" immediately following the MLDA.
Reproduced from Callaghan, Sanches, Gatley, & Cunningham, 2013, with permission from the *American Journal of Public Health*..

[2] The publisher of the article from which this figure is drawn requires it to appear exactly as it does in the source journal, hence the difference in the appearance of this figure from the others in the text.

Figure 3. Rate changes (%) in alcohol-related hospital admissions occurring immediately after the MLDA (Canadian provinces, excluding Quebec, total cases, females and males)



The percentage rate change was calculated as: [(post-MLDA regression Y intercept value - pre-MLDA regression Y intercept value) / pre-MLDA regression Y intercept value]. For example, the percentage rate change for alcohol use disorders/poisoning for women is: [(13.96-11.53)/11.53] = 21.1% "jump" at MLDA.
Statistical significance, * $p < 0.05$; † $p \leq 0.001$.

MLDA and MVCs

Surprisingly, in a study looking at Ontario hospital service use data, no significant relationship was found between the MLDA (19 years) and MVCs (see Figure 2) (Callaghan, Sanches, Gatley & Cunningham, 2013). However, in Quebec, both male and female drivers who were just older than the MLDA of 18 years experienced an immediate and significant 6% increase in MVCs, with night-time collisions, a proxy for alcohol-related collisions, increasing by 11% (Callaghan, Gatley, Sanches, & Asbridge, 2014). The difference in Ontario (Callaghan, Sanches, Gatley, & Cunningham, 2013) and Quebec (Callaghan, Gatley, Sanches, & Asbridge, 2014) findings might be due to the difference in driving outcomes examined across the two studies, differences in the MLDA or drinking trends across the two provinces.

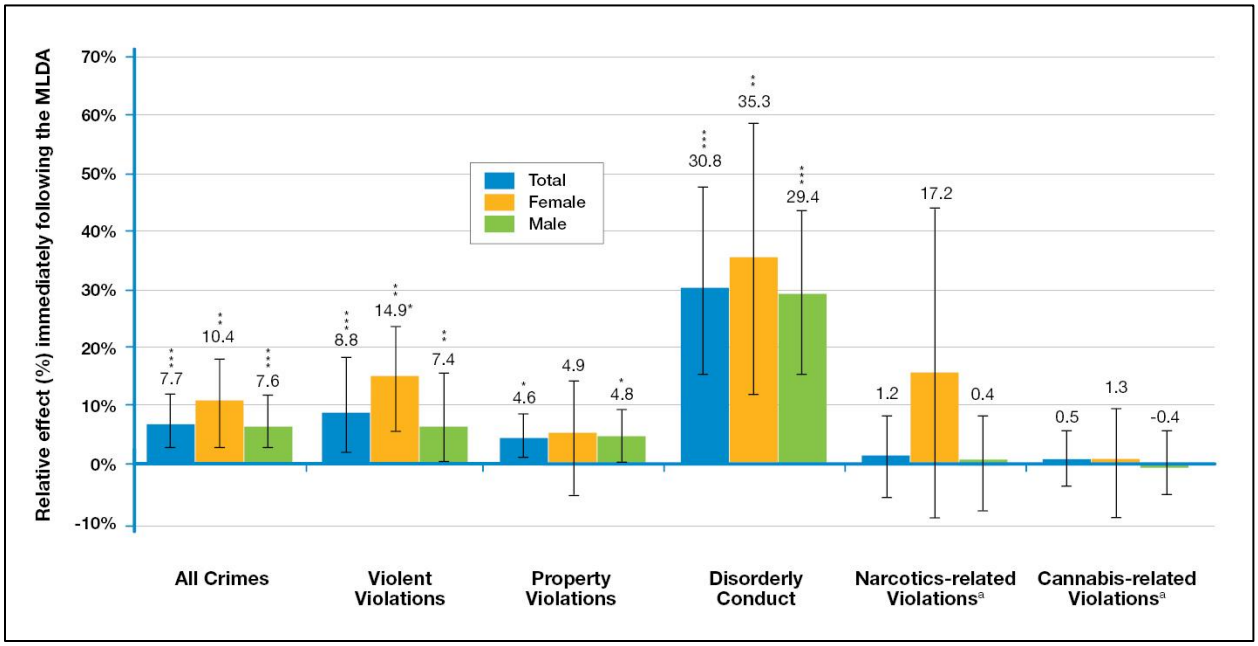
In general, work by Callaghan, Sanches and Gatley shows that young drivers who have recently matured past the MLDA restrictions experience sharp and immediate increases in driving harms as indicated by hospital admissions and ER presentations (see Figure 3), (Callaghan, Sanches, Gatley, 2013) as well as alcohol-related MVC deaths (see Figure 1) (Callaghan, Sanches, Gatley, & Stockwell, 2014; Callaghan, Gatley, Sanches, Benny, & Asbridge, 2016) and severe alcohol-related MVCs (Callaghan, Gatley, Sanches, Benny, & Asbridge, 2016). This trend is also evident in police-reported impaired-driving incidents (Callaghan, Gatley, Sanches, Asbridge, & Stockwell, 2016). One notable exception is the finding that male drivers in the Northwest Territories experienced an unexpected decrease in alcohol-related MVCs immediately after aging past the MLDA; further research is needed to explore this finding (Callaghan, Gatley, Sanches, Benny, & Abridge, 2016).

MLDA and Crime

Data from the Canadian Uniform Crime Reporting Survey for 2009–2013 was used in four studies to examine the impact of the MLDA on a range of crimes (Callaghan, Gatley, Sanches, Asbridge, & Stockwell, 2016; Callaghan, Gatley, Sanches, & Benny, 2016; Gatley, Sanches, Benny, Wells, & Callaghan, in press; Benny et al, in press). Police-reported criminal incidents across the Canadian provinces were examined for individuals ages 15–23 years. When comparing those slightly older than the MLDA to those slightly younger than the MLDA, both males and females slightly older than the MLDA exhibited sharp increases in criminal activity (males, 7.6%; females, 10.4%). Specifically, violent crimes (males, 7.4%, females, 14.9%) and disorderly conduct (males, 29.4%; females, 35.3%) increased significantly for both males and females, whereas property crimes increased amongst males only (4.8%) (Callaghan, Gatley, Sanches, & Benny, 2016). Figure 4 summarizes the effects of the MLDA on a range of different crimes.

When examining major sexual assault crimes documented in the Uniform Crime Reporting Survey, nationally and in provinces where the MLDA is 19 years of age, the perpetration of sexual assault crimes increased significantly for males just older than the MLDA compared to males just younger than the MLDA (31.9% and 56.0% respectively). For females, there was no indication that the MLDA had an impact on the perpetration of sexual assault crimes (Gatley, Sanches, Benny, Wells, & Callaghan, in press). When looking at police-reported crime victimizations in Canada both males and females just older than the MLDA were more likely to be victims of violent crimes (e.g., homicide, assault and robbery) and of all crimes compared to those just younger than the MLDA (10.4–13.5%) (Benny, Gatley, Sanches, & Callaghan, in press).

Figure 4: Relative change (%) in the number of national criminal incidents immediately following the MLDA in Canada, 2009–2013



[a]The following crime categories were quasi-controls: cannabis-related violations and narcotics related violations.
Statistical significance, * *p*-value < 0.05; ** *p*-value < 0.01; *** *p*-value < 0.001.
Reproduced from Callaghan, Gatley, Sanches, & Benny, 2016, with permission from Elsevier.

An examination of alcohol-impaired driving crimes demonstrates that males exhibited immediate sharp increases in alcohol-impaired driving crimes in provinces with a MLDA of 18 years (43%) and

19 years (28 %) as did females in provinces where the MLDA is 18 years (40%), but not in provinces where the MLDA is 19 years (Callaghan, Gatley, Sanches, Asbridge, & Stockwell, 2016). There was little evidence to suggest that the MLDA had a significant impact on reducing other driving related crimes such as dangerous operation of a vehicle, drug-impaired driving and other driving-related violations except for a significant increase in other driving violations among males (Callaghan, Gatley, Sanches, Asbridge, & Stockwell, 2016; Callaghan, Gatley, Sanches, & Benny, 2016).

Conclusions

Currently, Canadian young people transitioning across the MLDA experience a range of serious and immediate increases in alcohol-related harms. Through a series of Canadian studies, Callaghan and colleagues demonstrate that when young people gain legal access to alcohol they incur an increased number of negative outcomes ranging from serious alcohol-related events requiring inpatient hospital and ER services, alcohol-impaired driving crimes and victimization, as well as death. These findings also indicate a differential impact of the MLDA by gender. The more severe patterns of alcohol-related harms seen among young men might be attributable to their greater propensity for general risk-taking behaviour, including drinking before driving and binge drinking. However, recent trends in alcohol consumption and harms suggest that this gender gap might be closing (Freeman, Coe, & King, 2014; Perreault, 2013). It might be beneficial for prevention strategies to target this age group with tailored interventions that take into consideration gender differences in the harms experienced by this group. Prevention efforts will also need to be linked with other effective policy responses that target alcohol-related harms among young drinkers. For example, research in the United States has shown that MLDA legislation and zero tolerance laws have both independent and synergistic effects on the reduction of alcohol-related MVCs (Voas, Tippetts, & Fell, 2003).

These findings likely represent a conservative estimate of the impact of the MLDA. The data used in this series of studies captures the most severe outcomes and does not capture the less severe harms that do not require medical services and those not reported to police. Furthermore, it is possible that the effects of the MLDA have been attenuated by other overlapping policies such as graduated licensing programs, zero tolerance laws, and challenge and refusal practices that also target underage drinking. Overall, through this program of research, Callaghan and colleagues conclude that substantial benefits can be gained by raising the Canadian MLDA to 19 or 21 years.

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