

MARIJUANA USE AMONG DRIVERS IN CANADA, 2000-2017

TIRF'S NATIONAL FATALITY DATABASE

Traffic Injury Research Foundation, November 2020

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Introduction

Public concern about drug-impaired driving has increased in recent years. Almost seven out of 10 Canadians (68.8%) were very or extremely concerned about drugged drivers according to TIRF's Road Safety Monitor (RSM) in 2020. In comparison, only 59.5% of respondents were concerned about this issue as recently as 2014 (Woods-Fry et al. 2020). This high level of concern is warranted. For example, studies have shown the psychoactive chemical delta-9tetrahydrocannabinol (or THC) enters the user's bloodstream and brain immediately after smoking marijuana. Impairing effects of THC on driving performance may include variability in driving speed, lane weaving, increased variability in headway, and increased reaction times (Hartman 2016). In addition, research investigating drivers in fatal crashes has demonstrated that THC-positive drivers are more than twice as likely to crash as THC-free drivers (Grondel 2016). Common errors committed by THC-positive drivers in multi-vehicle crashes included failure to stay in the proper lane and driving too fast for conditions (Chihuri & Li 2020). Moreover, evidence from

surveys of Canadian drivers suggests the prevalence of marijuana use is greater among 16-19 year old drivers than drivers in other age groups (Robertson et al. 2017). With the October 2018 legalization of recreational marijuana in Canada, continued monitoring of this issue is important to inform decision-making.

This fact sheet, sponsored by Desjardins, examines the role of marijuana in collisions involving fatally injured drivers in Canada between 2000 and 2017. Results are based upon data from TIRF's National Fatality Database and, unlike previous fact sheets, British Columbia data are included. Canada-wide results for all previous years have been re-calculated accordingly.¹

Trends in the use and characteristics of drivers using marijuana are explored in this fact sheet. Other topics that are examined include the presence of different categories of drugs among fatally injured drivers in different age groups, as well as comparisons of the presence of marijuana and alcohol among this population of drivers.²

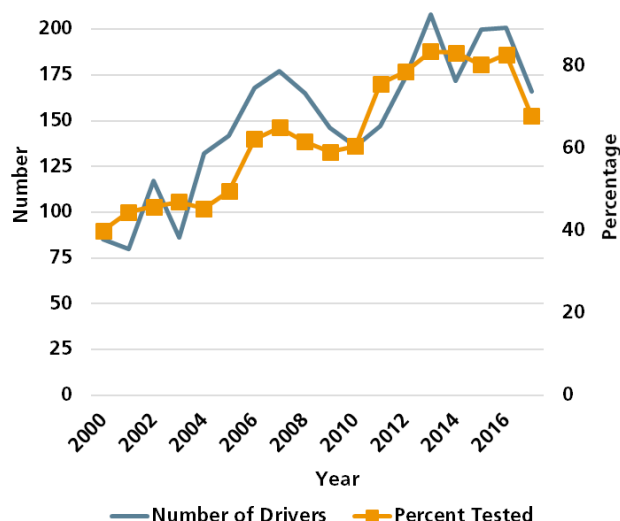
¹ When comparing this fact sheet with those published in previous years, slight differences in the data reported may be observed as fatality data from British Columbia are now included.

² Descriptions of drivers testing positive for marijuana and other substances indicate their presence in a driver's blood sample and not a specific amount.

Trends over time in marijuana use among fatally injured drivers

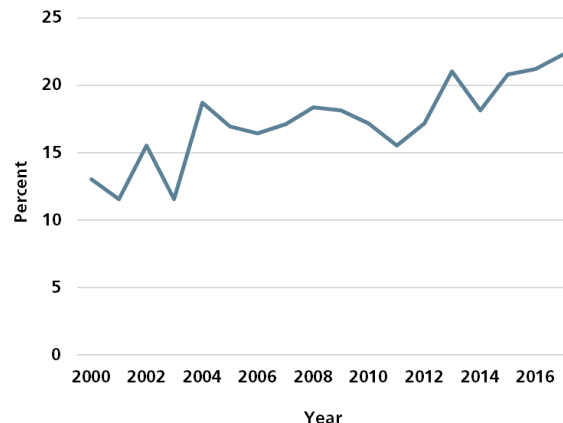
The number of fatally injured drivers who tested positive for marijuana from 2000 to 2017 and the percentage of fatally injured drivers who were tested for marijuana is shown in Figure 1. In this regard, positive results for marijuana use refer to the presence of any level of marijuana in a driver's blood or urine sample. However, positive results do not necessarily indicate impairment while driving since it cannot be determined how long the substance was ingested prior to driving. A total of 85 fatally injured drivers tested positive for marijuana in 2000. This number generally increased to 210 in 2013, then declined to 175 in 2017. Of importance, only 52.5% of fatally injured drivers killed between 2000 and 2010 were tested for drugs, compared to 79.6% between 2011 and 2017. Therefore, these results should be interpreted with caution.

Figure 1: Fatally injured drivers who tested positive for marijuana compared to testing rates, Canada, 2000-2017



Trends related to the percentage of marijuana-positive drivers among all fatally injured drivers who were tested for the presence of drugs is shown in Figure 2. Among those drivers tested for drugs, 13.1% of fatally injured drivers were positive for marijuana in 2000. This percentage generally increased to 20.5% in 2017.

Figure 2: Percentage of fatally injured drivers who tested positive for marijuana, Canada, 2000-2017

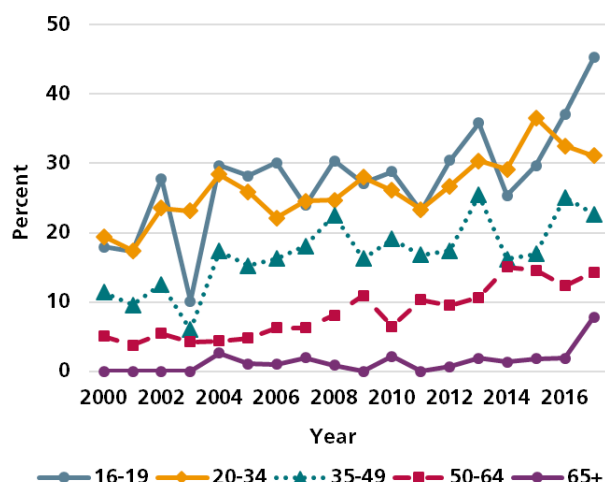


Characteristics of fatally injured drivers testing positive for marijuana

In this section, demographic factors were analyzed to determine their role in marijuana-related driver fatalities from 2000 to 2017. Fatally injured drivers who tested positive for marijuana were examined according to the age and sex of drivers. Comparisons were also made to data regarding the presence of alcohol use among fatally injured drivers.

The percentage of fatally injured drivers in each age group who tested positive for marijuana is shown in Figure 3. Drivers were grouped according to the following age categories: 16-19 years, 20-34 years, 35-49 years, 50-64 years, and 65+ years.

Figure 3: Percentage of fatally injured drivers testing positive for marijuana by age group, Canada, 2000-2017



and older. The percentage of fatally injured 16-19 year old drivers that tested positive decreased from 17.9% in 2000 to a low of 10.1% in 2003, then peaked at 41.4% in 2017. The proportion of fatally injured drivers aged 20-34 years that tested positive generally increased from 19.4% in 2000 to its highest level at 36.3% in 2015, then declined to 28.6% in 2017.

The percentage of fatally injured 35-49 year old drivers that tested positive for marijuana decreased from 11.4% in 2000 to 6.0% in 2003, then generally rose to 21.8% in 2017. For fatally injured 50-64 year old drivers, the percentage rose from 5.1% in 2000 to 15.0% in 2014 before decreasing to 12.8% in 2017. Fatally injured drivers aged 65 and older have also consistently had lower than average percentages of fatally injured drivers testing positive for marijuana. Throughout this 18-year period, a very small percentage tested positive for marijuana, ranging from 0.0% to 2.2%, before rising sharply to 6.9% in 2017.

In summary, the 16-19 year old age group had the highest percentage of fatally injured drivers testing positive for marijuana (41.4% in 2017). However, it should also raise concern that higher percentages of drivers aged 20-34 have tested positive for marijuana (28.6% in 2017) in recent years.

The percentage of male and female fatally injured drivers who tested positive for marijuana is compared in Figure 4. Throughout this 18-year period, males were more likely than females to test positive. The percentage of fatally injured male

drivers who tested positive generally increased from 14.4% in 2000 to 23.1% in 2017. The percentage of fatally injured female drivers who tested positive increased from 6.4% in 2000 to 17.0% in 2013 and decreased again to 11.3% in 2017. Although there was a general increase for both sexes from 2010 to 2014 in the percentage of fatally injured drivers who tested positive for marijuana, in more recent years there has been an increase among male drivers and a decrease among female drivers.

Trends in marijuana use versus alcohol use among fatally injured drivers are compared in Figure 5; it shows the percentage of fatally injured drivers that tested positive for each of these substances. A larger percentage of fatally injured drivers tested positive for alcohol than marijuana between 2000 and 2017. In 2000, more than one-third (35.4%) of fatally injured drivers tested positive for alcohol compared to 13.1% who tested positive for marijuana. However, from 2008 to 2017, the percentage of fatally injured drivers who tested positive for alcohol generally decreased (from 38.4% to 30.1%), while the percentage of those drivers who tested positive for marijuana increased (from 18.4% to 20.5%).

Figure 4: Percentage of fatally injured drivers testing positive for marijuana by sex, Canada, 2000-2017

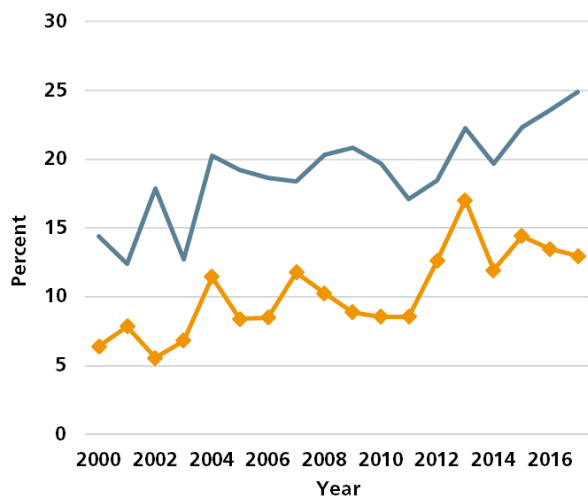
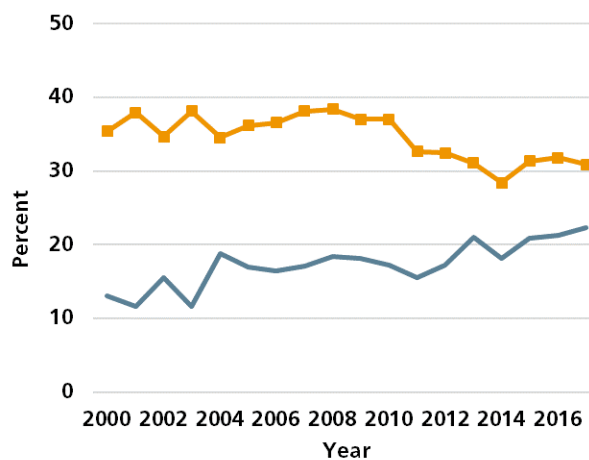


Figure 5: Percentage of fatally injured drivers testing positive for marijuana and for alcohol, Canada, 2000-2017



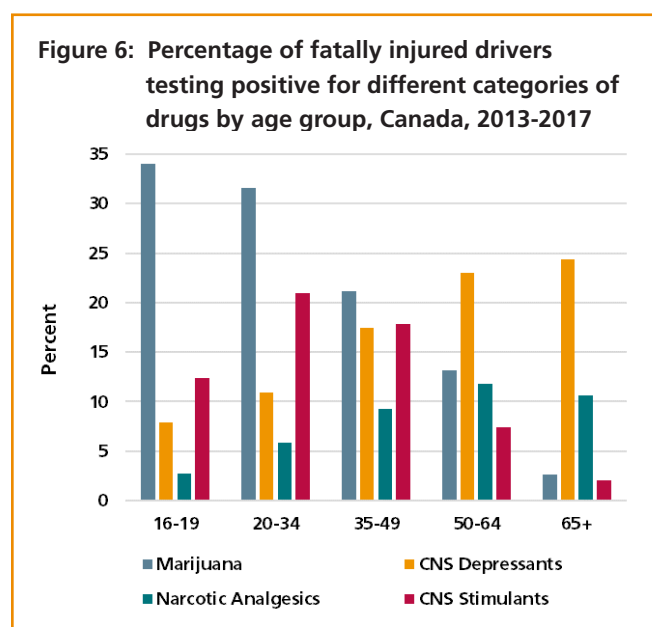
Marijuana and other types of drugs used by fatally injured drivers by age group

Drugs are categorized according to the Drug Evaluation Classification (DEC) program which has been adopted by police services throughout North America. The program was developed by the International Association of Chiefs of Police (IACP) and the National Highway Traffic Safety

Administration (NHTSA). This classification system is based upon common signs and symptoms associated with the presence of different types of drugs (Jonah 2012). The seven drug categories are:

- > Cannabis (marijuana);
- > Central nervous system (CNS) depressants (e.g., benzodiazepines and antihistamines);
- > Central nervous system (CNS) stimulants (e.g., cocaine, amphetamines, and ecstasy);
- > Hallucinogens (e.g., LSD, magic mushrooms);
- > Dissociative anesthetics (e.g., ketamine and phencyclidine);
- > Narcotic analgesics (e.g., morphine, fentanyl, heroin, codeine, oxycodone); and,
- > Inhalants (e.g., toluene, gasoline, cleaning solvents).

The percentage of fatally injured drivers in each age group who tested positive for each drug type during a five-year period from 2013 to 2017 is presented in Figure 6. The drug types shown are marijuana, CNS depressants, narcotic analgesics, and CNS stimulants. Since less than 2.0% of fatally injured drivers tested positive for dissociative anesthetics, hallucinogens, and inhalants, these drug categories are not included in the figure.

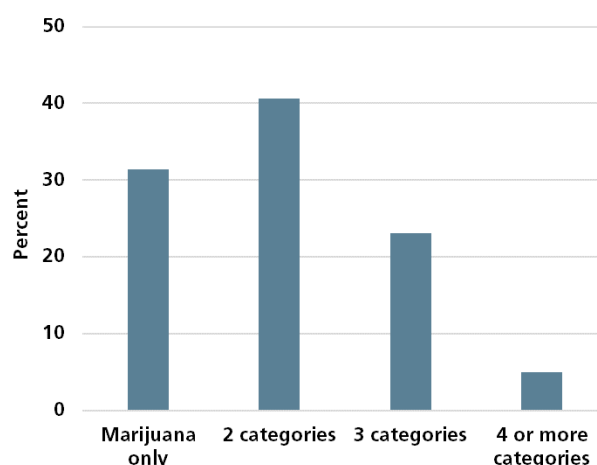


Marijuana was the drug most commonly detected among 16-19, 20-34, and 35-49 year old drivers (33.7%, 31.4%, and 21.2% respectively). The prevalence of marijuana among fatally injured 16-19 year old drivers is similar to levels reported in

previous analyses of fatally injured drivers (Brown et al. 2019). This finding is also consistent with an online survey of Canadian drivers showing marijuana use was more prevalent among 16-19 year old drivers (6.1%) as compared to drivers aged 25-44 years (2.8%), 46-64 years (0.9%), and over age 65 (0.1%) between 2002 and 2015 (Robertson et al. 2017). Only 2.6% of fatally injured drivers aged 65 years and older tested positive for marijuana.

CNS depressants were the type of drug most commonly found among fatally injured drivers aged 50-64 and 65 and older (22.4% and 24.0% respectively). Drivers aged 35-49 were the most likely to test positive for CNS stimulants (17.5%), and narcotic analgesics were most commonly found among fatally injured drivers aged 50-64 (11.7%) and 65 and older (10.5%).

Figure 7: Percentage of fatally injured drivers testing positive for marijuana who were also positive for other types of drugs, Canada, 2013-2017

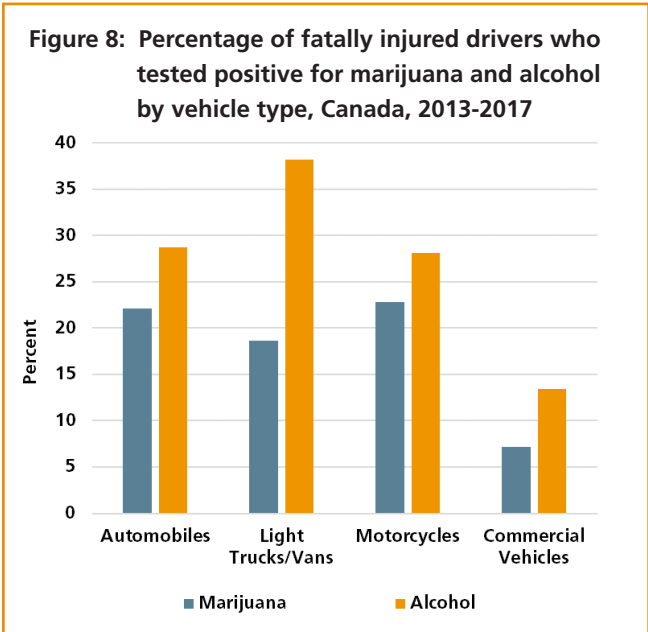


Recent research on self-reported driver behaviour shows almost one-third of respondents who admitted to driving after using marijuana also claimed to have been drinking (Robertson et al. 2018). Figure 7 shows the prevalence of other drug category use among fatally injured drivers who tested positive for marijuana between 2013 and 2017. Less than one-third of fatally injured drivers testing positive for marijuana (30.0%) only tested positive for that drug type. Over two-fifths (42.0%) of these drivers tested positive for marijuana and a second substance (2 categories). Although it is not shown in the figure, 69.4% of fatally injured drivers who tested positive for two categories of drugs were positive for marijuana and alcohol. Among

fatally injured drivers testing positive for marijuana, 22.5% were positive for three different categories of drugs (most commonly marijuana, alcohol, and CNS stimulants). A smaller percentage (5.5%) of fatally injured drivers testing positive for marijuana used four different categories of drugs.

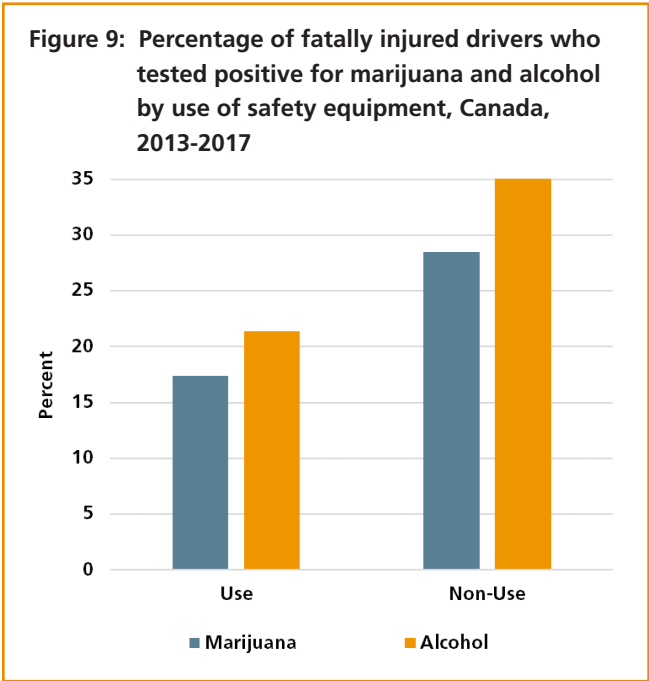
Characteristics of collisions involving drivers testing positive for marijuana or alcohol

Patterns of marijuana use versus alcohol use among fatally injured drivers were compared during the same five-year period (2013-2017). Characteristics were examined including the type of vehicle driven by the fatally injured driver and the number of passengers in that driver's vehicle. The percentage of drivers of different vehicles that tested positive for marijuana or alcohol during this five-year period is presented in Figure 8. The vehicle types are: automobiles, light trucks/vans, motorcycles, and commercial vehicles (heavy trucks and tractor-trailers). As can be seen, fatally injured drivers of light trucks/vans were more than twice as likely to test positive for alcohol (37.8%) than marijuana (18.5%). Among fatally injured automobile drivers, motorcyclists and commercial vehicle drivers, a larger percentage tested positive for alcohol than marijuana although the difference was not as pronounced.



The use or non-use of safety equipment among fatally injured drivers was also compared in terms of positive test results for marijuana and alcohol. In Figure 9, it can be seen that among fatally injured drivers using safety equipment (seatbelts/helmets),

17.4% tested positive for marijuana and 21.4% tested positive for alcohol. Among fatally injured drivers who did not use safety equipment, 28.5% tested positive for marijuana while 50.9% tested positive for alcohol.



Lastly, Figure 10 shows a comparison of fatally injured drivers testing positive for marijuana and alcohol by day of the week. Weekday crashes are those which occurred between 6 p.m. on Sunday to 5:59 pm on Friday while weekend crashes occurred between 6 p.m. on Friday to 5:59 p.m. on Sunday. Among fatally injured drivers dying in weekday crashes, 19.0% tested positive for marijuana and 24.6% tested positive for alcohol. In weekend crashes, 23.5% of fatally injured drivers tested positive for marijuana compared to 42.9% that tested positive for alcohol.

Conclusions

In the past 18 years, the percentage of fatally injured drivers in Canada who tested positive for marijuana has generally increased. Historically, fatally injured drivers aged 16-19 years were most likely to test positive for marijuana. Of particular concern is the steady increase in the percentage of fatally injured drivers aged 16-19 testing positive for marijuana since 2014. Although the percentage of fatally injured drivers aged 20-34 years testing positive for marijuana has decreased since 2015, this age group still has the second highest proportion. Addressing this behaviour among 20-34 year old

drivers may require different approaches in terms of enforcement and education.



Driver sex explains differences in the magnitude of marijuana use among fatally injured drivers. In particular, fatally injured male drivers were almost twice as likely to test positive for marijuana than fatally injured female drivers. Trends among male and female fatally injured drivers, particularly since 2014, show increases in the percentage of fatally injured male drivers testing positive for marijuana while there has been a decrease in the percentage of fatally injured female drivers testing positive. Continued scrutiny will be needed as this may suggest that male drivers are more willing to drive while positive for marijuana than female drivers.

Between 2000 and 2017, a larger percentage of fatally injured drivers tested positive for alcohol than for marijuana. Generally speaking, between 2008 and 2014, the percentage of alcohol-positive drivers decreased while the percentage of marijuana-positive drivers increased. More recently, however, there has been an upward trend in fatally injured marijuana-positive drivers while reductions in the percentage of alcohol-positive drivers appears to have stalled. This is cause for concern.

Another challenge that requires attention is that two-thirds of all fatally injured drivers testing positive for marijuana also tested positive for at least one other impairing substance, most commonly alcohol. Furthermore, non-use of safety equipment is not uncommon among this group of drivers.

Thus, convincing these drivers not to drive after using marijuana may be just one issue that needs concerted efforts.

In conclusion, the increasing trend in the percentage of fatally injured drivers testing positive for marijuana is concerning, especially considering the combination with alcohol, which has been demonstrated to increase crash risk exponentially (Drummer et al. 2020). Persistent multi-substance use of marijuana with alcohol among fatally injured drivers appears to be quite common based on data from TIRF's National Fatality Database. The most recent data year available today for these indicators is 2017, which is one year before the legalization of the recreational use of marijuana. Other types of indicators such as self-reported use provide more recent data and suggest the use of marijuana while driving continues to increase (Woods-Fry et al. 2020). It is anticipated the number and percent of fatally injured drivers testing positive may continue to increase unless effective prevention strategies and countermeasures are implemented. In addition, continued monitoring of marijuana use is essential. Equally important, the percentage of fatally injured drivers testing positive for alcohol is still higher (30.1% versus 20.5%) and has generally plateaued since 2014. Clearly the continued tracking of indicators regarding both substances, and their combined use, remains a top priority.

References

- Brown, S.B., Vanlaar, W.G.M., Robertson, R.D. (2019). The Alcohol and Drug-Crash Problem in Canada 2015 Report. Ottawa, ON.: Canadian Council of Motor Transport Administrators.
- Brown, S.B., Vanlaar, W.G.M., Robertson, R.D. (2019). Marijuana Use Among Drivers in Canada, 2000-2016. Ottawa, ON.: Traffic Injury Research Foundation.
- Chihuri, S. Li, G. (2020). Direct and indirect effects of marijuana use on the risk of fatal 2-vehicle crash initiation. *Injury Epidemiology* 7(1): 49.
- Drummer, O.H., Gerostamoulos, D., Di Rago, M., Woodford, N.W., Morris, C., Frederiksen, T., Jachno, K., Wolfe, R. (2020). Odds of culpability associated with use of impairing drugs in injured drivers in Victoria, Australia. *Accident Analysis and Prevention* 135: 105-389.

Grondel, D. (2016). Driver Toxicology Testing and the Involvement of Marijuana in Fatal Crashes, 2010-2014: A Descriptive Report. Olympia, WA.: Washington Traffic Safety Commission.

Hartman, R.L., Richman, J.E., Hayes, C.E., Huestis, M. A. (2016). Drug Recognition Expert (DRE) examination characteristics of cannabis impairment. Accident Analysis & Prevention, 92, 219-229.

Jonah, B. (2012). Drugs and Driving Framework. Ottawa, ON.: Canadian Council of Motor Transport Administrators.

Robertson, R.D., Mainegra Hing, M., Pashley, C.R., Brown, S.W., Vanlaar, W.G.M. (2017). Prevalence and trends of drugged driving in Canada. Accident Analysis and Prevention 99: 236-241.

Woods-Fry, H., Vanlaar, W.G.M., Lyon, C., Brown, S., Robertson, R.D. (2020). Road Safety Monitor 2020: Trends in Marijuana Use Among Canadian Drivers. Ottawa, ON.: Traffic Injury Research Foundation.

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