

MARIJUANA USE AMONG DRIVERS IN CANADA, 2000-2014

Traffic Injury Research Foundation, December 2017

Introduction

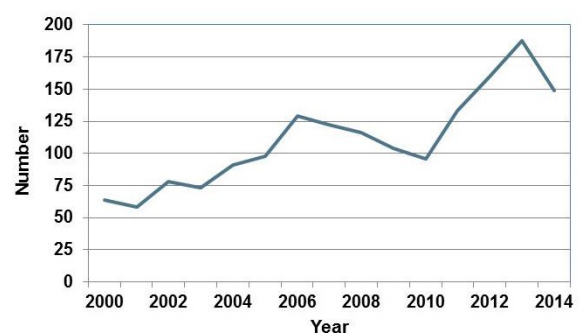
Public concern about drug-impaired driving in general and marijuana-impaired driving in particular has increased in recent years. Marijuana studies have shown that the psychoactive chemical delta-9-tetrahydrocannabinol (or THC) enters the user's bloodstream and brain immediately after smoking or consuming marijuana, and has impairing effects. In addition, research on drivers in fatal crashes has shown that THC-positive drivers are more than twice as likely to crash as THC-free drivers (Grondel 2016). There is also evidence from surveys of Canadian drivers suggesting that the prevalence of marijuana use is greater among 16-19 year old drivers than drivers in other age groups (Robertson et al. 2017).

In light of this concern, this fact sheet, sponsored by Desjardins Insurance, examines the role of marijuana in collisions involving fatally injured drivers in Canada between 2000 and 2014. Data from TIRF's National Fatality Database were used to prepare this fact sheet which explores trends in the use of marijuana among fatally injured drivers, and the characteristics of these drivers.¹ Other topics that are examined include the presence of different categories of drugs among fatally injured drivers in different age groups, and the combined presence of marijuana and alcohol among this population of drivers.

Trends in marijuana use among fatally injured drivers

The number of fatally injured drivers who tested positive for marijuana from 2000 to 2014 is displayed in Figure 1. In 2000, 64 fatally injured drivers tested positive for marijuana. This number increased to 129 in 2006, decreased to 96 in 2010, and reached a higher peak at 188 in 2013 before decreasing to 149 in 2014. Since a much smaller percentage of drivers (37.0% to 62.1%) that were killed in road crashes were tested for drugs between 2000 and 2010, as compared to a much larger percentage (73.9% to 82.9%)

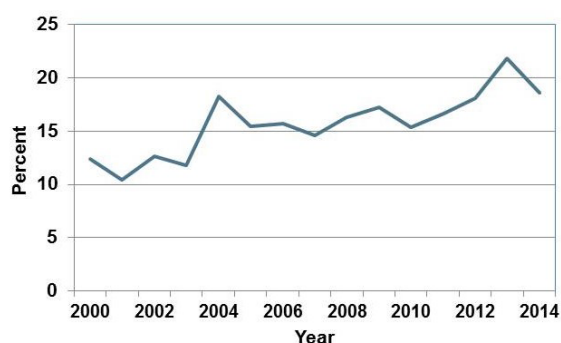
Figure 1: Number of fatally injured drivers who tested positive for marijuana: Canada, 2000-2014



that were tested between 2011 and 2014, these results should be interpreted with caution. A much larger absolute number of drivers were tested for marijuana during this latter period, thus, it would be expected that from 2011 to 2014, the absolute number of fatally injured drivers who tested positive for marijuana would be larger than during the earlier period.

An analysis of trends related to the percentage of marijuana-positive drivers among all fatally injured drivers who were tested for the presence of drugs was also conducted. Figure 2 shows the percentage of fatally injured drivers in this group that tested positive for marijuana. Among those drivers tested for drugs, 12.4% of fatally injured drivers were positive for marijuana in 2000. This percentage decreased to 10.4% in 2001, and gradually rose to its highest level in 2013 (21.9%) before declining in 2014 to 18.6%.

Figure 2: Percentage of fatally injured drivers who tested positive for marijuana: Canada, 2000-2014



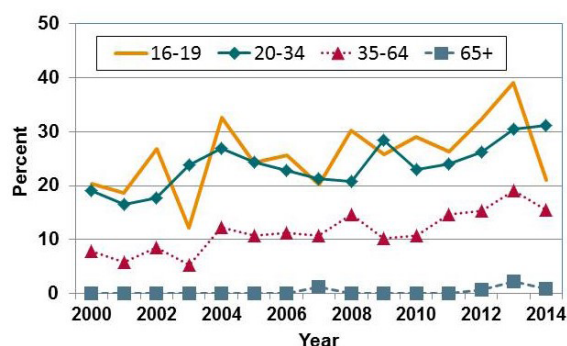
Characteristics of fatally injured drivers testing positive for marijuana

In this section, demographic factors were analyzed to determine their role in marijuana-related driver fatalities from 2000 to 2014. Fatally injured drivers that tested positive for marijuana were examined according to the age and sex of drivers. These results were further compared 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 from 2000-2014 is shown in Figure 3. Drivers were grouped according to the following age categories: 16-19 years, 20-34 years, 35-64 years, and 65 years and older. The percentage of fatally injured 16-19 year old drivers that tested positive for marijuana

generally decreased from 2000 (20.4%) to its lowest level in 2003 (12.1%), but then gradually rose to its highest level in 2013 (39.1%) before decreasing to 21.1% in 2014.

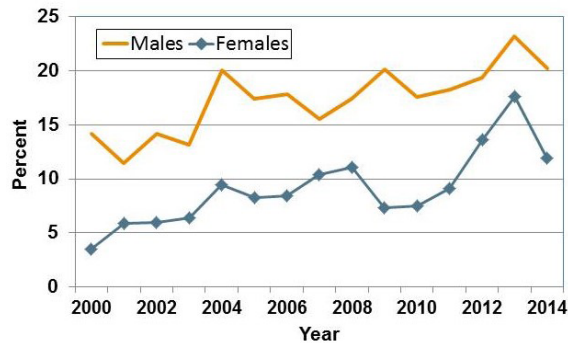
Figure 3: Percentage of fatally injured drivers testing positive for marijuana by age group: Canada, 2000-2014



The proportion of fatally injured drivers aged 20-34 years that tested positive for marijuana generally increased from 2000 (19.0%) to its highest level in 2014 (31.3%). Similarly, there has been a general increase in the percentage of fatally injured 35-64 year old drivers who tested positive for marijuana between 2000 (7.8%) and 2014 (15.5%). In sharp contrast, throughout this 15-year period, a very small percentage of fatally injured drivers aged 65 and older tested positive for marijuana (ranging from 0.0% to 2.3%).

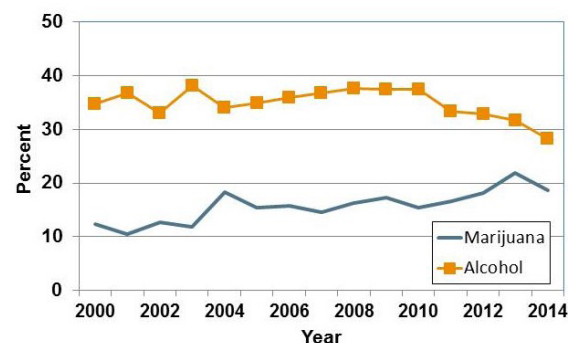
The percentage of male and female fatally injured drivers who tested positive for marijuana from 2000 to 2014 is compared in Figure 4. Throughout this 15-year period, males were more likely than females to test positive for marijuana. Among fatally injured male drivers, the percentage of drivers who tested positive for marijuana generally increased from 2000 (14.2%) to its highest level in 2013 (23.2%), before decreasing in 2014 (20.2%). Similarly, the percentage of fatally injured female drivers who tested positive for marijuana increased between 2000 (3.5%) and 2013 (17.6%), before decreasing in 2014 to 11.9%. Although there was a decrease from 2013 to 2014 in the percentage of male and female fatally injured drivers who tested positive for marijuana, the decrease among female drivers appears to be more pronounced.

Figure 4: Percentage of fatally injured drivers testing positive for marijuana by sex: Canada, 2000-2014



Trends in marijuana use and 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 between 2000 and 2014. A larger percentage of fatally injured drivers tested positive for alcohol as compared to marijuana during this 15-year period. In 2000, more than one-third (34.8%) of fatally injured drivers tested positive for alcohol compared to just 12.4% who tested positive for marijuana. However, from 2010 to 2013, the percentage of fatally injured drivers who tested positive for alcohol consistently decreased (from 37.6% to 31.6%), while the percentage of those drivers who tested positive for marijuana increased (from 15.4% to 21.9%). By 2014, the percentages of fatally injured drivers who tested positive for alcohol (28.4%) and marijuana (18.6%) had both declined.

Figure 5: Percentage of fatally injured drivers testing positive for marijuana and for alcohol: Canada, 2000-2014



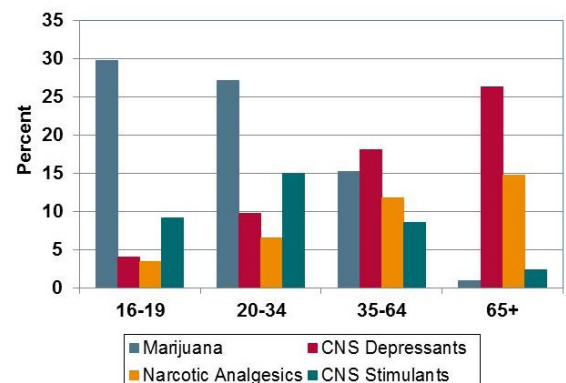
Marijuana and other types of drugs used by fatally injured drivers by age group

Drugs are categorized according to the Drug Evaluation Classification (DEC) program which has been adopted by police services throughout North America. 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 depressants (e.g., benzodiazepines and antihistamines);
- > central nervous system 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 (2010-2014) period is presented in Figure 6. The drug types shown are marijuana, CNS depressants, CNS stimulants and narcotic analgesics. Less than 2.0% of fatally injured drivers tested positive for dissociative anesthetics, hallucinogens, and inhalants, hence, data related to these drug categories are not shown.

Figure 6: Percentage of fatally injured drivers testing positive for different categories of drugs by age group: Canada, 2010-2014



Marijuana was the drug most commonly detected among 16-19 and 20-34 year old drivers (29.8% and 27.2%, respectively). The prevalence of marijuana among fatally injured 16-19 year old drivers is similar to levels that were reported in previous analyses of fatally injured drivers (TIRF 2014). This finding is also consistent with an online survey of Canadian drivers that showed 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). Less than 1.0% of fatally injured drivers aged 65 years and older tested positive for marijuana.

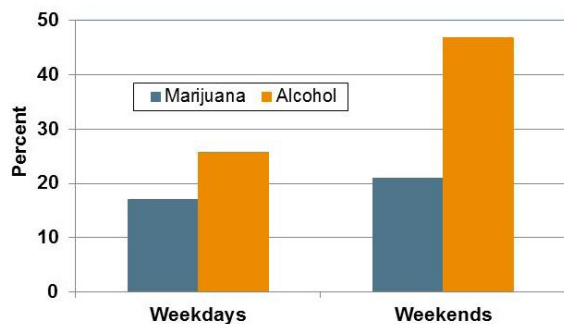
CNS depressants were the type of drug most commonly found among fatally injured drivers aged 35-64 and 65 and older (18.1% and 26.3% respectively). Drivers aged 20-34 were the most likely to test positive for CNS stimulants (15.0%), and narcotic analgesics were most commonly found among fatally injured drivers aged 65 and older (14.6%).

Characteristics of collisions involving drivers testing positive for marijuana and alcohol

Patterns of marijuana use and alcohol use among fatally injured drivers were compared during a five-year period (2010-2014). Characteristics that were examined included the type of day (weekdays versus weekends) and hours of day that collisions occurred. Weekday collisions were defined as those which occurred between 6:00 p.m. on Sunday to 5:59 p.m. on Friday whereas weekend collisions are defined as those which occurred between 6:00 p.m. on Friday to 5:59 p.m. on Sunday.

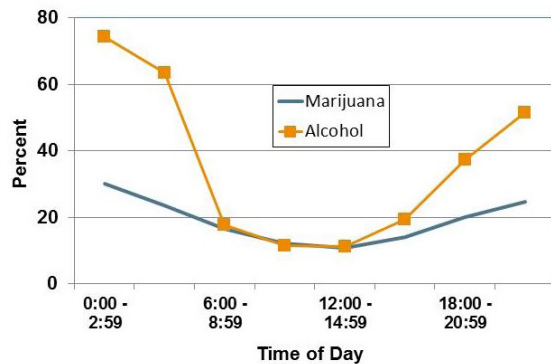
Figure 7 compares drivers killed in weekday versus weekend crashes from 2010 to 2014 and the percentages that were positive for marijuana and alcohol. Drivers that died in weekend crashes (20.9%) were slightly more likely to test positive for marijuana than those who died in weekday crashes (17.0%). There was a more pronounced difference in terms of the presence of alcohol with almost half (45.8%) of fatally injured drivers in weekend crashes who tested positive compared to approximately one-quarter (25.8%) of drivers killed in weekday crashes.

Figure 7: Percentage of fatally injured drivers in weekend and weekday crashes who tested positive for marijuana and alcohol: Canada, 2010-2014



An analysis was also performed to identify any variations based upon the time that collisions occurred in relation to the percentage of fatally injured drivers who tested positive for marijuana versus alcohol between 2010 and 2014. The results are presented in Figure 8. Collision times were divided into three-hour increments on a 24-hour scale. The largest percentage of drivers who tested positive for marijuana and who tested positive for alcohol were involved in collisions which occurred between midnight and 2:59. An almost identical proportion of drivers tested positive for marijuana and alcohol for the three time periods between 6:00 and 14:59. After this time of day, there was an increase in the percentage of both drivers who tested positive for marijuana and those who tested positive for alcohol until 23:59. Although there was a greater likelihood that drivers tested positive for both substances in collisions that occurred between midnight and 2:59, a larger percentage of drivers tested positive for alcohol (74.3%) than for marijuana (30.0%). For collisions which occurred just prior to midnight (21:00 to 23:59), more than half of drivers were positive for alcohol (51.6%) compared to 24.8% who tested positive for marijuana.

Figure 8: Percentage of fatally injured drivers who tested positive for marijuana and alcohol by time of day: Canada, 2010-2014



Conclusions

In the past 15 years, there has been a steady increase in the percentage of fatally injured drivers in Canada who tested positive for marijuana. Generally speaking, drivers aged 16-19 years were the age group of fatally injured drivers who were most likely to test positive for marijuana. However, in 2014, a larger percentage of fatally injured drivers aged 20-34 years tested positive. Continued monitoring is required to determine whether the presence of marijuana in fatally injured drivers aged 20-34 remains higher as compared to the prevalence in younger drivers aged 16-19.

Trends in the percentage of male and female fatally injured drivers who tested positive for marijuana from 2000 to 2014 were similar in terms of annual increases and decreases. However, throughout this 15-year period, males were twice as likely as females to test positive for marijuana. While driver sex may explain differences in the magnitude of marijuana use among fatally injured drivers, it does not appear to account for differences in trends.

Between 2000 and 2014, a larger percentage of fatally injured drivers tested positive for alcohol than for marijuana. There was a four-year period (2010-2013) during which the percentage of alcohol-positive drivers decreased while the percentage of marijuana-positive drivers increased. Trends in the prevalence of these substances among fatally injured drivers warrant further attention.

Almost one-third of fatally injured drivers aged 16-19 tested positive for marijuana which is comparable to data reported previously. Notably,

the percentage of drivers aged 20-34 years who tested positive was almost as large. This suggests that education programs that have been developed to reduce marijuana use among 16-19 year old drivers may also be appropriate to address marijuana-impaired driving among this older age group. Conversely, fatally injured drivers aged 35-64, and aged 65 and older were more likely to test positive for CNS depressants and narcotic analgesics. Although programs to reduce marijuana use among older age drivers do not appear necessary at this time, continued monitoring of trends is needed to track whether the prevalence of marijuana use will increase across age categories. Furthermore, a 'one size fits all' approach to reduce any kind of drug-impaired driving among all age groups may not resonate equally throughout the driving population.

Similar to alcohol, a larger percentage of drivers tested positive for marijuana on weekends as opposed to weekdays and at night as opposed to daytime. However, it should be noted that the differences were less pronounced for drivers who tested positive for marijuana than for alcohol. This suggests targeting drivers by time of day and day of week may be less effective for marijuana impaired driving than alcohol impaired driving.

To summarize, an increasing percentage of fatally injured drivers in Canada tested positive for marijuana in recent years whereas a decreasing percentage of these drivers tested positive for alcohol. Nevertheless, despite such opposite trends, the percentage of alcohol-positive fatally injured drivers remains larger than the proportion of drivers who tested positive for marijuana. In addition, the incidence of marijuana use appears greater among drivers in younger age groups that are involved in crashes on weekends and night-time, however, these indicators were not as reliable to predict marijuana use as they were to predict alcohol use. Ongoing analysis of data in future years is needed to monitor progress in reducing marijuana-impaired driving.

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¹ Fatality data from British Columbia from 2011 to 2014 were not available at the time that this fact sheet was prepared. As a result, Canadian data presented have been re-calculated to exclude this jurisdiction and make equitable comparisons.

Traffic Injury Research Foundation

The mission of the Traffic Injury Research Foundation (TIRF) is to reduce traffic-related deaths and injuries. TIRF is a national, independent, charitable road safety institute. Since its inception in 1964, TIRF has become internationally recognized for its accomplishments in a wide range of subject areas related to identifying the causes of road crashes and developing programs and policies to address them effectively.

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