# Toronto's Drunk Driving Incident Data Reveals Low Rates of Fatal Injuries*

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Drinking and driving is a dangerous offense committed daily by some of the residents of Toronto. The following document aims to investigate the number of drinking and driving incidents that occur in Toronto, their severities, and the evolution of the problem. The data spans over the years 2006-2021, has been found on opendatatoronto, and has been filtered to only include accidents in which alcohol was involved. The findings indicate that overall, the number of drinking and driving incidents has a downward trend, and that fatal injuries have been the least likely to occur every year when compared to the spectrum of injury-related accidents, including major, minor, and no injury. However, "major" injury types make up roughly 33% of all the alcohol related crashes in Toronto. By assessing the severity of the problem, hopefully, more funding and attention can be brought to preventative organizations such as MADD (Mothers Against Drunk Driving) and OSAID (Ontario Students Against Impaired Driving).

## Introduction

Drinking and driving is a well-known problem across the country leading to serious injuries and deaths of not only those who are driving impaired but other innocent civilians and drivers. Toronto is a well-developed city which offers some of the best public transit services in North America, as well as supporting ride-sharing applications such as Uber and Lyft. However, in 2019 Canada experienced a shocking 85,673 incidents involving impaired drivers Canada (2019), which was a 19% increase from 2018, and ended the downward trend that had started in 2011. The Canadian law does support some of the stricter laws pertaining to offenders caught driving while impaired, setting the blood alcohol limit to be 0.08 BAC (blood alcohol content), with a maximum penalty of $550 for first time offenders alongside an immediate roadside license suspension for 90 days Ontario.ca (2021). Additionally, subsequent offenders

*Github repo containing all data: https://github.com/jackchinski/analysis-of-torontos-vehicle-collisions

will have to undergo education and treatment programs or even be required to install an "ignition interlocking device" which is an in-car breathalyzer that prohibits the engine from firing if alcohol is detected. However, there is always room for improvement, and lessons can be learned from other countries such as France, where "If a blood sample demonstrates that the amount of alcohol is 0.08% or higher, the case becomes a criminal offense which could result in a €4,500 fine and up to two years in prison." Torontodui.com (2019). With strict laws, programs, and fines in place, Toronto has been making great progress in decreasing the amount of impaired driving year after year. However, the issue has not yet been eradicated, and after the increase of 2019, the problem is yet far from over. As such, groups composed of regular citizens like MADD (Mothers Against Drunk Driving) and OSAID (Ontario Students Against Impaired Driving), have made it their mission to decrease the number of drinking and driving incidents.

In this paper, I analyze and graph the records of "Motor Vehicle Collisions involving Killed or Seriously Injured Persons" from Toronto between the years 2006 and 2021. All of the data has been found on open.toronto.ca, which is a website hosting data information relating to the city of Toronto. The data has been filtered and cleaned to only include incidents that involved alcohol and an automobile. The data was then graphed using R's library ggplot2 to showcase the overall trends in drunk driving cases over the entire data collection period, as well as during each individual year for easier comparison. The findings indicate that there exists an overall downward trend of drunk driving in Toronto, and the increased penalties for offenders made after the 2019 rise in cases have been addressed well with a severe reduction in cases in the subsequent years as shown in Figure 2. The number of saved lives is unclear and cannot be known exactly, however, any number of lives saved is worth fighting for. In this paper, I will be analyzing the trends of drinking and driving incidents as well as potential influences on these trends using tables and graphs.

The entire repository containing all of the data included in this paper can be accessed on Github, link included on the first page.

## Data

In order to analyze the amount of drunk driving incidents in Toronto, I have gathered data from the data set "Motor Vehicle Collisions involving Killed or Seriously Injured Persons" from opendatatoronto. The following data set contains all of the information pertaining to all driving accidents that occur within the region of Toronto between the years 2006 and 2021. The entire data set contains 17,488 entries as of the writing of this document on February 1st, 2023. While filtering the data for entries that include both alcohol and an automobile, the data set narrows down to 755 cases. It is important to note the lack of depth of information that the data set provides. While the full data set includes a variety of information such as the location of the incident, the weather, and road conditions, it fails to address important information useful to this report such as the driver's BAC level or details of the injuries beyond the level of severity. However, as the included entries have met my selection criteria for the

data set, the assumption that the driver had approximately a 0.08% BAC can be inferred. Additionally, the following data set does not account for all occurrences of drunk driving in Toronto - only ones that have resulted in a crash and have been reported by the Toronto police department.

By using R (R Core Team 2022), and R packages such as "dplyr" (Wickham et al. 2022), "tidyverse" (Wickham et al. 2019), "knitr" (Xie 2021), I was able to extract data and clean it in order to create the desired visual depictions of the data as shown in Figure 1.

Figure 1: Number of Accidents (Minor, Major, Fatal) by Year

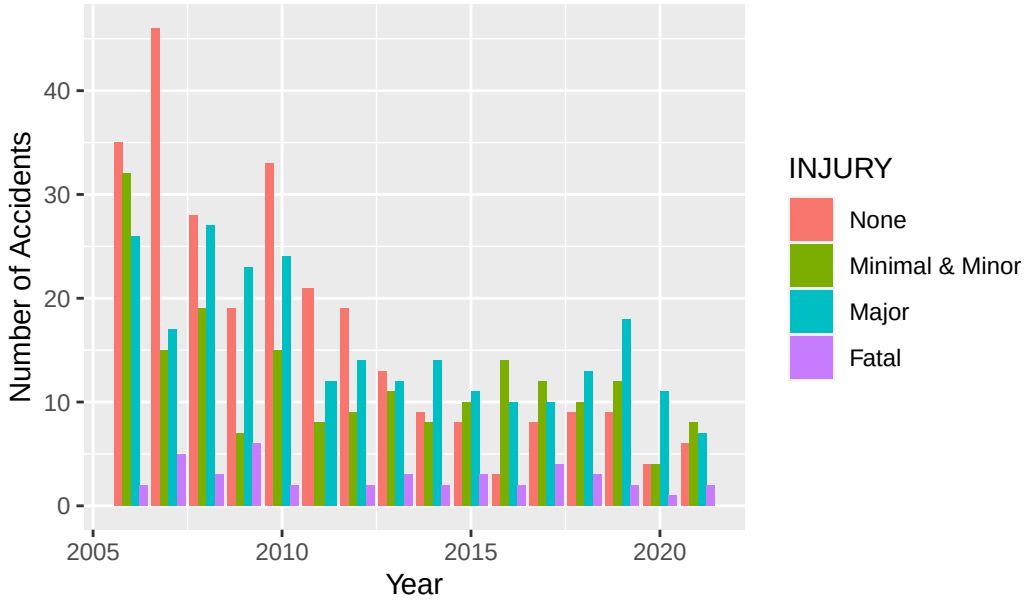


Figure 1 shows all of the incidents which involved drinking and driving between 2006 and 2021. The total number of incidents is equal to 755. The data set includes 4 columns; "year" representing the year in which the accident took place, "injury" representing the severity of the injury with the options being none, minor, minimal, major and fatal, and "automobile" representing a car and driver that was involved in the collision, and "alcohol" representing an alcohol related collision. For the purpose of better data visualization, I have decided to group together the two injury classes "minor" and "minimal" as there is no clear distinction between the two in the data set description, and in doing so space was made on the graph for a less compressed look. And for a clearer look in the number of incidents per year, Figure 2 depicts the number of each incident for every year in 2006-2021.

Figure 2: Type of Accidents Per Year

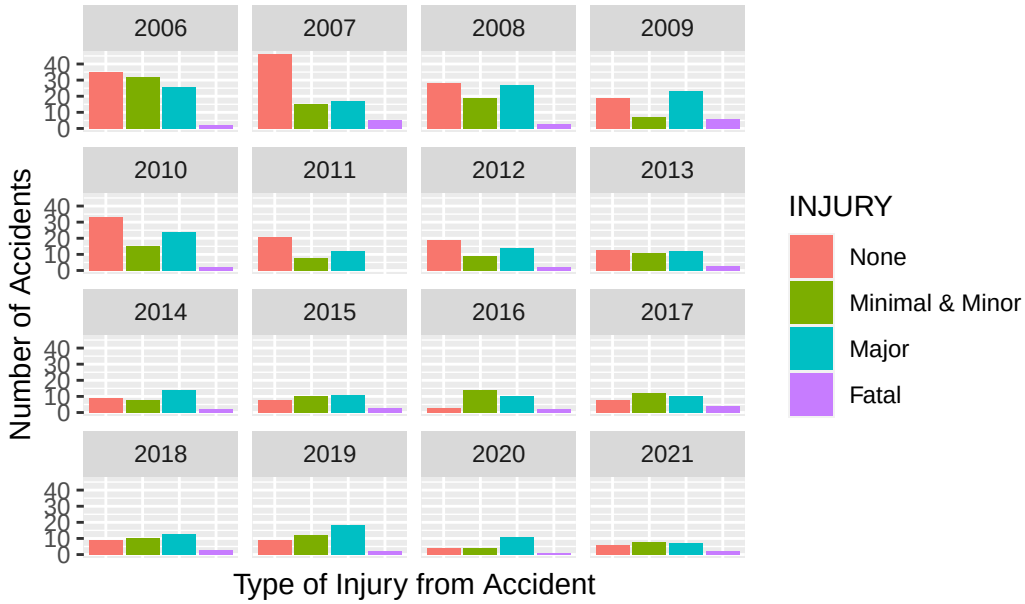


Figure 1 features the total numbers of all the drunk driving incidents, and Table 1 shows that of the 755 cases, only 42 of them were fatal, making up 5.56% of the total number of accidents. Subsequently, the "major" injury type is the second highest, with a total of 249 total cases, making up 33% of all accidents. Lastly, the "no injuries" category makes up a total of 270 cases, comprising 35.76% of all cases.

Table 1: Count of Toronto's Driving Incidents Involving Alcohol 2006-2021

| Injury.Type | Number.of.Incidents | Percent.Of.Total |
|---|---|---|
| None | 270 | 35.8% |
| Major | 249 | 33% |
| Minor | 131 | 17.3% |
| Minimal | 63 | 8.4% |
| Fatal | 42 | 5.6% |

## Discussion

The good news is that "fatal" injuries comprise the smallest group of injury type, and that "no injuries" comprise the second most common injury type. As such, fatal injuries as a result of drunk driving incidents are among the least likely to occur in terms of injury severity, and the death rate as a result of impaired driving has reached an all-time low since data collection began, falling an astounding 38% since 2018. Sadly, "major" injuries come in a close second

place to "no injuries", only trailing behind by 21 incidents as shown in Table 1. Additionally, the COVID-19 pandemic has had an impact on the number of cases that were reported, with a decrease of 14% in drunk driving cases overall. However, the reduction of drunk driving cases over the pandemic could be a result of less driving overall by Torontonians. According to the new stricter laws that were put in place after the 2018 spike in drunk driving incidents, as shown in Figure 2, the number of incidents has gone down in the following year, making the stricter laws a success.

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