Stronger Enforcement on Speeding: Analyzing Traffic Violations in Toronto*

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This paper examines Toronto's traffic ticket data from 2018 to 2023, identifying patterns in enforcement by offense type, demographics, and geography. Speeding and other Highway Traffic Act violations dominate ticket counts, with certain divisions showing higher concentrations. Trends in ticket issuance by age group and year highlight fluctuations, with notable increases during certain periods. These findings offer insights for improving law enforcement strategies, enhancing road safety, and optimizing resource allocation across the city.

Table of contents

*Code and data supporting this analysis is available at: https://github.com/cristinaasu/TorontoTicketsIssued

1 Introduction

As of 2021, around 1.107 million Toronto residents commuted by car, van, or truck, while 393,000 used public transport, underscoring the city's heavy reliance on vehicles for daily commuting (S. Canada 2023). With such a high volume of vehicular traffic, ensuring road safety is essential. This involves identifying patterns in traffic violations to target areas and groups with elevated incidents. Such approach can provide the foundation for more effective educational campaigns and enforcement strategies. For instance, a study by Castillo-Manzano et al. demonstrated that the implementation of a points-based driver's license system and increased police monitoring in Spain significantly reduced traffic violations and road fatalities (Castillo-Manzano et al. 2019). This demonstrates the potential for similar targeted interventions to improve road safety in Toronto.

In Ontario, traffic offenses are primarily regulated by the Highway Traffic Act or HTA, introduced in 1923. This provincial legislation classifies various traffic infractions and plays a critical role in maintaining road safety by setting out penalties and enforcement mechanisms (Optraffic 2024). This study investigates traffic ticket issued trends from 2018 to 2023, a period marked by significant changes in driving behavior, influenced by the COVID-19 pandemic and targeted safety initiatives such as "MarchSafe" (Lavoie 2022) and "Speed Kills" (Morton 2022a). Using publicly available data, the analysis focuses on the spatial distribution, demographic patterns, and offense categories of traffic tickets across the city, aiming to identify trends that can inform targeted interventions and policy adjustments to improve road safety.

The findings reveal significant disparities in ticket issuance across Toronto's divisions, with certain neighborhoods and age groups consistently receiving higher numbers of tickets. Additionally, the results underscore the need for stronger enforcement and educational campaigns to reduce speeding violations. This paper is organized as follows: Section Two outlines the data sources and the methods of analysis used. Section Three presents a critical analysis of the data, draws conclusions, and proposes further areas of exploration.

2 Data Analysis

To examine ticket issuance patterns in Toronto from 2018 to 2023, recorded data on tickets issued (Services 2024b) and Toronto Police divisions (Services 2024a) were acquired using the OpenDataToronto R package (Gelfand 2022), which sources data from the Toronto Open Data Catalogue. The tickets issued dataset, updated annually with records until August 2024, was generated from traffic tickets recorded by police officers during their daily enforcement activities. Each ticket issued was documented electronically or manually, capturing details such as the offense category, location, and demographic data. The Toronto Police divisions dataset was used solely for plotting geographic distributions in the mapping section of the analysis.

The datasets were cleaned using R (R Core Team 2022) and several of its packages: tidyverse (Wickham et al. 2019), janitor (Firke 2023), and sf (Pebesma 2018). To maintain data integrity, entries with unspecified division locations marked as "NSA" (No Specified Address) were excluded, as they generally denote occurrences outside the jurisdictional bounds of Toronto or those without a confirmed location. Additionally, entries categorized under "Unknown" within the age group variable were also omitted to enhance the reliability of demographic insights. After these adjustments, the tickets issued dataset was refined to include 15,672 observations (originally was 28,604); offence year, division, ticket type, offence category, tickets issued, and age group were made of interest for this analysis. A sample of the cleaned dataset is displayed in Table 1. For visual representation, the knitr (Xie 2014), kableExtra (Zhu 2024), ggplot2 (Wickham 2016), sf (Pebesma 2018) packages were utilized to generate tables, graphs and map.

Table 1: Sample of Toronto Tickets Issued Data

Offence Year	Division	Ticket Type	Offence Category	Age Group	Ticket Count
2018	D22	Prov Offence Summons Part III Form 104	Other HTA	Adult	1
2018	D11	Prov Offence Notice - Part I (Pot)	Other HTA	Adult	1
2018	D23	Prov Offence Notice - Part I (Pot)	Other HTA	Adult	1
2018	D22	Prov Offence Notice - Part I (Pot)	Other HTA	Adult	1
2018	D32	Prov Offence Summons Part III Form 104	Other HTA	Adult	1

Table 2 revealed a total of 1,145,119 tickets issued over a six-year period from 2018 to 2023, averaging 190,853 tickets annually with a standard deviation of 14,082. This variation suggests fluctuations in driving behaviors over time, perhaps influenced by changes in local regulations such as road safety campaigns.

Table 2: Summary Statistics

Statistic	Value
Total Tickets Issued	1,145,119
Mean Tickets Issued per Year	190,853.2
Standard Deviation of Yearly Tickets Issued	14,082.49

2.1 Ticket Distribution by Type

Starting with the distribution in the types of traffic tickets issued within Toronto, Figure 1 highlights that a substantial 93% of these tickets fall under Provincial Offence Notices - Part I (Pot), with the remaining 7% processed through Provincial Offence Summons Part III Form 104. This disparity underscores a law enforcement strategy that focuses on managing less severe infractions through notices, rather than escalating them to court summons.

Among the offenses, as seen in Figure 2, the most commonly issued tickets are for Speeding and Other HTA (Highway Traffic Act) violations across both ticket types, with speeding predominating in Part I and Other HTA in Part III.In contrast, tickets for Distracted Driving and All CAIA (Compulsory Automobile Insurance) are issued less frequently. For the reader's convenience, a brief guide on the differences between these ticket types and some categories is provided in the Appendix.

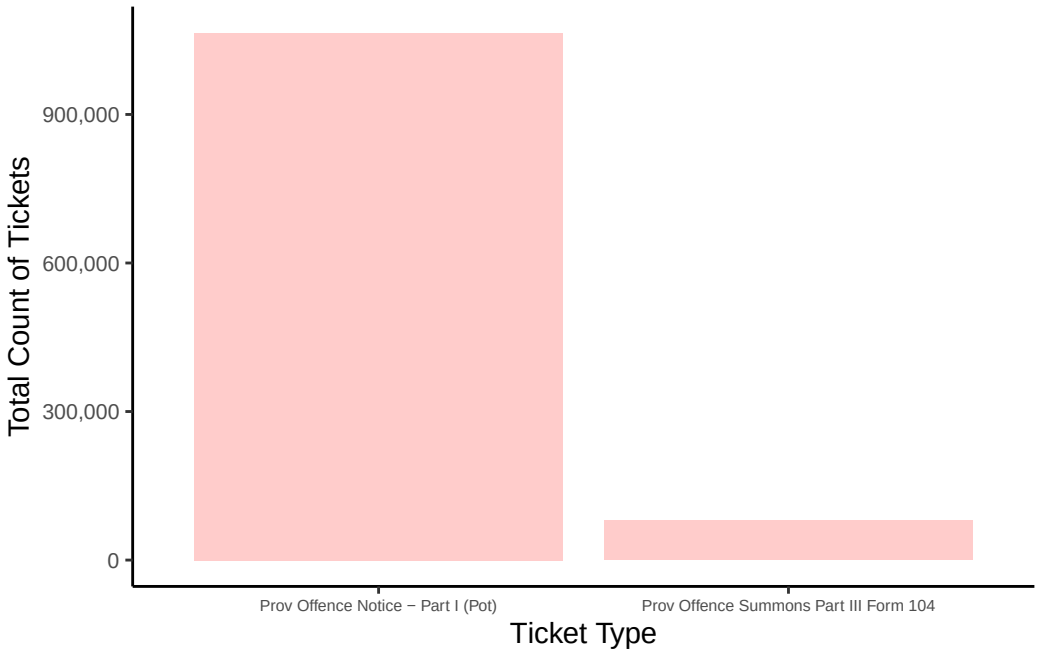

Figure 1: Distribution of Ticket Type

Figure 2: Distribution of Offences by Ticket Type

2.2 Ticket Trends Across Age Groups

Under the guidelines of the Toronto Police Service, an individual aged 18 or above is classified as an adult (Service 2024). As of March 2022, only 1.86% of licensed drivers in Ontario are categorized as youths, reflecting their minimal representation on the roads (G. of Canada 2023). While this analysis spans from 2018 to 2023, we can infer that the youth population has likely remained consistent over the past five years, as growth in the number of licensed youths may not significantly alter this disparity.

Consequently, it is expected that ticket issuance statistics would similarly reflect a significant difference between the two groups. Indeed, there is a marked difference in ticket issuance in Figure 3, with adults receiving the vast majority—1,138,393 tickets, or 99.4% of the total issued across all offense categories—correlating with their more frequent interactions with traffic enforcement.

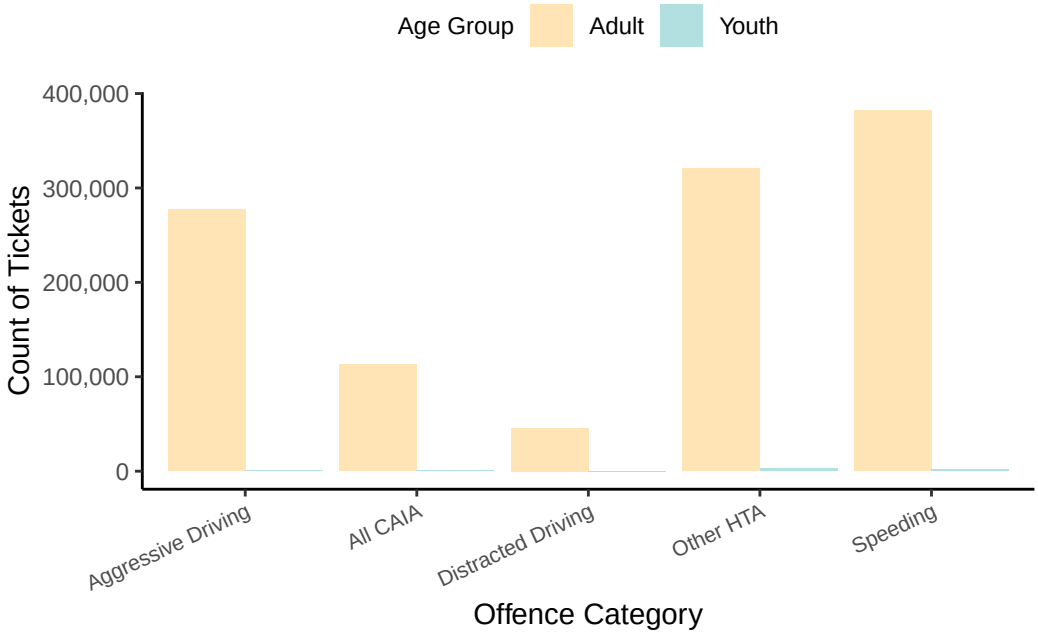

Figure 3: Distribution of Offences by Age Group

2.3 Annual Ticket Trends

To analyze changes in traffic ticket issuance from 2018 to 2023, data was compiled into Table 3 and visually represented in Figure 4, illustrating trends across various offense categories. Each line in Figure 4 is color coded to correspond with different offenses.

Speeding tickets peaked in 2021 with 83,742 issued, before declining to 63,630 by 2023, a decrease of 24%. This significant drop is clearly depicted with a pronounced downward trajectory, reflecting a reduction in these offenses. Conversely, Other HTA violations recorded the largest increase, surging by 47% from 46,356 in 2022 to 68,146 in 2023. Aggressive Driving shows a similar trend but with less magnitude, peaking at 52,779 tickets in 2023. The categories of All CAIA and Distracted Driving showed more moderate changes. Notably, Distracted Driving tickets increased steadily, rising 18% from 8,332 in 2018 to 9,825 in 2023. These trends align with earlier findings in Figure 2 from Section 2.1, where Speeding and Other HTA offenses were highlighted for having a higher incidence of tickets issued.

Overall, the total number of tickets issued saw a significant 15% increase from 2019 to 2020, likely influenced by changes in enforcement strategies or public behavior during the COVID-19 pandemic. The upward trend continued with a 17% increase from 2022 to 2023, resulting in a total of 212,840 tickets, indicative of a rebound in traffic volumes and enforcement activities as pandemic related restrictions were lifted.

Table 3: Tickets Issued by Category and Year

Offence Category	2018	2019	2020	2021	2022	2023
Aggressive Driving	50986	51889	44015	39038	39484	52779
All CAIA	21999	20655	19173	17391	16068	18460
Distracted Driving	8332	7868	4873	6732	8087	9825
Other HTA	60186	58136	49086	41484	46356	68146
Speeding	41821	36142	83742	87278	71458	63630
Total	183324	174690	200889	191923	181453	212840

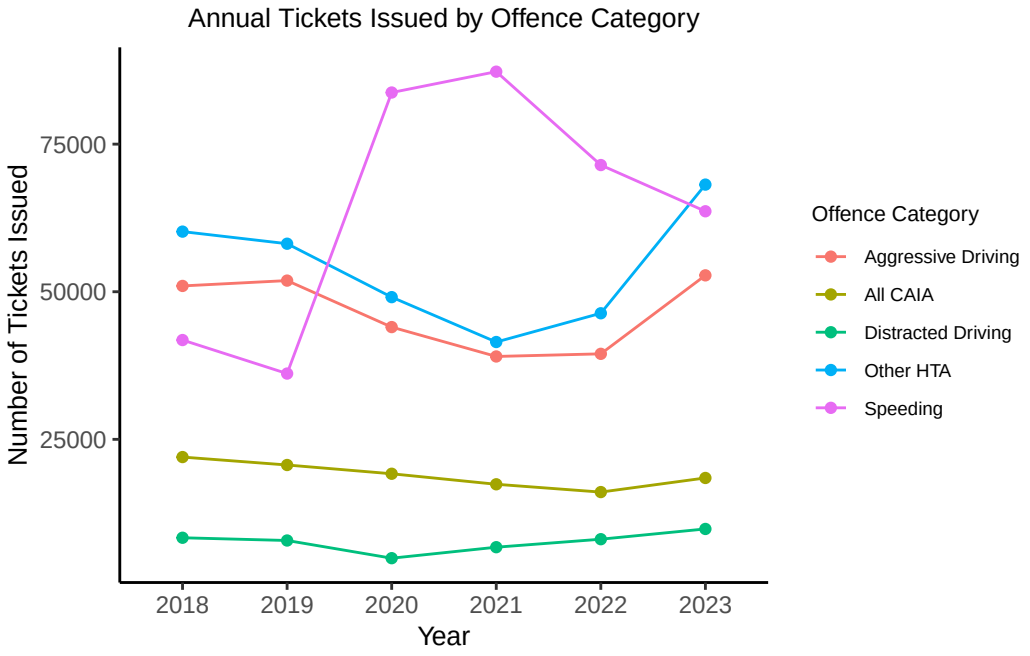

Figure 4: Ticket Issued by Offence Category and Year

2.4 Geographic Distribution

Finally, to understand the geographic distribution of traffic ticket issuance across Toronto, Table 4 and Figure 5 offer detailed insights into the dispersion of tickets across police divisions, highlighting areas with the highest enforcement activities. Using color gradients, Figure 5 visually emphasizes divisions D14, D41, D42, and D55, as the focal points of ticket issuance, with green to blue tones indicating the areas with the highest frequencies of tickets.

Table 4 details the breakdown of tickets in these divisions, showing D55 with the highest count at 99,065, primarily in Speeding and Other HTA offenses. D14, with a total of 98,307

tickets, shows a comparative decrease in Speeding offenses by 18% relative to D55. D41 and D42, meanwhile, exhibit similar ticket distribution profiles, pointing to consistent enforcement approaches or similar driver behaviors in these regions.

Table 4: Tickets Issued by Division and Offence Category

Division	Aggressive Driving	All CAIA	Distracted Driving	Other HTA	Speeding	Total
D14	40337	9965	4836	29477	13692	98307
D41	14671	8564	3068	24209	39237	89749
D42	14668	9687	2073	24560	38362	89350
D55	22073	9931	4416	29383	33262	99065

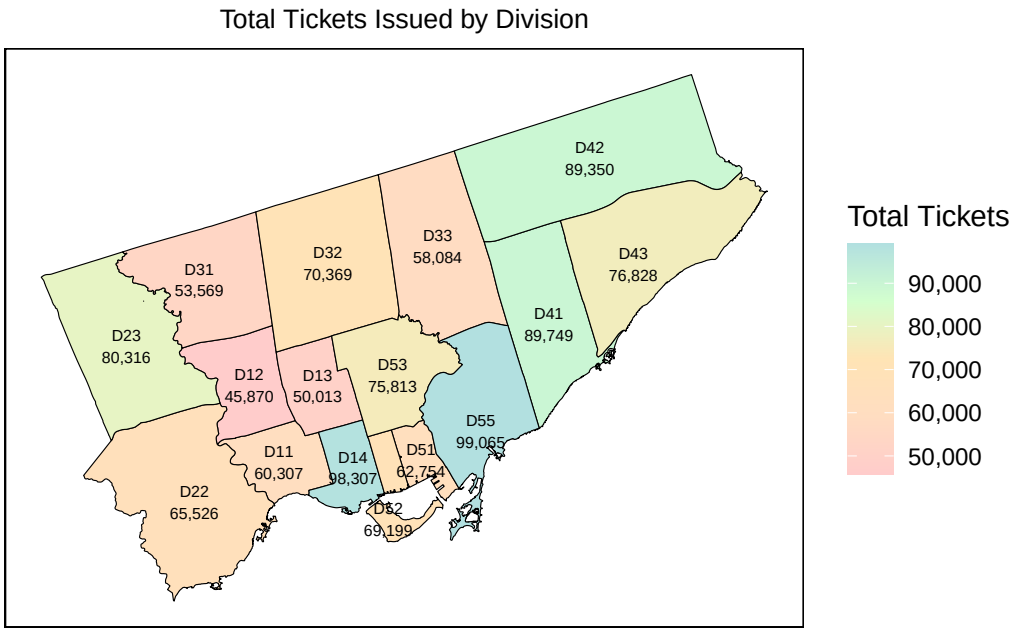

Figure 5: Map of Total Tickets Issued by Division

3 Discussion

3.1 Results and Implications

The analysis of traffic ticket issuance in Toronto from 2018 to 2023 reveals key enforcement patterns and highlights areas for targeted policy interventions. As shown in Figure 5 from

Section 2.4, Divisions D55, D42, D41, and D14 consistently recorded the highest numbers of traffic tickets, particularly for Speeding and Other HTA offenses. These findings suggest a need for increased patrols and advanced monitoring technologies in these divisions to address high rates of violations and improve road safety.

A notable increase in tickets issued between 2019 and 2020 is surprising, given the expectation that the pandemic would lead to fewer violations. However, speeding offenses saw a rise, possibly due to lower traffic volumes and fewer pedestrians, which may have encouraged higher speeds on less congested roads. Speeding remains a significant public safety concern, with the Toronto Police emphasizing the direct link between speed and the severity of injuries: "Drivers who speed, drive distracted or aggressively cause collisions—but it's speed that directly impacts the severity of injury" (Morton 2022b). While the "MarchSafe" (Lavoie 2022) and "Speed Kills" (Morton 2022a) campaigns initially resulted in about 500 tickets during their first week in 2022, overall ticket counts for the year were notably lower than in previous years, indicating these initiatives had a positive impact on reducing traffic violations.

The demographic analysis revealed that only 0.6% of tickets were issued to the youth demographic, consistent with the relatively small proportion of young drivers on Toronto's roads. The vast majority of tickets were issued to adults, particularly for high-risk behaviors such as Speeding, Other HTA and Distracted Driving. This highlights the need for targeted educational programs specifically aimed at adult drivers to address these risk factors. As discussed in Section 2.1, most tickets were issued under Provincial Offence Notices - Part I (Pot), reflecting an enforcement strategy focused on managing minor infractions without court involvement.

In summary, these findings underscore the need to adapt enforcement strategies to address both the geographic concentration of violations and the behavioral patterns of adult drivers. By increasing patrols in high-violation areas and implementing educational campaigns targeting adult drivers, Toronto can enhance road safety citywide, particularly as traffic volumes normalize post-pandemic.

3.2 Further Areas of Exploration

What specific neighborhood factors contribute to higher violation rates, and how can targeted interventions be designed for those areas? Future analyses could incorporate detailed neighborhood data within Toronto's divisions to understand where traffic violations occur most frequently. Although available in the raw dataset, this information was excluded due to the complexity of analysis. Including it could provide a nuanced understanding of factors driving higher violation rates at specific intersections, enabling more precise interventions.

Moreover, analyzing temporal factors like time of day or seasonality could identify peak violation periods, optimizing resource allocation. Addressing missing data labeled "NSA" or "Unknown" would improve reliability, while further exploring demographic trends and vehicle types could reveal overrepresented groups. Advanced spatial analysis and machine learning

could enhance predictions of high-risk areas and times, supporting data-driven road safety strategies across the city.

4 Appendix

Explanation of Key Terms:

- *Ontario Highway Traffic Act (HTA)*: Governs motor vehicle offenses in Ontario.
- *Provincial Offences Act (POA):* Outlines procedures for addressing these violations.
- *Part I (POT):* Tickets for minor infractions, such as speeding, allowing offenders to pay fines or request a trial without a court summons.
- *Part III (Form 104)*: Summons for serious offenses requiring court appearances, carrying penalties like higher fines or license suspensions, and used when the offense is reported more than 30 days after it occurred.
- *Other HTA*: Includes offenses like impaired driving, failing to stop at a red light or stop sign, and failing to yield right-of-way.
- *All CAIA*: Relates to the failure to carry valid automobile insurance, evidenced by not having an insurance card.

All definitions were obtained through (Publishing 2020), (Law 2023), (Service 2024).

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