Analyzing Victimology: A Statistical Overview of Crime Victims in Toronto*

Yi Tang

September 27, 2024

The data analyzes the annual statistical report with crime victims in Toronto Police Service from 2019 to 2023, including types of falling victim, different age groups of victims, victim counts and trends over five-year. These findings highlight the necessity of targeted interventions and policy adjustments to address the specific needs of the most impacted groups. Ultimately, this paper underscores the importance of demographic-focused crime analysis in enhancing public safety and tailoring preventative strategies in urban environments.By analyzing these data, it lets law enforcement and policymakers concern about the victims and other vulnerable population. Similarly, safter society is what everyones wants.

Table of contents

*Code and data are available at: https://github.com/YiTang2/victim-of-crime.git.

1 Introduction

This paper is going to analyze crime victim datas in the Toronto Police Service from 2014 to 2023. The dataset includes the period of happening, the crime subtype of victim, sex, age group and the total victim counts over years.We use R R Core Team (2023) to write code and plot many graphs for direct and straightforward analyzing about the victim of crime. Also we utilize several key R packages from tidyverse(Wickham et al. 2019a), including ggplot2(Wickham 2016) for visualization, dplyr (Wickham et al. 2023) for data manipulation and Wickham, Vaughan, and Girlich (2024) for data cleaning. The data and paper orgainization and structure was given by Wickham et al. (2019b). And telling Stories with Data by Alexander (2023) provides detailed fundamental code steps and manipulation to make analytical workflow more manageable.

The issue of crime the count of victims is a topic worthy of attention, especially in urban areas like Toronto. Understanding the patterns and characteristics of crime victims helps connect public safety strategies and policymaking with. This paper focuses on analyzing crime victim data provided by the Toronto Police Service from 2014 to 2023. The dataset includes information such as the reported year, crime subtype, sex, age group, and the total number of victims. This research aims to explore the trends in victimization, the distribution of different crime subtypes, and demographic factors such as gender and age group to provide insights into which populations are most vulnerable.

In the process of analysis, this paper found that adult males are disproportionately affected by crimes like assault and robbery, while females are more likely to be victims of sexual violations. It was also found that there are significant shifts in victim counts over time, with a obvious falling during the COVID-19 pandemic in 2020. Then there is a sudden increasing in the later year. These findings are critical because they highlight the importance of targeted interventions for specific groups and point to broader societal issues.

The paper is structured as follows in Section 2: first, a detailed introduction of the dataset used; second, an exploration of crime trends over the years and how they correlate with different demographic variables; third, visual representations of the data to offer a clear understanding of these trends; and finally, conclusions and recommendations for public safety policies.

2 Data

These datasets are sourced from the Toronto Police Service's open data platform, Gelfand (2022), and provide detailed annual reports on crime victims in the city. The data includes variables such as crime subtype, sex, age group, and report year, with all personal information protected under the Municipal Freedom of Information and Protection of Privacy Act. For this paper, the data from 2014 to 2023 was selected, cleaned, and processed using R packages like `dplyr`(Wickham et al. 2023).

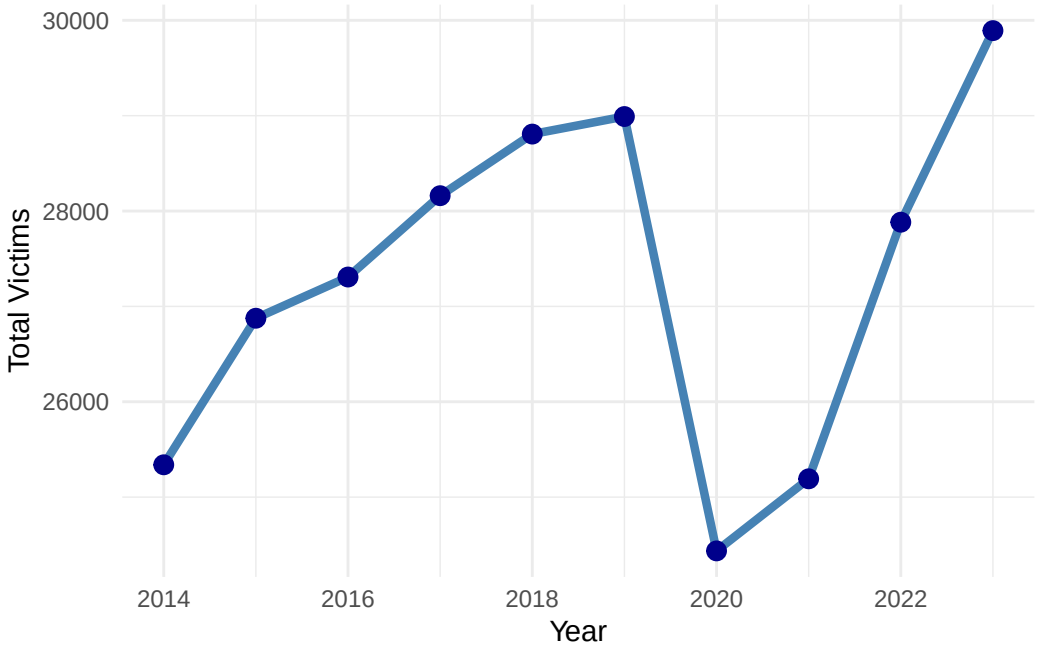

Figure 1: Annual trend of crime victims in Toronto from 2014 to 2023

This Figure 1 illustrates the trend of crime victims in Toronto from 2014 to 2023, showing a fluctuating and increasing trend in the total number of recorded victims per year. According to the data, there was a progressive increase from 2014 to 2018, and then a little fall in 2019. But it has began to increase again from year 2020. In 2020, the COVID-19 sweeping every country and it makes people's lives and movements very inconvenient. So, this is the reason that there is large fall in 2020. But now that people have lifted the virus crisis and are beginning to move freely again, this has also led to a continued increase in victims.

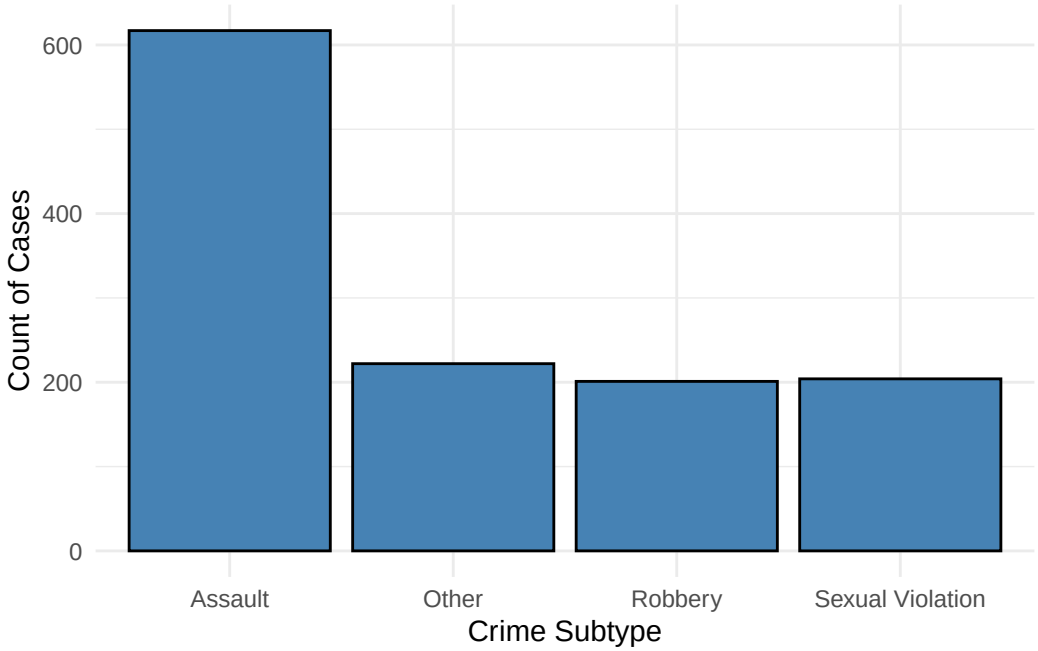

Figure 2: Distribution of Crime Subtypes in Toronto (2014-2023)

From Figure 2, we can see that assault is the most frequently reported crime subtype, significantly outnumbering instances of robbery, sexual violation, and other crimes. This highlights a specific vulnerability to assaults within the community. Robbery and sexual violation appear with comparable frequency, suggesting targeted interventions might be necessary. The substantial count of crimes classified as "other" indicates a diverse crime landscape that could benefit from varied prevention strategies and robust law enforcement responses.

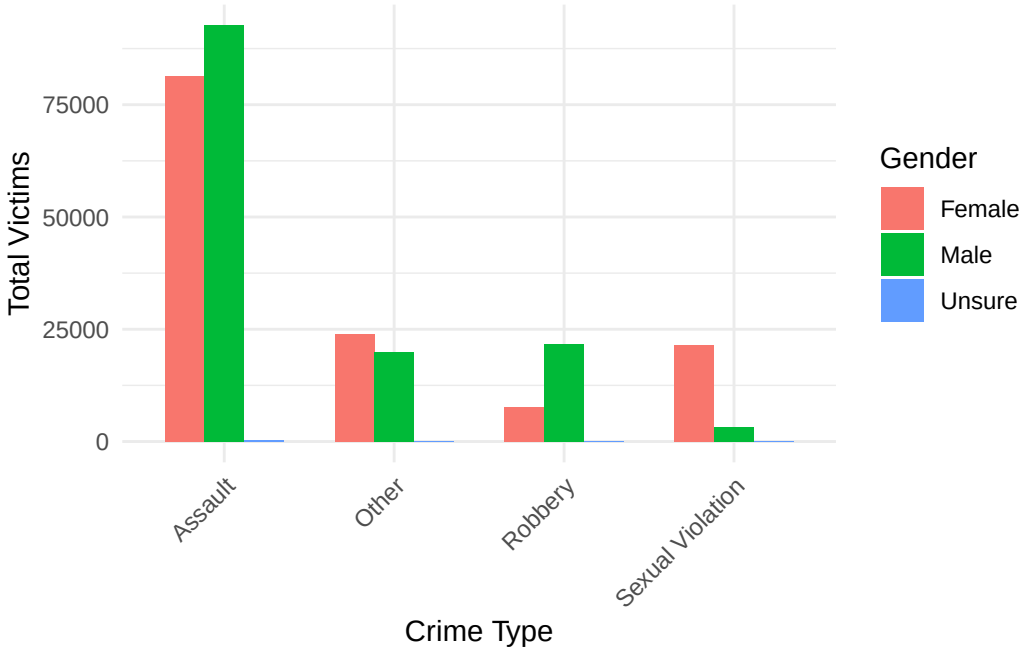

Figure 3: Comparative Analysis of Crime Victims by Gender and Crime Type in Toronto (2014-2023)

Based on the observation we analyzed before, which is assault is the most prevalent crime subtype, Figure 3 further amplify the count of different gender during each crimes. Specifically, male victims are consistently higher in number than female victims across most crime categories, particularly for assault. Moreover, we can find that assault and robbery are the only two crime subtypes where males are more likely to be victimized than females. Then, most situation help explain the reason, which is mens have a higher exposure to environments and social behaviors. But in contrast, women have the unfair treat with power imbalances and vulnerability in public situations. This indicates government should make special strategies to figure out the different risks faced by men and women.

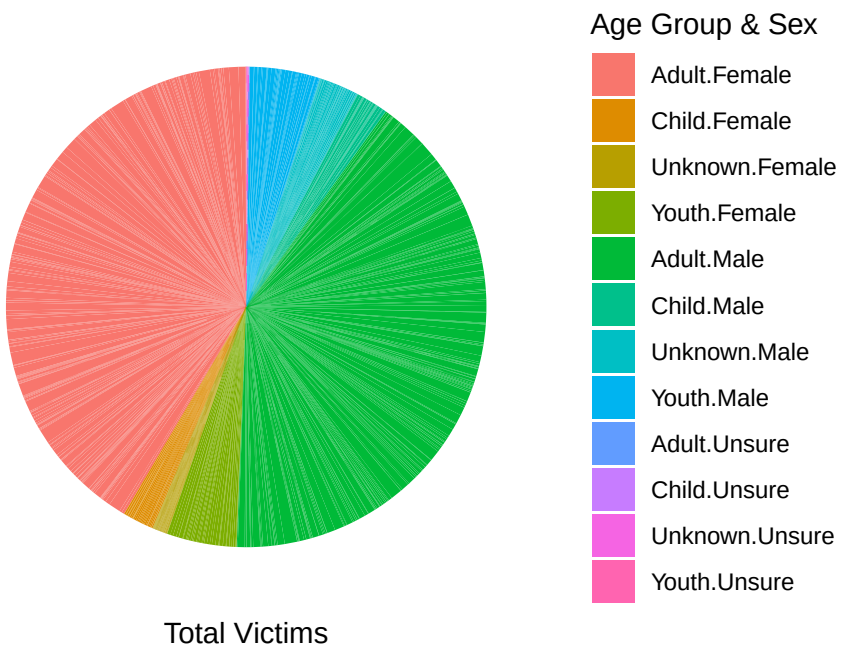

Figure 4: Distribution of Crime Victims by Age Group and Gender in Toronto (2014-2023)

We have known male victimization are the larger group than female on assault and robbery from graph above. I want to explore the victimization of different age groups within the male and female groups. From Figure 4, adult males and adult females have the largest portion in this pie chart. This suggests that adults, especially males, are more exposed to situations that lead to victimization. The similar explanation from above graph can tell that the actions of minors are supervised by their guardians, so their actions are often restricted, but they are safer. This is why the victimization rate of minors in the figure is relatively low; comparatively, adults are more free to act, so they have higher security uncertainty and victimization rates.

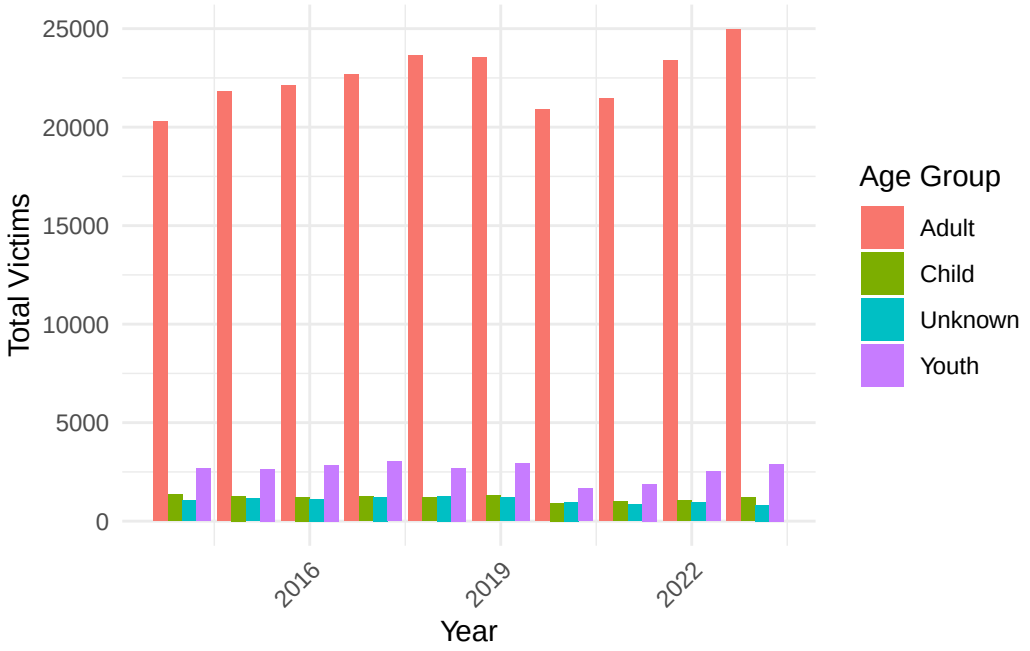

Figure 5: Annual Trends of Crime Victims by Age Group in Toronto (2016-2022)

This Figure 5 shows that from 2014 to 2023, adults accounted for the majority of crime victims, with the annual number of adult victims remaining largely constant at 20,000–25,000. This suggests that adults are the most vulnerable demographic over time. The number of victims who are children and young people, on the other hand, is far lower and does not appear to be rising with time. This could be as a result of the likelihood that kids and young adults are in safe spaces, like schools or homes with parental supervision, which lowers their exposure to crime. In conclusion, the total victims don't have a obvious increasing trend, which can also tell that the supervision today can effectively restrict the victimization.

3 Appendix

This code first cleans and standardizes the column names in the raw dataset by using the janitor::clean_names() function, ensuring consistent naming conventions. It then selects the key variables report_year, subtype, sex, age_group, and count to focus the analysis on relevant data. The sex variable is recoded for readability, converting "M" to "Male," "F" to "Female," and "U" to "Unsure." Additionally, the subtype column is renamed to crime_subtype for clarity. Finally, the code removes any rows with missing values using tidyr::drop_na() to ensure the dataset is clean and ready for analysis.

References

Alexander, Rohan. 2023. *Telling Stories with Data: With Applications in r*. Chapman; Hall/CRC.

Gelfand, Sharla. 2022. *Opendatatoronto: Access the City of Toronto Open Data Portal*. https://CRAN.R-project.org/package=opendatatoronto.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. https://ggplot2.tidyverse.org.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019a. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

———, et al. 2019b. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

Wickham, Hadley, Romain François, Lionel Henry, Kirill Müller, and Davis Vaughan. 2023. *Dplyr: A Grammar of Data Manipulation*. https://CRAN.R-project.org/package=dplyr.

Wickham, Hadley, Davis Vaughan, and Maximilian Girlich. 2024. *Tidyr: Tidy Messy Data*. https://CRAN.R-project.org/package=tidyr.