Is Crime Really On A Rise In Toronto? An Analysis of The Past And Current Crime Rates of Toronto*

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Current mainstream news outlets are reporting a significant increase in crime rates, a trend that from our data analysis supports. Our findings indicate a dramatic increase in crimes such as homicide and auto theft, with them increasing over 210% from 2014. Compared to 2022, homicide rates have escalated by over 180% with auto theft having an increase of 20%. These substantial increases in crime rate underscore an evergrowing concern around public safety in Toronto and highlight the urgent need for effective crime prevention strategies.

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*Code and data analysis are available at: https://github.com/AdrianUofT/Toronto-Crime-Rates-Investigation.git

1 Introduction

Over the recent years, major news outlets have been increasingly focused on the trends and patterns of crime rates in our city, Toronto. The narrative of a major increase in overall crime is sparking debate and concern over the general public's safety. This has caused a comprehensive analysis to understand the nature of these trends. To dissect and interpret crime data, this paper focuses on various types of crime to provide an objective view of how crime patterns and trends have evolved. More specifically, our analysis focuses on more petty thefts such as bike theft to more serious crimes such as homicide and auto theft. We examine the data from 2014 to 2023 seeking to uncover the underlying trends and percentage increases or decreases in crime rates. The goal is to offer a clear, data-driven perspective beyond anecdotal evidence and media narratives. Understanding these trends is not only important to inform the general public about them but also to point the direction for law enforcement and policymakers to make imperative choices to combat these criminals. This paper is structured into the following sections: Data, Results, Discussion, and Conclusion. In the data section I discuss the nature of these crime rates obtained from the City of Toronto's `opendatatoronto` (Gelfand 2022) library, and the steps I took to clean and analyze the data. The result section highlights the trends found in the analysis process. The discussion section provides further evaluation of the trends and serves to provide insight as to the potential reasoning behind these crime trends and possible areas that require more attention. Lastly, the conclusion section is to summarize the main findings of this paper.

2 Data

The data utilized throughout this paper was obtained through the City of Toronto's `opendatatoronto` (Gelfand 2022). The specific data set that was used is entitled `Neighbourhood Crime Rates, 2023` (Toronto 2023). Data was collected and analyzed through the statistical program `R` (R Core Team 2023), with additional support from `tidyverse` (Wickham et al. 2019), `ggplot2` (Wickham 2016), `knitr` (Xie 2014), `janitor` (Firke 2023), `lubridate` (Grolemund and Wickham 2011), `dplyr` (Wickham et al. 2023), `tibble` (Müller and Wickham 2023), `readr` (Wickham, Hester, and Bryan 2024), `stringr` (Wickham 2022), `here` (Müller 2020), and `kableExtra` (Zhu 2021). Further discussion of data collection, cleaning, and analysis process can be found later in this paper.

2.1 Neighbourhood Crime Rate Statistics

This data set was published by the Toronto Police Services. It outlines the various crime data by neighborhood. That is, for each neighborhood, the data set shows the associated area name, its hood ID, the population for said area, followed by the type of crime and number of times said crime has been committed for a specific year. The main crimes being analyzed here are assault, auto theft, bike theft, break and enter, robbery, theft over, theft from motor vehicles, homicide, and shooting & firearm discharges. The data set also includes the crime rate per 100,000 population. That is, it calculates the crime count per 100,000 population per year.

Other types of crime are not represented in this data set and are deemed to be outside the scope of this paper. This data set was last refreshed on January 14, 2024, and was captured for this paper on January 16, 2024. I conducted the first step of cleaning the data to omit any NA values, simplifying the names of columns, eliminating any additional columns, and re-factoring the data (see Table 1).

Table 1: Sample of Cleaned Neighbourhood Crime Rate Statistics Data

Crime	Year	Crime Rate
assault	2014	344.9786
assault	2015	332.1355
assault	2016	377.8270
assault	2017	429.4543
assault	2018	431.5816
assault	2019	345.8669

2.2 Average Crime Rate

Using the cleaned crime rate data set, I created a script using the `group_by` function which first allowed me to first group the data by type of crime and year. Then using the `summarize` function, I was able to calculate the average the average crime rate for each crime per year (see Table 2).

Table 2: Sample of Average Crime Rate Statistics Data

Crime	Year	Average Crime Rate
assault	2014	610.4018
assault	2015	656.9970
assault	2016	670.1699
assault	2017	673.5303
assault	2018	680.1286

Crime	Year	Average Crime Rate
assault	2019	706.7088

3 Results

3.1 Average Yearly Crime Rate

Our results of the average crime rate for all of the neighborhoods in Toronto, from 2014-2023, for each type of crime is summarized in Figure 1. As of January 14, 2024, out of the 158 different neighborhoods, the crime with the highest average crime rate is assault with an average crime rate of 806 crimes per 100,000 population. The lowest being homicides with an average of 7.6 crimes per 100,000 population.
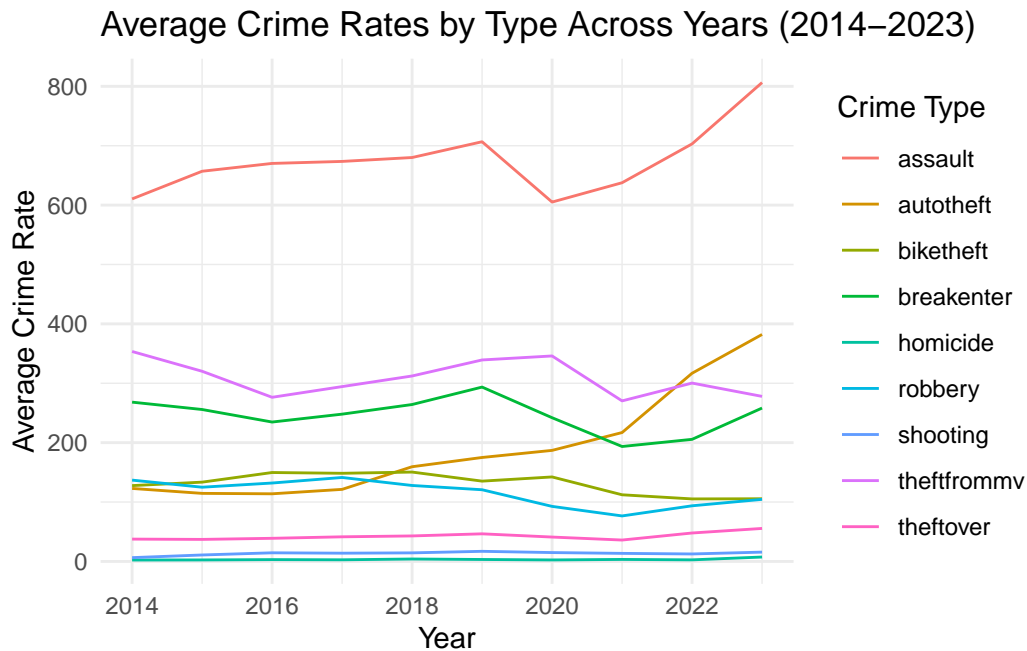

Figure 1: Average Crime Rates by Type Across Years (2014-2023)

3.2 Percentage Change in Average Crime Rates

Further breaking down this data allows us to focus on the trends of crime rates over a specified period and determine the percentage change in the average crime rate to give us an insight into how crime patterns have evolved.

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3.2.1 Calculating the Percentage Change in Average Crime Rate

Given our data set, we computed the percentage change of the average yearly crime rate and analyzed the year-over-year percentage change in these rates. The percentage change was computed using the following formula:

$$\text{Percentage Change} = \left(\frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \right) \times 100$$

Using the `mutate` function, I was able to calculate the percentage change on a year-over-year basis of the average yearly crime rate for each different type of crime. Table 3 shows the percentage change for each crime when comparing the years 2014 and 2023. Notably, we can see that both auto theft and homicide have increased by over 210% while crimes such as robbery and theft from motor vehicle have both decreased by ~24% and ~21% respectively. Table 4 shows how homicide is now up 180% while robbery is now up 11% with theft from motor vehicle only down 7%. For a full picture, Figure 2 details the percentage changes on a year-over-year basis.

Table 3: Percentage Changes in Average Yearly Crime Rate from 2014 to 2023

Crime	Percentage Change
assault	32.095043
autotheft	210.976443
biketheft	-17.346429
breakenter	-3.716469
homicide	210.802636
robbery	-23.653876
shooting	146.712763
theftfrommv	-21.383784
theftover	47.799544

Table 4: Percentage Changes in Average Yearly Crime Rate from 2022 to 2023

Crime	Percentage Change
assault	14.6906919
autotheft	20.6163946
biketheft	0.2606616
breakenter	25.6188686
homicide	180.0693525
robbery	11.6282807
shooting	24.8203372

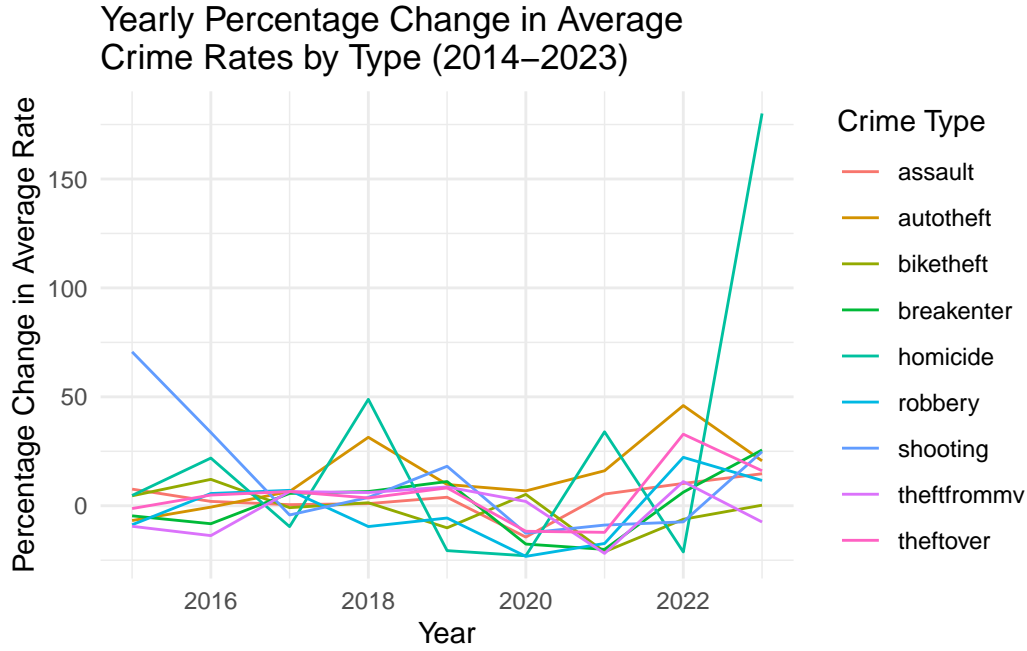| Crime	Percentage Change
theftfrommv	-7.4537952
theftover	16.0646109

Figure 2: Yearly Percentage Change in Average Crime Rates by Type (2014-2023)

4 Discussion

Overall, the data reveals that there is a significant upward trend in crime rates, more particularly in homicide and auto theft rates. The data indicates an over 210% increase in homicide rates with a more notable spike of 180% in the last year. Similarly, we have auto theft rising by 20% from last year. If we were to factor in all of the crime rates in our data set, the overall crime rate increase in the last year is about ~32%. These findings are in alignment with recent reports from various news outlets that suggest a growing trend in criminal activity. The National Post stating 'murder rate highest in 30 years' (Oli 2023), CP24 claiming that 'Toronto saw 15 percent increase in its violent crime index in 2022' (Fox 2023), or the CBC saying that 'vehicle thefts were up some 25.4 percent over 2022' (CBC 2023). An interesting caveat in the data is that there is a noticeable decrease in crime rates when looking from 2020-2021. Global events like COVID-19 could have influenced these trends.

As to the reason why crime rates are on the rise, there isn't necessarily a clear answer. What would someone's motive be for committing a crime in the first place? While the percentage in crime rates has increased over the years, correlation doesn't necessarily mean causation as the reason for these percentage increases could be down to numerous different factors. Some factors that could be contributing to this trend could be socio-economic factors. For example, income inequality, unemployment, high costs of living, etc. are major prevailing problems that all Canadians, not just specifically people living in Toronto, in the last few years have experienced to some degree. Another factor could be the societal attitude towards crime. If someone were to commit a crime, there is an incentive to do so. In the case of auto theft, thieves can get away with stealing an entire car and then selling it overseas. The point to highlight here is they can get away with doing said crime. If the incentive to commit the crime far outweighs any potential punishment for said crime, then it gives criminals the encouragement to do the crime and more importantly repeat doing so.

This increase in crime rate calls for an urgent review of our current crime prevention and law enforcement strategies. This can include giving better funding to our law enforcement and crime prevention programs or making major changes to the policies addressing socio-economic issues.

There are several limitations to this analysis and it is important to acknowledge these limitations of our analysis. A major limitation in our analysis is that this data only accounts for reported crime. While trying to factor in unreported crime is deemed to be beyond the scope of this paper, it is important to highlight that our data set may not capture unreported crime incidents. By extension, the argument could also be made that the 'increase' in crime rate could be because of a more efficient crime reporting system or changes in the legal definitions of certain crimes. Another limitation is that the raw data set listed some crime rates as 'NA'. This can cause our data to be skewed in certain places and could potentially mislead our findings.

5 Conclusion

This paper investigated the crime rates over the years in Toronto taking into account the 158 different neighborhoods in Toronto. My results reveal that there was an increase in crime rate overall over the years, with crimes such as homicide and auto theft having the more notable and concerning increases. However, these results don't necessarily imply causation, but rather a high correlation that warrants a deeper investigation. Future research should be aimed to explore the factors as to why this increase is happening and why these trends are occurring. Whether it be to examine the current effectiveness of various crime prevention strategies or to monitor ongoing crimes to provide a better understanding of the nature of the crime which can be crucial to implementing a timely and effective response. Having strong law enforcement is crucial for ensuring the safety of the general public and to make sure new and repeat offenders are dealt with by justice.

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