Wasted Money? Changes in Toronto's Annual Police Budget and Reported Crimes From 2020 to 2023*

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This study analyzed Toronto's annual police budget and crime statistics from 2020 to 2023 using R to assess the budget's effectiveness in preventing crime. Results showed that reported crimes steadily increased while the clearance rate declined over time. Budget changes, including increases from 2020 to 2022 and a reduction from 2022 to 2023, had no significant impact on crime rates. The lack of a relationship between the police budget and crime suggests that Toronto's current crime prevention strategies may be ineffective and that the police budget could be misallocated. These findings highlight the need to reevaluate strategies for ensuring the safety of Toronto's citizens.

1 Introduction

In recent years, personal safety has become a prominent concern among Toronto's citizens. Parsaud (2021) illustrated a rise in violent crimes; the annual number of shootings in 2020 was 462, nearly double the average annual number from 2004 to 2015. The findings of Putrik et al. (2019) establish a connection between violence and the lack of subjective safety, showing that people's perception of higher rates of violent crimes, among other crimes, was the only factor positively correlated with feeling unsafe. The objective increase in violent crimes and subjective safety concerns compel individuals to question whether the city's police department is fulfilling its purpose, especially since the police consume a significant proportion of the city budget.

To date, no comprehensive study has addressed the relationship between the police budget and the number of crimes in Toronto. Such an analysis is essential to assess the effectiveness of

*Code and data supporting this analysis are available at: https://github.com/YisuHou1/Toronto-Police-Budget-Statistics.

the police department in preventing crime and protecting citizens' safety. This study aims to fill this gap in the literature. In the United States, a few quantitative studies have examined this topic, with most scholars identifying a significantly negative relationship between police budget and crime rates. For instance, Mello (2019) found that a higher level of policing had statistically significant effects on reducing robbery, larceny, and auto theft, driving the decline in overall victimization. Additionally, Lin (2009) used state tax rates as an instrumental variable to regress police presence against crime, discovering elasticities of -1.1 for violent crime and -0.9 for property crime.

Using official data from Open Data Toronto Gelfand (2022) and the R programming language R Core Team (2023), the annual police budget, the number of reported crimes, and the number of cleared crimes were analyzed for the years 2020 to 2023. The data revealed that the number of reported crimes consistently rose while the number of cleared crimes remained relatively stable, leading to a reduction in the clearance ratio. The police department's total annual budget increased slightly from 2020 to 2022 but fell by over 45% in 2023. The drastic change in the police budget and the consistent crime numbers indicate that the Toronto police have little influence on crime rates. Therefore, this paper encourages a thorough analysis of why investment in Toronto's police department has not resulted in fewer crimes and increased safety.

The subsequent sections of this paper include a justification of the data source, an overview of the relevant variables, and a preliminary analysis of the temporal trends between the police budget and the number of crimes in Toronto.

2 Data

2.1 Introduction of Datasets

Two datasets were extracted from Open Data Toronto Gelfand (2022): one records all instances of expenditure and revenue in Toronto Police since 2020, and the other contains the number of reported crimes in various categories along with the corresponding number of cleared crimes up to the end of 2023. Summary statistics of the disaggregated data are presented in Table 3 and Table 4 in the Appendix. These tables are excluded from the main body because the analysis focuses on aggregate budgets and total crime counts rather than individual expenses and specific crime categories.

Open Data Toronto was chosen as the data source because it provides official data from the City of Toronto, ensuring credibility, variety, and depth. The only alternative source for crime and police budget data is the Toronto Police data portal, and its datasets are identical to those in Open Data Toronto.

The data measurements from Gelfand (2022) are not entirely reliable. The police budget dataset includes approved budgets from the Toronto Police Services Board and City Council, as well as operational expenses incurred. Expenses or revenues that were not officially reported

are excluded from the dataset. The crime reports and cleared crimes dataset relies on reports filed by officers, meaning undiscovered crimes are not included, and unfounded reports are counted. These measurement biases complicate trend interpretation. For example, an increase in reported crimes may reflect either an actual rise in crime or an improvement in officers' ability to detect crimes.

The cleaned, aggregated datasets generated using knitr Xie (2023) and KableExtra Zhu (2024) are as follows:

Table 1: Total Police Budget Over Years

Year	Yearly Budget	Change From Last	Percent Change
2020	2249095580	NA	NA
2021	2251806074	2710494	0.12
2022	2334406349	82600275	3.67
2023	1220043900	-1114362449	-47.74

Table 2: Total Crime Reports Over Years

Year	Yearly Crimes	Cleared Crimes	Percent Cleared
2020	118568	41984	35.41
2021	120397	39384	32.71
2022	141136	42757	30.29
2023	169620	51161	30.16

2.2 Data Cleaning

Data cleaning and calculations were performed to derive the variables in Table 1 and Table 2. The "Year" variable was limited to 2020–2023 because the police budget dataset begins in 2020 and the crime report dataset extends to 2023. "Yearly Budget" was calculated by summing all individual expenses and revenues in the disaggregated dataset, with expenses represented as positive values and revenues as negative values. "Change From Last" was determined by subtracting the previous year's "Yearly Budget" from the current year, excluding 2020, which has no preceding year. "Percent Change" was calculated by dividing the previous year's "Yearly Budget" by the current "Change From Last." For Table 2, "Yearly Crimes" and "Cleared Crimes" were calculated by summing the reported and cleared cases across all crime categories, respectively. The data cleaning process was facilitated by the R package tidyverse Wickham et al. (2019).

2.3 Temporal Analysis

Figure 1 and Figure 2 captures the temporal change in police budgets and crimes.

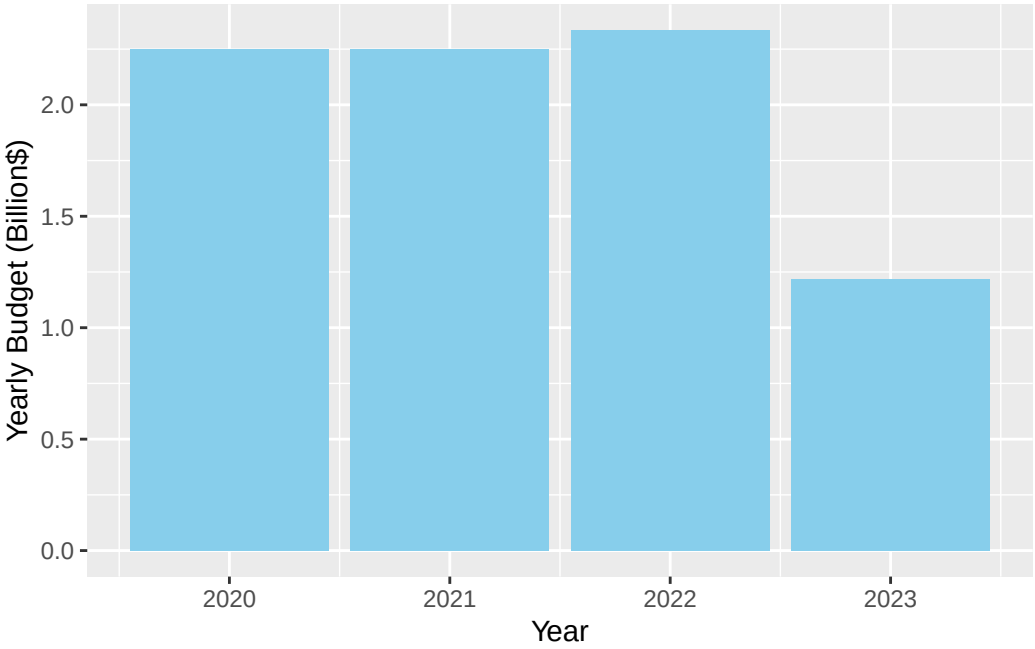

Figure 1: Total Police Budget Over Time

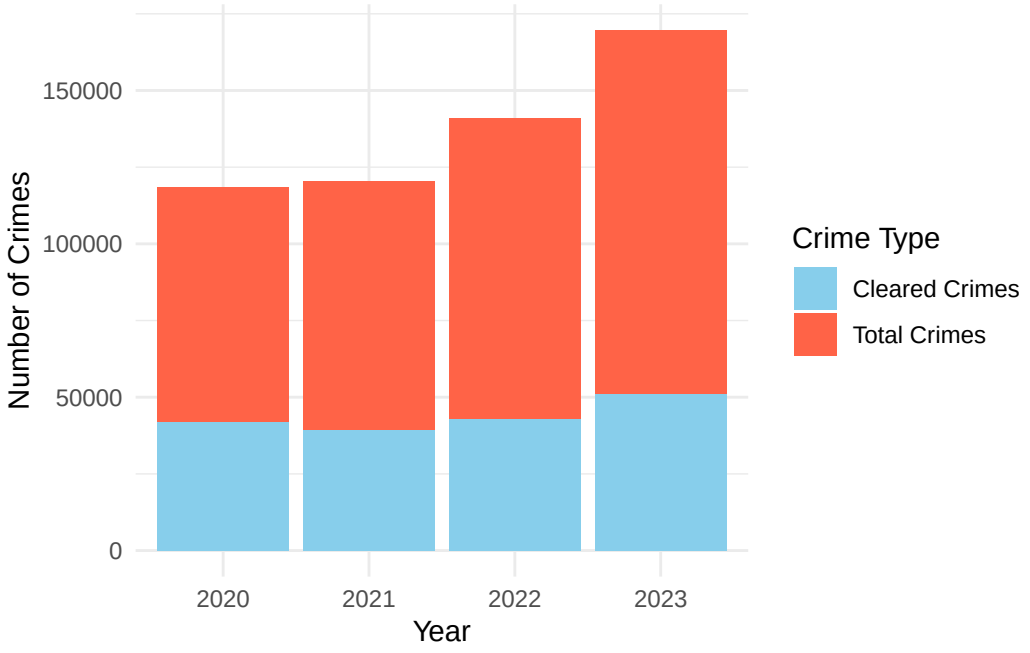

Figure 2: Total Reported Crimes and Cleared Crimes Over Time

Table 1 and Figure 1 show minor increases in the police budget from 2020 to 2022, followed by a nearly 50% reduction in 2023. Figure 2 illustrates a consistent rise in total crimes from 2021 to 2023, while the number of cleared cases remained relatively stable over the four-year period. Consequently, Table 2 reveals a steady decrease in the clearance rate, indicating a persistent decline in safety conditions in Toronto despite changes in the police budget.

It is important to note that the recorded total budget for 2023 may not accurately reflect the actual level of policing resources compared to previous years. Although 2024 data is not included in this paper, the recorded budget for that year is approximately 1.2 billion, similar to the 2023 budget. In contrast, earlier years had budgets exceeding 2 billion dollars. This discrepancy suggests a possible shift in measurement or recording methods in 2023, although Gelfand (2022) does not indicate such a change. This limitation may affect the validity of the analysis presented in this paper.

2.4 Police Budget-Crime Relationship

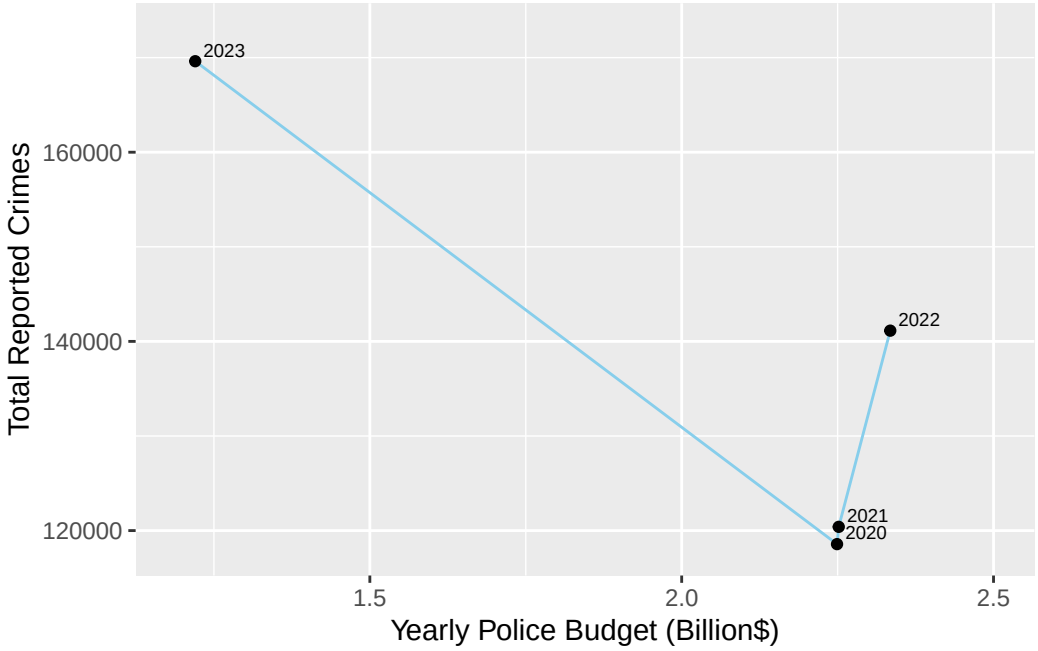

Figure 3: Reported Crimes for Different Police Budget, 2020-2023

It is not possible to identify a significant relationship between the yearly police budget and annual reported crimes based on Figure 3. From 2020 to 2022, both the police budget and crime reports increased, but in 2023, the budget sharply decreased, making the trend appear negative. Additionally, the original datasets provided only four data points for analysis, which is insufficient to establish meaningful correlations.

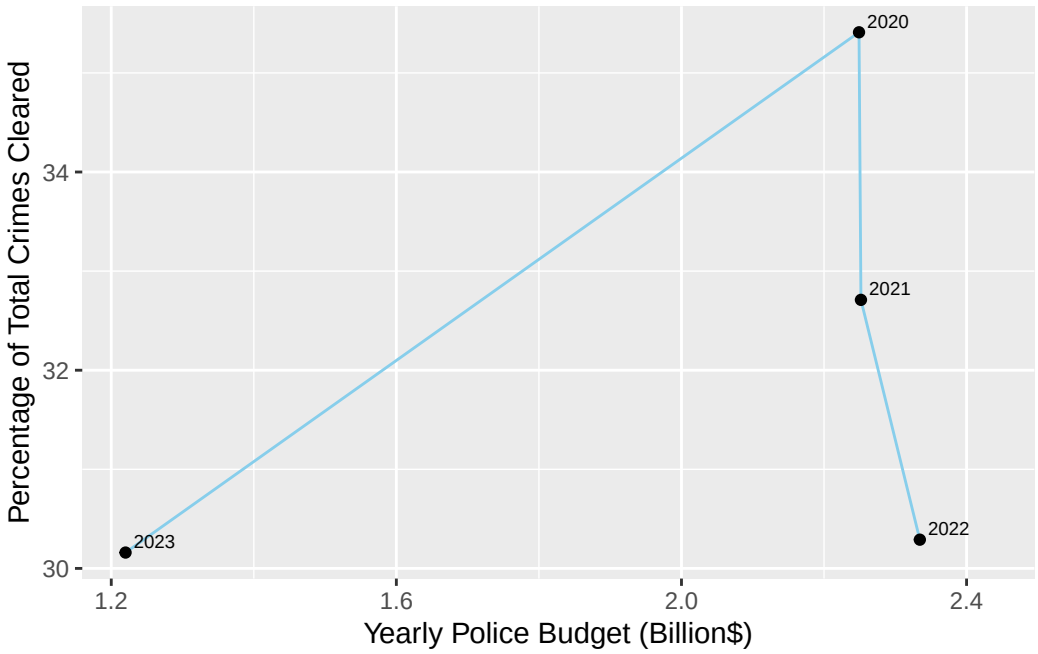

Figure 4: Cleared Crimes Percentage for Different Police Budgets, 2020-2023

Similarly, the relationship between the police budget and the percentage of cleared crimes remains ambiguous. Figure 4 shows a negative relationship from 2020 to 2022, but with 2023 recording both the lowest budget and the lowest clearance percentage, contrary to the previous trend.

In summary, no definitive conclusions can be drawn about the relationship between the annual police budget and the level of safety in Toronto. This uncertainty may stem from a possible change in the measurement of the police budget dataset in 2023. Nevertheless, the lack of a clear relationship warrants further investigation, suggesting that the resources allocated to the Toronto Police may not effectively impact crime prevention. It is crucial to determine why criminal activity has increased despite government efforts in recent years. Potential factors include socioeconomic influences driving individuals toward crime, issues in lawmaking, or inefficiencies within policing strategies.

Appendix

Summary statistics of raw data frames are presented below.

Table 3: Summary Statistics for Raw Police Budget Dataset

Statistic	Value
Fiscal_Year_Mean	2021.52
Fiscal_Year_Median	2022.00
Fiscal_Year_SD	1.23
Fiscal_Year_Min	2020.00
Fiscal_Year_Max	2024.00
Spending_Mean	325840.49
Spending_Median	2700.00
Spending_SD	2610129.21
Spending_Min	-44557166.00
Spending_Max	59628900.00

Table 4: Summary Statistics for Raw Crime Dataset

Statistic	Value
REPORT_YEAR_Mean	2018.40
REPORT_YEAR_Median	2018.00
REPORT_YEAR_SD	2.88
REPORT_YEAR_Min	2014.00
REPORT_YEAR_Max	2023.00
CRIME_COUNT_Mean	35.81
CRIME_COUNT_Median	11.00
CRIME_COUNT_SD	92.44
CRIME_COUNT_Min	1.00
CRIME_COUNT_Max	3471.00
COUNT_CLEARED_Mean	14.34
COUNT_CLEARED_Median	4.00
COUNT_CLEARED_SD	40.87
COUNT_CLEARED_Min	0.00
COUNT_CLEARED_Max	1602.00

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