An Analysis of Home Invasion and Property Theft Crimes in Toronto before and after COVID-19*

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This paper investigates how the COVID-19 pandemic impacted home invasion and property theft crime rates across Toronto by comparing trends before and after the onset of the pandemic in 2020. The findings reveal that there is a significant shift in crime patterns. This suggests that unprecedented epidemics can cause shift in crime dynamics and it is crucial to consider such aftermaths in advanced in the future.

1 Introduction

"To prevent the possibility of being attacked in your home, leave your fobs at your front door" (Global News 2024). In March of 2024, Constable Marco Ricciardi sparked controversy with a comment made at a community meeting, igniting public debate. Given the alarming rise in home invasion crimes and thefts in 2024 compared to 2023, it is essential to identify the reasons behind this surge and explore effective prevention strategies.

For years, crime rates have been linked to economic conditions. During times of economic crisis, individuals may become more desperate to meet their basic needs, often resulting in an increase in crimes like theft (Rosenfeld & Fornango 2008). The COVID-19 pandemic is a recent event that left many people unemployed. During this time, individuals faced not only health challenges but significant economic hardships as well. As a result, one might expect an increase in overall crime rates. However, it is important to consider that lockdowns and COVID-19 restrictions kept people at home, which may have also influenced crime trends during this period (Frith et al. 2022).In particular, we are interested in property invasion and theft crime rates. With homes continuously occupied by their owners, it became more challenging for

*Code and data are available at: LINK.

intruders to break in. This paper aims to investigate if the economic crisis triggered by the pandemic was a strong enough factor to drive individuals to commit property-related crimes, despite the increased home presence and security.

This paper tests the hypothesis that there is a significant difference in property invasion and theft counts before and after COVID-19. The remainder of this paper is structured as follows. In Section 2, the raw data is introduced and the cleaning process is briefly mentioned. In Section 3, the models are introduced to easily visualize the data. First, it explores the number of invasion and theft reports in Toronto across different districts before and after the year 2020 when major lockdowns began. Next, it will investigate the districts that had the most significant changes. Furthermore, we compare the property invasion and theft reports to overall crime reports across the different districts. Finally, we see if the number of counts cleared contribute to the overall trend of crime rate changes. In Section 5, findings are linked to contextual factors such as increased unemployment, lockdowns, and neighborhood reputation sourced from literature papers. Limitations are noted and suggestions for future solutions are discussed.

2 Data

The Police Annual Statistical Report - Reported Crimes dataset includes the report year across the 16 districts in Toronto. The categories are divided into either 'Crimes Against Person' and 'Crimes Against Property' with subtypes to name specific crimes. This dataset includes the count of the total number of crime reports and the number of counts cleared.

Talk more about it.

And also planes (**?@fig-planes**). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

Talk way more about it.

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular...

We can use maths by including latex between dollar signs, for instance θ.

4 Results

Our results are summarized in **?@tbl-modelresults**.

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

In **?@fig-ppcheckandposteriorvsprior-1** we implement a posterior predictive check. This shows…

In **?@fig-ppcheckandposteriorvsprior-2** we compare the posterior with the prior. This shows…

Examining how the model fits, and is affected by, the data

Figure 1: **?(caption)**

B.2 Diagnostics

?@fig-stanareyouokay-1 is a trace plot. It shows… This suggests…

?@fig-stanareyouokay-2 is a Rhat plot. It shows… This suggests…

Checking the convergence of the MCMC algorithm

Figure 2: **?(caption)**

C References

REMOVE THIS AFTER: References should be added using BibTeX. Be sure to reference R, and any R packages you use, as well as the dataset. Strong submissions will draw on related literature and reference those.

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

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