Analysis of the Effect of COVID-19 Lockdown on Attempted Suicide Calls for Service Attended (CFSA) in Toronto*

My subtitle if needed

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January 23, 2024

With the closing of non-essential businesses and the increased social restrictions of the COVID-19 pandemic from March 2020 in Toronto, many Canadian's mental health were reported to have been affected negatively. Second sentence. Third sentence. Fourth sentence.

1 Introduction

The effects of the COVID-19 pandemic began to reach the citizens of Toronto throughout the month of March in 2020. From the NBA season suspension on March 11th to the Ontario declaration of state of emergency by Doug Ford on the 17th, all gathering activities started to shut down to mitigate the impacts of the virus on the city (CityNews XX). This is soon followed by the mandated closure of non-essential businesses and the law to ensure a 2 meter distance between people in public places punishable by fines (CityNews XX). As individuals naturally crave in-person contact and outdoor activities, many studies have reported psychological distress relating to anxiety, depression, or general lack of interest in anything throughout the progression of the lock-down (Library of Medicine). In conjunction with psychological distress, it is important to analyse whether the lock-down also correlates with suicide-related incidents in order to better understand the extent that of not only an involuntary secluded lifestyle, but also other effects of COVID-19 such as unemployment and the death of a family member that can negatively impact an individual's well-being.

Knowing the correlation between the lock-down and suicide-related calls for service attended can also help policy makers know how to better prepare and provide mental health support

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*Code and data are available at: https://github.com/YcartXin/Effect-of-COVID-Lockdown-on-Attempted-Suicide-CFSA-Analysis.

during a nation-wide crisis. A survey conducted on COVID-19 and mental health (SCMH) has shown that one in four Canadians aged 18 and older indicates symptoms of depression, anxiety, and post-traumatic disorder (PTSD) (The Daily). Furthermore, between fall 2020 and spring 2021, symptoms of mental health disorder increased (The Daily). On the other hand, there are studies that reported no significant difference in suicide ideation - adf - in Canada between 2019 and 2020 (HPCDP). These research results stem from complicated factors and are time-limited in their analysis. The relation between the COVID-19 lock-down and mental health consequences can be further explored with an analysis that emphasizes the lock-down months between March 2020 to March 2021 as well as looking at the more long-term mental health fluctuations ().

Among present research there is a lack of analysis in the correlation between the lock-down to suicide-related calls for service attended focusing in Toronto. This paper will estimate the monthly average attempted suicide CFSA in Toronto and compare between years, and more specifically, the lock-down period. You can and should cross-reference sections and subsections.

The remainder of this paper is structured as follows. Section 2….

2 Data

2.1 Data source and collection {data-source}

The data used in this analysis - Persons in Crisis (PIC) Calls for Service Attended (CFSA) - is sourced from Toronto's Open Data Portal. The data was accessed through R using the 'opendatatoronto' package (Gelfand). The CFSA is collected by the Toronto Police Service (TPS) and includes events attended by an officer from the TPS. However, the data does not include events attended by members in Parking, Marine, Court or Primary Report Intake and Management and Entry. It is refreshed monthly with the last update on January 11th, 2024 on the Open Data Portal.

Although the TPS is a trustworthy source, the methodology of data collection contains flaws that decrease the reliability of the data. For instance, while not used in this analysis, the location at which the events take place provided in the data is not precise to protect the privacy of the person in crisis. The data set may further contain bias in analyzing the frequency for suicide-related cases as some calls may not have been picked up by officers for various reasons. An officer also may not be dispatched for some calls which means the calls recorded may also not be accurate to actual suicide-related incident numbers. Additionally, some cases may not call for the Toronto Police Service in the first place. While these occurrences are likely to under-represent the frequency of CFSA for the type suicide-related, in contrast, some attended calls may have been unnecessary which may have inflated the data. These issues pose to be inaccuracies for this data.

2.2 Exploring the data

The raw data downloaded includes 291991 observations with 16 variables. The cleaning process keeps only four as they are relevant to the analysis and describe a different aspect of the CFSA. Event month and event year differentiate the data through time periods. The date variable combines year and month to further differentiates between each month in each year. The day is set to be the first of every month as they do not have high significance in this analysis. People's mental health state usually do not shift drastically over days but more so over the unit of months.

Event type is also kept although it contains only type "Suicide-related" after cleaning. The website from which the data was downloaded claims to have six event types: Attempt Suicide, Person in Crisis, Elopee, Jumper, Overdose and Threaten Suicide (XX). However, the downloaded data shows that events are split into three types: Suicide-related, Overdose, and Person in Crisis. Assuming overdose maps to overdose, person in crises includes person in crises and elopee, suicide-related data is then comprised of attempted suicide, jumper, and threaten suicide data.

The variable occurrence created documents whether a occurrence report is filed which signifies an activity that has been entered into police records' management systems. This indicates a serious injury or incident from suicide-related cases.

Furthermore, an indicator variable is created for the cleaned data named lock_down. This variable takes the value of either 0 or 1. It identifies the time period when people in Toronto's mental health would be affected by lock-down (1) and the period before/after (0) for the convenience of later analysis. The affect should start around April 2020 as the lock-down started on 17th of March in 2020, while the estimated effects end in May 2021 since it is likely to take at least three months for an individual to show significant improvements mentally (APA). Overall, this is what the cleaned data looks like.

```
toronto_cfsa |> head() |> kable()
```

event_year	event_month	event_type	occurrence_created	date	lock_down
2019	1	Suicide-related	No	2019-01-01	0
2019	1	Suicide-related	Yes	2019-01-01	0
2019	1	Suicide-related	Yes	2019-01-01	0
2019	1	Suicide-related	No	2019-01-01	0
2019	1	Suicide-related	Yes	2019-01-01	0
2019	1	Suicide-related	Yes	2019-01-01	0

The frequency of suicide-related CFSA can be graphically expressed through a scatter plot.

3

```
toronto_cfsa |> count(date) |>
  ggplot(aes(x = date, y = n)) + geom_point() +
  theme_minimal() + labs(x = "Time", y = "Monthly Frequency of Suicide-related CFSA") +
  scale_colour_brewer(palette = "Set1") + theme(legend.position = "bottom")
```
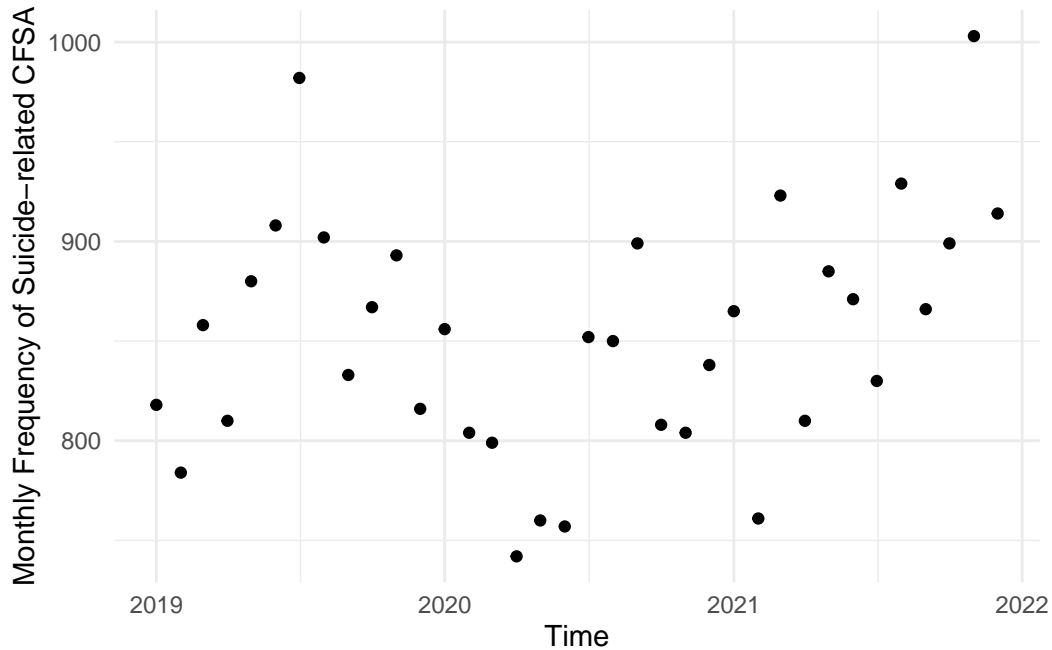

Figure 1: Monthly Frequency of Suicide-related Calls for Service Attended over Time

From (Figure 1), it is difficult to see a clear trend between time and the frequency of suicide-related CFSAs. However, further exploration can be done to separate the data between the lock-down period, and the prior/post data. It can be helpful to compare the monthly frequency of suicide-related calls for service attended during the period when lock-down impacted individuals in Toronto the most.

```
toronto_cfsa |> filter(lock_down == 1) |>
  ggplot(aes(x = date)) +
  geom_bar() +
  theme_minimal() +
  labs(x = "Lock-down affect time", y = "Monthly Frequency of Suicide-related CFSA" )
```
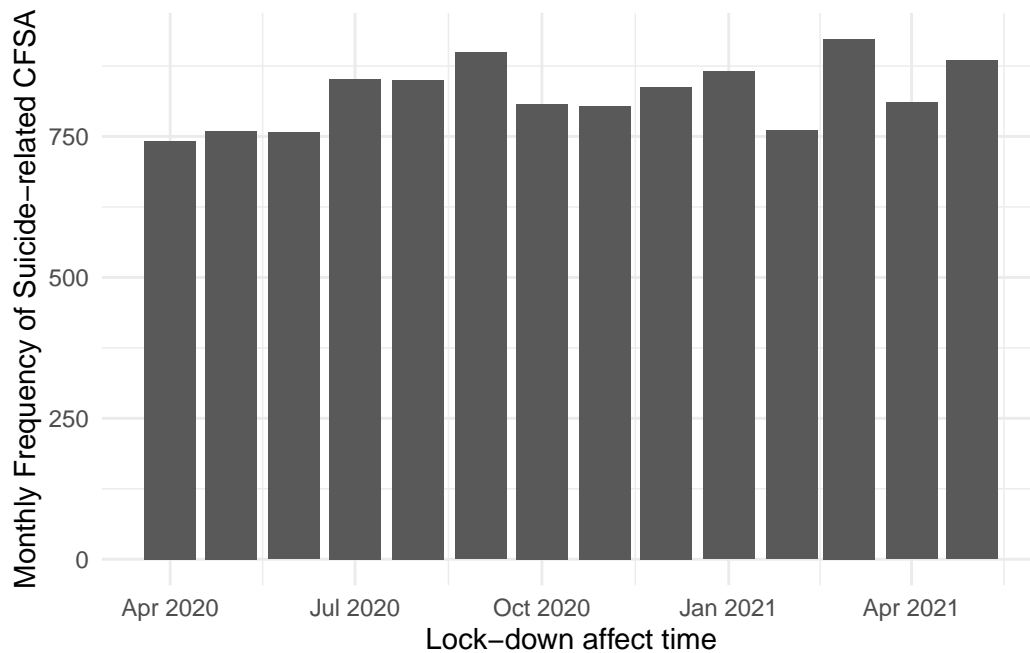
Figure 2: Monthly Frequency of Suicide-related Calls for Service Attended over Lock-down Related Time

From (Figure 2), once again, there is no clear trend in suicide-related calls from person in crisis. There is a hint of increase throughout this period but the difference is not very distinctive. However, as the data may be heavily biased by calls where the police were dispatched unnecessarily, it is worth emphasizing on whether an occurrence was created in these incidents.

```
toronto_cfsa |> filter(occurrence_created == "Yes") |>
  count(date) |>
  ggplot(aes(x = date, y = n)) + geom_point() +
  theme_minimal() + labs(x = "Time", y = "Monthly Frequency of Suicide-related CFSA") +
  scale_colour_brewer(palette = "Set1") + theme(legend.position = "bottom")
```
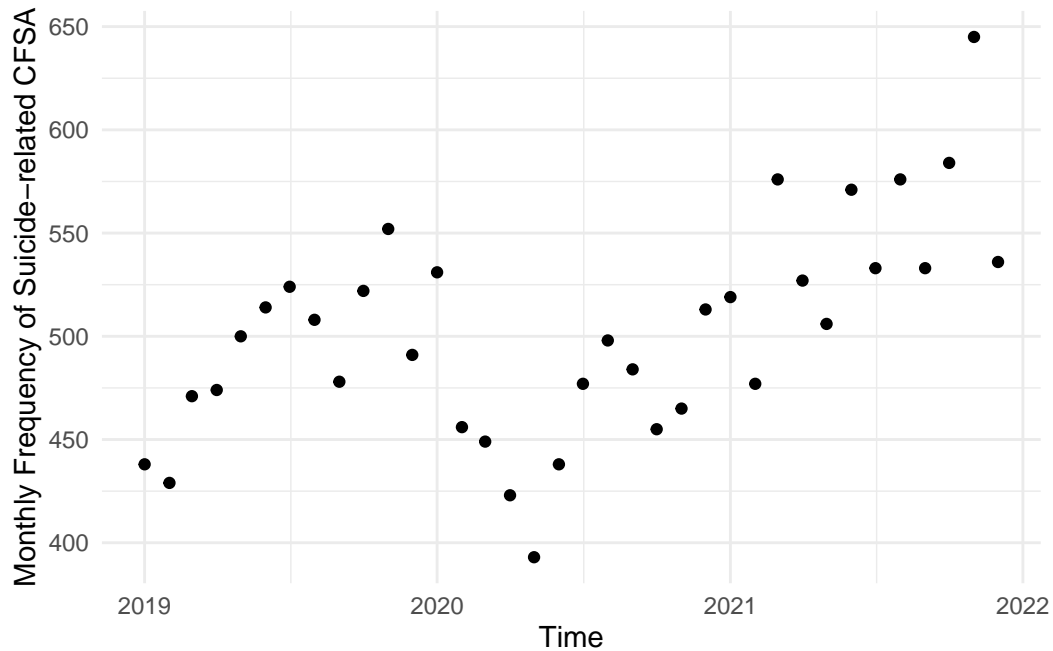
Figure 3: Monthly Frequency of Suicide-related CFSA with Occurrence over Time

(1) provides more clarity to a trend of a surge in occurrence filed CFSAs between 2019 to 2020, a short fall, and then another surge between 2020 to 2022. The number of suicide-related calls with occurrence created increased since the lock-down in 2020 and has no indication of a decrease even after the lock-down period ended.

3 Discussion

3.1 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.

3.2 Second discussion point

3.3 Third discussion point

3.4 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...

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 4: **?(caption)**

C References