Analysis of the Effect of COVID-19 Lockdown on Suicide-related Calls for Service Attended (CFSA) in Toronto[1]

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Abstract 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. This analysis seeks to find a correlation between the COVID-19 lock-down and the suicide-related calls for service attended (CFSA) in Toronto due to the psychological distress incited by the lock-down. However, although the frequency of suicide-related CFSA increased during the lock-down period, the analysis does not show a strong correlation between the two variables, especially considering the rise in cases did not stop with the ending of the lock-down. This signifies that the lock-down was not a significant factor for suicide-related incidents in Toronto during and after the pandemic period.

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[1]Code and data are available at: https://github.com/YcartXin/Effect-of-COVID-Lockdown-on-Suicide-Related-CFSA-Analysis.

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 [1]. 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 [1]. 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 [2]. 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 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) [3]. Furthermore, between fall 2020 and spring 2021, symptoms of mental health disorder increased [3]. On the other hand, there are studies that reported no significant difference in suicide ideation - having suicidal thoughts - in Canada between 2019 and 2020 [4]. 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 look at the frequency of monthly attempted suicide CFSA in Toronto and compare between years, and more specifically, the lock-down period. The remainder of this paper is structured as follows. Section 2 (Data) will include the source and data collection process for the analysis as well as the exploring of the cleaned data. Data source and collection in Section 2 will explain the background of the source, how the data was collected, and potential biases within the data. The following section Exploring the data will explain the cleaned data and use different graphs to investigate whether there is a correlation between the lock-down and suicide related CFSAs. Section 3 (Discussion) will provide overall summaries and findings of Section 2 in context.

The overall analysis shows that there is a slight positive correlation between confirmed cases of suicide-related calls for service attended in Toronto during the COVID-19 lock-down. The frequency of the calls rises from when the lock-down started while showing no signs of decrease after the end of lock-down. With this information, more research can be conducted for an even longer period post-COVID-19 . Policy-makers can also better weigh the impact of lock-down policies for any necessity in the future.

2 Data

2.1 Data source and collection

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 [5]. This analysis will be carried out in **R** [6] using packages **tidyverse** [7], **knitr** [8], **dplyr** [9], **ggplot2** [10], **knitr** [8], **here** [11], and **janitor** [12]. 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 three as they are relevant to the following 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 [13]. The variable occurrence created documents whether an 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.

There are no similar data as the one used in this analysis on Open Data Toronto. Within the data, may variables are eliminated due to their irrelevance. One variable that was crucial in the cleaning process is event type. However, after filtering through the type "Suicide-related", this variable is no longer needed. However, it is worth noting the "Suicide-related" category of calls for service attended. 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 [5]. However, the downloaded data shows that events are split into three categories: 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.

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 [13]. Overall, Table 1 is what the cleaned data looks like.

Table 1: Sample of Cleaned Suicide-related Calls for Service Attended Data between 2019 - 2021

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

With the clean data sorted graphs can be used to try and find correlations or trends. The frequency of suicide-related CFSA can be graphically expressed through a scattered histogram.

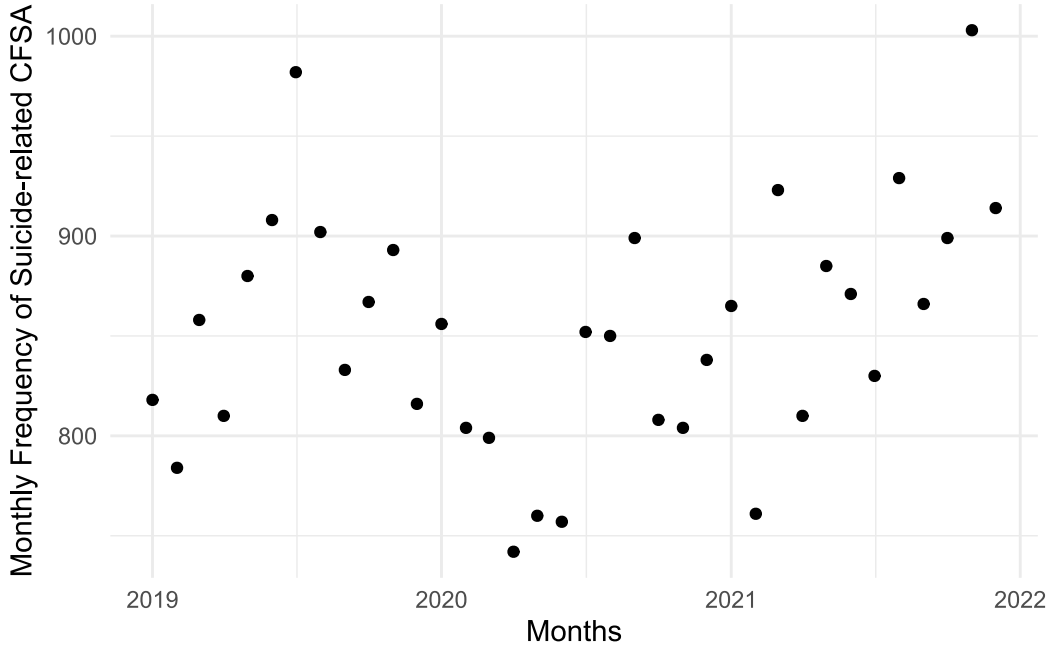

Figure 1: Monthly Frequency of Suicide-related Calls for Service Attended between 2019 - 2021

From Figure 1, it is difficult to see a clear trend between time and the frequency of suicide-related CFSAs. There appears to be no strong correlation. 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 com-

pare the monthly frequency of suicide-related calls for service attended during the period when lock-down impacted individuals in Toronto the most.

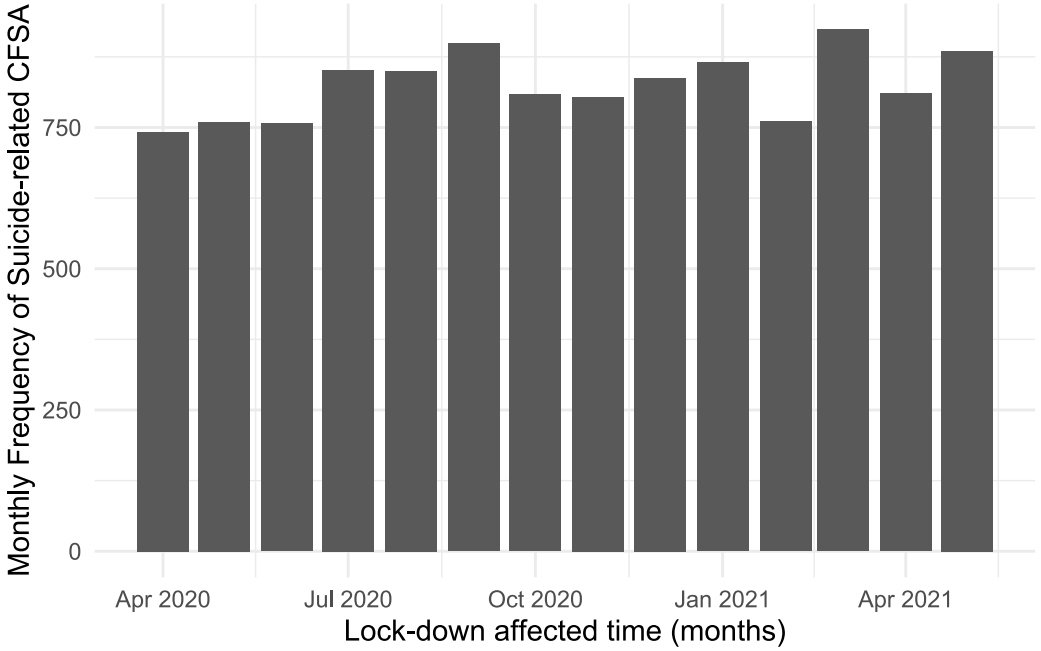

Figure 2: Monthly Frequency of Suicide-related Calls for Service Attended over Lock-down Period

Figure 2 shows the lock-down affected period's suicide-related calls for service attended. 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 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.

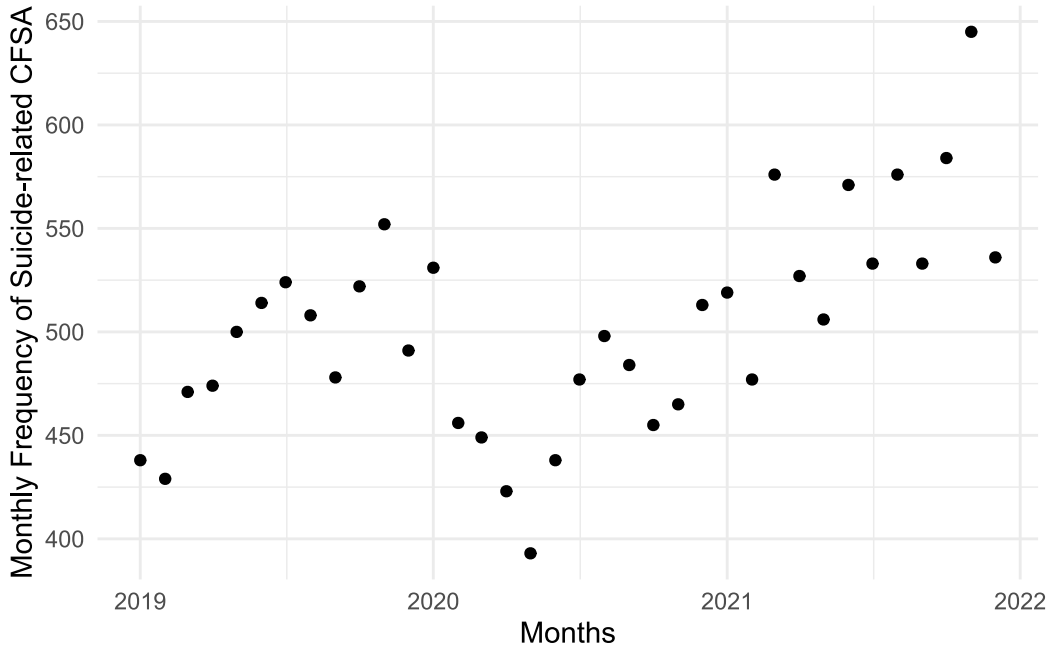

Figure 3: Monthly Frequency of Suicide-related CFSA with Occurrence Filed 2019 - 2021

Figure 3 includes only the CFSA where an occurrence report is filed which confirms the data to be more reliable. Figure 3 provides more clarity to a trend of a surge in occurrence filed CFSAs between 2019 to 2020, a short fall in the beginning of 2020, and then another surge between mid-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. This graph suggests that the beginning of the lock-down saw a decrease in suicide-related calls for service attended. Overtime, the frequency of the CFSA with an occurrence report filed increased until even after the lock-down ended. This correlation is relatively clear and the post-pandemic frequency surpasses the pre-pandemic suicide-related CFSA with occurrence report. However, the overall trend is not clear as the beginning of the lock-down saw a decrease in confirmed CFSA frequency and the ending of the lock-down did not see significant decrease in frequency.

3 Discussion

From the Section 2, data containing unconfirmed suicide-related calls from 2019 to 2021 in Toronto did not show signs of correlation with the COVID-19 lock-down. However, once whether an occurrence report is filed is taken into consideration, the graph showed an increase in frequency in confirmed cases which does not stop after the lock-down ended. From Figure 3, it is clear that there are two spikes in confirmed CFSA cases. The first spike peaked around the winter months of 2019 and a drastic downfall with its lowest point in April. This curve may be explained by seasonal reasons such as suicide-ideation occurring more often in the darker and colder winter climates. However, as the lock-down started in March - with the exception of a low frequency in April that my be attributed to a delayed effect - the frequency of suicide-related CFSA with a occurrence filed continuously increased until 2022. The seasons did not cause noticeable trends in this period

which suggests that the frequency of cases may not be independent from the COVID-19 lock-down. Nonetheless, there is no conclusive evidence of a relationship between confirmed suicide-related calls for service attended and the COVID-19 lock-down - a more detailed analysis is needed over a longer period of time.

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