

# CRIM 515 Project 1

Sydney Reuter

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## Research Question

This project will examine if there is a statistical change in (1) mass shooting activity, (2) public interest in mass shootings, and (3) the relationship between mass shootings and public interest. Mass shootings will be defined as gun violence events in the United States since 2014 where 4 or more individuals are shot or killed (not including the shooter). This definition is sourced from the Gun Violence Archive. The research question will be examined through the number of casualties per event. Specifically, how many victims were killed or wounded.

## Literature Review

This study examined what characteristics of mass shootings impact media coverage. The researchers utilized mass shooting data (defined as a 24-hour gun violence period that results in 4 or more victim deaths or injuries) from 2000 to 2019. New stories were obtained from the Associated Press (AP). The researchers utilized a negative binomial regression to examine the data. Factors that increased news coverage were the number of casualties (higher numbers), location of shooting (government buildings, schools, and places of worship), age and state of assailants (younger with mental health problems), motive (terrorism and hate), and victim characteristics (women, children, strangers, and Caucasian). The researchers concluded that selective news coverage of these events based on these variables can strengthen stereotypes and distorted perceptions about these crimes.

Fox, J. A., Gerdes, M., Duwe, G., & Rocque, M. (2021). The Newsworthiness of Mass Public Shootings: What Factors Impact the Extent of Coverage? *Homicide Studies*, 25(3), 239–255. <https://doi.org/10.1177/1088767920974412> (<https://doi.org/10.1177/1088767920974412>)

## Data

This project will use data from the Gun Violence Archive (GVA). The GVA collects data on mass shootings in the United States dating back to 2014 and is updated regularly. Mass shootings are defined as gun violence events that result in four or more victims being killed or injured (not including the perpetrator). GVA provides a large amount of mass shooting events but does not have extremely detailed information about the events. Variables are limited to an assigned ID number, date of incident, location (city, state, address), victims killed and injured, suspects killed and injured, suspects arrested, and the source of the data. All data from the GVA website regarding mass shootings was utilized.

Data from Google Trends was also utilized. This data was based on Mass Shooting searches in the U.S. from January 1st, 2014 to March 21st, 2024. Variables included the year, month, and interest over time.

## Methods

This project utilized R Studio and R Markdown. Ggplot was used to produce all graphs. Data from Google Trends was downloaded as a CSV file and loaded into R Studio. Data from GVA was acquired using web scraping. Both data frames were manipulated to adjust variables (changing from numerical class to date class), split variables (splitting date into year, month, and year-month) and add variables (day of week and total casualties).

Data from GVA was then used to calculate the number of victims per year-month. Additionally, this data was subset into two separate data frames based on the Las Vegas Shooting. Data frame “events.pre” included shootings before Las Vegas and data frame “events.post” included shootings after Las Vegas. Neither data frame included the Las Vegas shooting (10/01/2017). The number of victims per year-month was then calculated for both of these data sets and a t-test was conducted to evaluate whether there was a statistical difference between the number of victim casualties before and after the Las Vegas shooting. Victim casualties was defined as the total number of victim deaths and injuries.

Two bar graphs were produced with these same data frames. The first graph displayed the number of victim casualties (y) from the “events.pre” data frame vs the date (x). The second graph displayed the number of victim casualties (y) from the “events.post” data frame vs the date (x).

One line chart was produced using the Google Trends data to plot interest over time (y) with date (x). A fourth graph was produced using the GVA data. This was a line chart that plotted the number of casualties per mass shooting (y) with date (x). The code for this project is not displayed in the final output.

# Findings

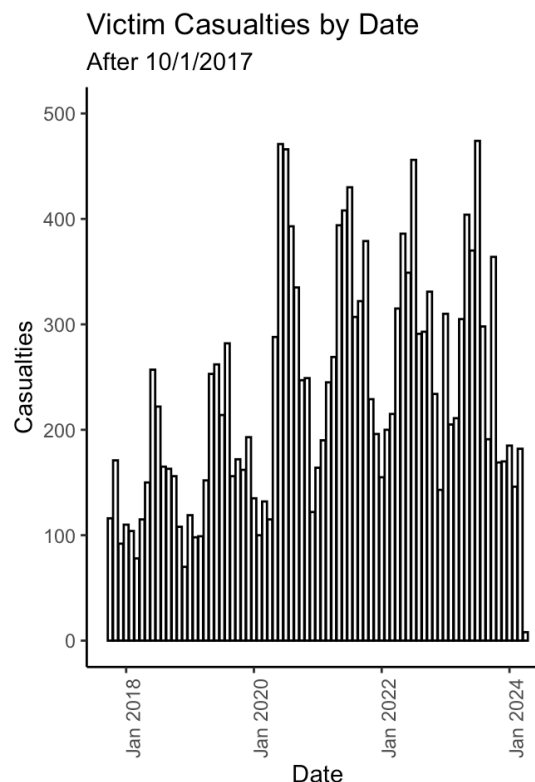
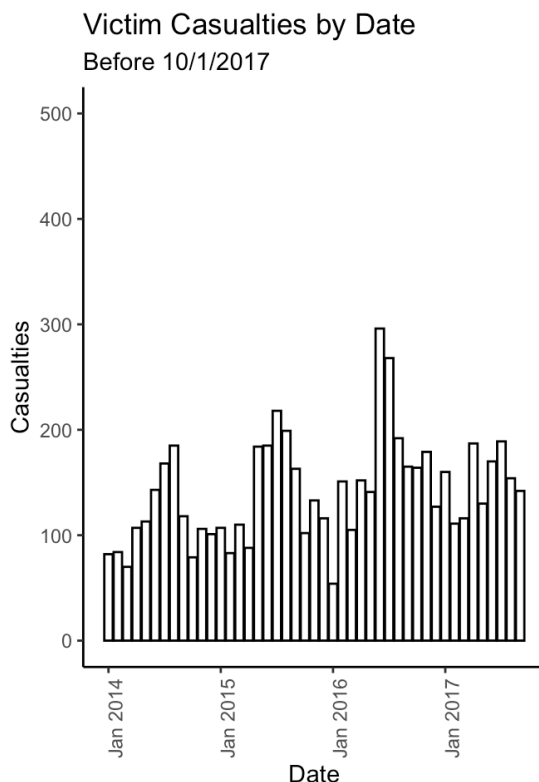
## Mass Shooting Analysis

According to the t-test (shown below), there is a statistically significant change in the number of victim casualties per mass shooting since 10/1/2017 (the Las Vegas shooting) ( $p < 0.01$ ). Before the Las Vegas shooting, the average number of victim casualties was approximately 142; after the Las Vegas shooting, the average number of victim casualties increased to approximately 232. This suggests that mass shooting casualties have significantly increased since 10/1/2017.

The bar graph (shown below) also reflects this increase. According to the graphs, shootings before 10/1/2017 reached a maximum of 300 casualties, whereas shootings after 10/1/2017 frequently exceeded 300 casualties, reaching up to 450 casualties. Shootings before 10/1/2017 appeared to most frequently have 60-125 casualties, whereas shootings after this date appear to most frequently have 100-250 casualties.

```
t.test(pre.yearmonth.vict$x, post.yearmonth.vict$x)
```

```
##  
## Welch Two Sample t-test  
##  
## data: pre.yearmonth.vict$x and post.yearmonth.vict$x  
## t = -6.1062, df = 117.47, p-value = 1.357e-08  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -116.58558 -59.48306  
## sample estimates:  
## mean of x mean of y  
## 142.1556 230.1899
```



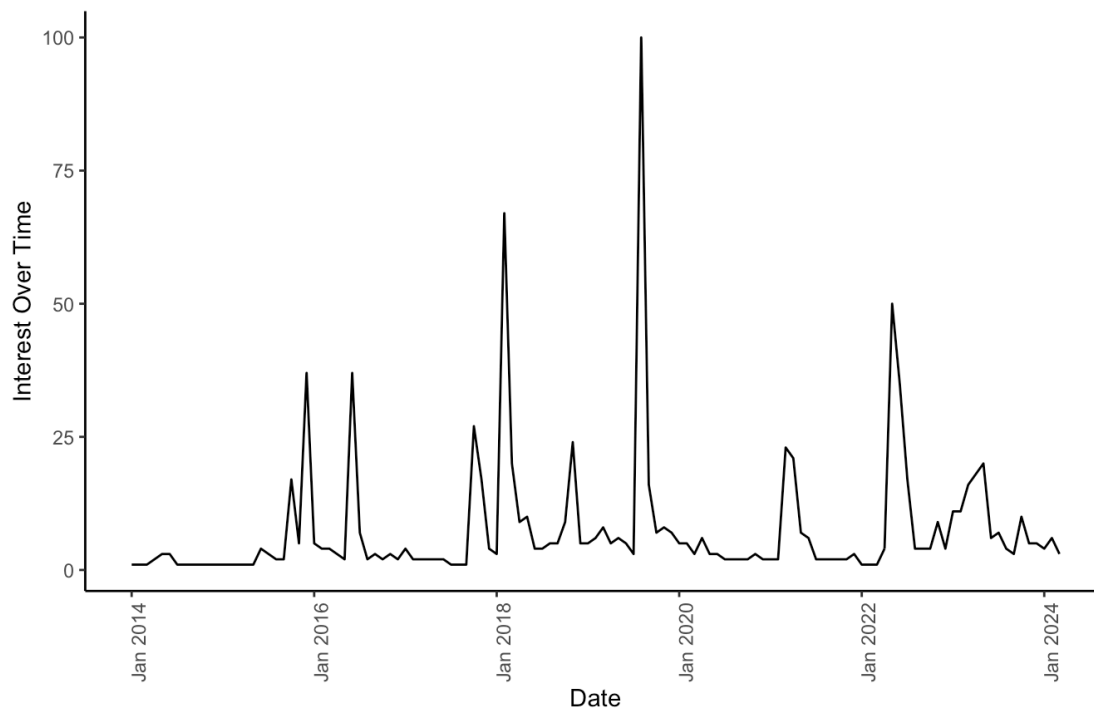
## Public Interest Analysis

According to the line graph (shown below), public interest in mass shootings over time varies widely. Interest in mass shootings peaked in late 2019. Other periods with high interest include January 2018 and the beginning of 2022. Moderate interest occurred from mid-2015 to mid-2016, and the beginning of 2021. Low periods of interest include January 2014 to mid-2015 and 2017. The base level of

interest appears to have slightly increased over time, from 1 in January 2014 to 5 in January 2024. However, most variation in interest occurs from peaks, not from a steady incline.

## Interest in Mass Shootings Over Time

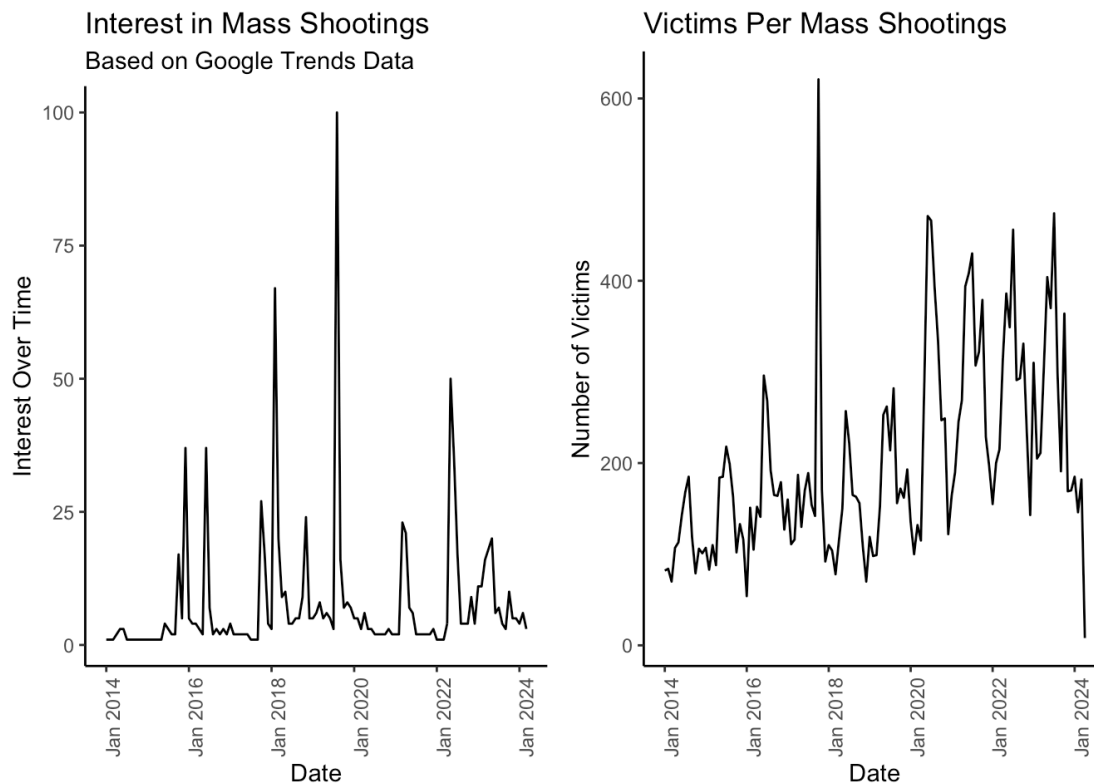
Based on Google Trends Data



## Intersection Analysis

According to the line graphs shown below, interest in mass shootings over time follows a similar pattern to victims per mass shooting. Specifically, when there is a mass shooting with a high victim count, interest tends to peak around the same time. However, there is no clear pattern that indicates whether this peak consistently occurs before, during, or after the high victim count.

For example, a high victim count in late 2017 was followed by a high level of interest. However, a high victim count in late 2023 was not followed by a high level of interest (although interest did increase, it only increased a moderate amount). Additionally, a moderate victim count in early 2020 was followed by an extremely high level of interest. While interest and victim count seem to follow a similar pattern, the intensity of the pattern differs. This may indicate the presence of a third variable, such as publicity and news coverage of the mass shooting event. Alternatively, other search results within the Google trends data may give clearer results, such as “deaths from mass shootings”. These results were not utilized in this project and may have given a more clear analysis.



## So What

These findings do confirm conventional wisdom of mass shooting activity. Specifically, that mass shootings are becoming deadlier, and that public interest in mass shootings has increased and peaks around the same time that mass shootings occur. These findings are important as they can help guide decision making within the criminal justice system, especially with regard to policy and practice.

In finding that mass shootings have become deadlier, policy and practice should be aimed at reducing the deadliness of these shootings (this study does not focus on the frequency of mass shootings and therefore will not discuss how to prevent mass shootings from occurring). To reduce the deadliness of mass shootings, multiple actions can be taken, such as decreasing police response time, making deadlier weapons more difficult to obtain, avoiding overcrowding locations, and designing buildings with security features (such as secure, locked rooms, bulletproof doors, and multiple exit routes). Research should be done to identify what variables are the best predictors of shooting deadliness. Actions should be taken on variables that are the best predictors. If further research cannot be accomplished then informed decision-making that incorporates previous research, budget constraints, and realistic implementation, should be utilized to identify what variables will become action items.

Finding that public interest in mass shootings has increased over time (and peaks around events) can be useful in two main ways. First, media outlets and law enforcement agencies should understand that the public is more interested in mass shootings than previously. This should encourage these organizations to share information about recent mass shooting activity to ensure the public is informed; however, organizations need to be careful not to bias information as to create misinformation or share too much information as to create copycats. Since interest has increased, now more than ever organizations need to ensure the public has a fair, unbiased understanding of how, when, and where mass shootings occur to prevent misinformation and stereotypes.

Second, it would be wise to conduct research on the relationship between public interest and mass shooting deadliness, especially with regard to when public interest spikes and to what level. This study's findings indicate that public interest can peak before, during, and after a major mass shooting. A clearer understanding of this relationship may facilitate police-community communication (as mentioned in the previous point) and may even assist in predicting mass shootings (specifically if public interest peaks before a major event).

This study's findings identify that mass shootings have become deadlier and public interest in mass shootings has increased over time. A successful integration of these findings within the criminal justice system would be new policies and practices focused on reducing the deadliness of mass shootings and better informing the public about mass shooting events.