**Mass Shooting and Gun Purchases in the United States**

**Background**

There have been a number of reports that gun sales increase just after a mass shooting occurs (CNN Business, 2019). Callcut, Robles, Kornblith, Plevin, & Mell (2019) reported significant increases in gun sales after 2012 and statistically significant increases in the months following a mass shooting. These increases in gun sales were also influenced by legislative changes discussed and enacted after a mass shooting. This study used monthly gun sales data provided by the California Department of Justice and looked at the data going back 20 years. After each mass shooting a debate ensues over greater restrictions in gun sales. The theory is that these talks frequently create panic that guns will be unavailable and purchases increase. Callcut, Robles, Kornblith, Plevin, & Mell (2019) study seems to suggest that this theory is correct. It is important to point out that these researchers used data from one state, California. This state has been on the forefront of enacting policies that restrict gun purchases. It should also be noted that they looked at data from a long period of time and defined mass shootings rather broadly. Other evidence has not been so conclusive. For instance, gun makers saw a rush to purchase guns just after the Sandy Hook Elementary School shooting, but the legislation was not passed and the gun manufactures had to sit on the increased inventory (Johnson, 2015). The relationship between mass shootings and gun sales appears to be more complicated then what is reported in the mass media. We wanted to investigate this relationship and see if we could find evidence of an increase in gun sales after a mass shooting.

**Hypothesis**

Hypothesis: Gun sales do increase after a major mass shooting.

Null Hypothesis: Gun sales do not increase after a major mass shooting

**Data**

We used data from *Mother Jones: A guide to mass shootings in America.* The website is maintained by the news magazine, *Mother Jones.* This database includes detailed data on mass shootings in the United States from 1982 to the present. It includes information about the incident, victims, shooters, and weapons used. We also used data from The Gun Violence Archive. This is a website run by a non-profit corporation formed in 2013 to provide free accurate information about gun-related violence in the United States. We primarily used the Gun Violence Archive Data to verify the data we obtained through *Mother Jones*. We used data from the FBI’s National Instant Criminal Background Check System to collect data about gun sales in the United States. This data has been used extensively in the literature as a way to measure gun purchases (Liu & Wiebe, 2019). We used data from Google Trends to determine if the mass shooting had an impact nationally.

**Methods**

*Definitions*

We defined mass shooting as a shooting where five or more people were injured or killed. This definition is supported by the literature (Liu & Wiebe, 2019). The shooting was not gang related. It happened in a period during which the term “shooting” was trending on Google trends. We pulled the data for the search word “shooting” from Google trends. Google creates a scaled score with a range from 0 to 100. This score gives a better idea of the relative popularity of a search term at a give time and in a particular geographical area. During the period between January 2014 and July 2019 the relative value of the term “shooting” was between 18 and 100. We took the mean of the relative value for this time period (M: 30.31; SD: 15.05). We determined that the mass shootings that corresponded with a score of 23 (1/2 of a standard deviation below the mean) or greater would be used for the study.

We created a “Total guns purchased” variable using the number of handguns, long-guns, other guns, and multiple weapons purchased per month during January 2014 and July 2019. This data was drawn from background check data collected by the FBI.

*Data Cleaning and Preparation*

We used Pandas to clean and format the data. We removed incidents with fewer than five victims and that occurred prior to January 1, 2014. We created incident IDs for all of the shooting incidents in both the *Mother Jones* data and The Gun Violence Archives data. The data were then merged using the incident ID variable. We used the Gun Violence Archives data to verify the data in the Mother Jones data. We decided to use the Mother Jones data because it included more information about the specific shoot incidents.

We created a numeric variable called “monthyr\_num” through which we can linked the data from the gun sales data set, the google trends data, and the Mother Jones mass shooting data. We created a “monthyr\_impact” variable to use to merge in the total guns purchased the month after a major mass shooting. The “monthyr\_impact” variable was created by adding one month to the “monthyr\_num” variable. We created a “monthyr\_prev” variable to use to merge in the total guns purchased data for the same period the year before the shooting. This variable was created by subtracting one year from the “monthyr\_impact” variable. We used the total number of guns purchased during these periods to look at the difference in the number of guns purchased just after a mass shooting and compare it to the number of guns purchased in a period not influenced by a mass shooting.

*Analyses*

We examined the data in the variables in these data sets to look for any discernable pattern between gun sales and mass shootings. We ran an independent sample t-test to look at the difference between the mean number of guns purchased in months not directly following a mass shooting and the mean number of guns purchased in the months directly following a major mass shooting. We looked at stock patterns for Smith & Wesson and Ruger (RGR) surrounding the time of the Las Vegas shooting, the highest profile mass shooting in the United States.

**Results**

We found no significant difference in the number of guns purchased just after a mass shooting (M=1153004.15, SD=304920.32) and the number of guns purchased at the same time of year when there was no mass shooting (M=1138564.50, SD=272338.34); t (1.262), p=.0.212 during the period from January 2014 through July 2019.

We ran Pearson correlations between the variables (Number of Mass Shootings, Total Number of Victims, Relative Value (Google Trends), Total Gun Sales without Mass Shooting, Total Gun Sales One Month After a Mass Shooting, and Total Gun Sales During the Month of the Mass Shooting). There was a significant relationship were between Total Number of Victims and Relative Value (r=.70, n=28, p<.001). We found a significant relationship were between Total Gun Sales After a Mass Shooting and Total Gun Sales Without a Mass Shooting (r=.74, n=28, p<.001) and between Total Gun Sales After a Mass Shooting and Total Gun Sales the Month of a Mass Shooting (r=.54, n=28, p=.003) (See Figure 1).

**Conclusions and Limitations**

We could not find a statistically significant relationship between mass shootings and an increase in gun sales as compared to the sales the year prior during the time period we considered in this study. While there is support in the literature for this relationship it appears that it is a bit more complicated than what the present study could detect. Callcut, Robles, Kornblith, Plevin, & Mell (2019) found a significant increase in gun purchases but their study covered a twenty-year span. They also used a narrower definition of mass shootings. They do also mention that the influence of legislation could impact the relationship between mass shootings and gun purchases. Liu & Wiebe (2019) found more mixed results. The found that some shootings were associated with increase in gun purchases and some were actually associated with a decrease in gun purchases. Other factors like higher fatality count and media attention have been found to influence the relationship between mass shootings and gun purchases. In our study we did not find a relationship between a higher number of victims and gun purchases (r= .18, n=28, p=.36). We did, however, find a significant but small relationship between number of victims and relative value from Google Trends (r=.70, n=28, p<.001). This is made less interesting since a higher relative value on Google Trends was part of the criteria for selecting mass shootings. Based on the data we found it appears that gun purchases follow a similar pattern over the months of each year. We did find a small significant relationship between total gun sales after a mass shooting and total gun sales without a mass shooting but these gun sales occurred in the same month in different years (r=.74, n=28, p<.001).

This study had numerous limitations. One of these is the narrow definition of mass shootings. If we used a broader definition of mass shootings we would have had more data points. We also limited the period of time we examined to five years. It is likely that had we looked at a longer period of time we would have had the opportunity to illuminate more patterns in mass shootings and gun sales. Even though the FBI’s National Instant Criminal Background Check System data has been used in other studies it is not an absolute measure of gun purchases. It is possible that an absolute measure of gun purchases would allow us to capture a relationship between mas shooting and gun purchases. There appear to be a number of other factors that impact this relationship and the relationship seems to be more complicated. It would be helpful to examine these other factor in more detail to see how they affect this relationship.

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| *Figure 1: Correlation Table for Mass Shootings and Gun Sales* | | | | | | |
| **Variable** | **Number of Mass Shootings** | **Total Number of Victims** | **Relative Value (Google Search)** | **Total Gun Sales Without Mass Shooting** | **Total Gun Sales Month After Mass Shooting** | **Total Gun Sales During the Month of a Mass Shooting** |
| **Number of Mass Shootings** | 1.0 | .30 | .20 | .19 | -.02 | .06 |
| **Total**  **Number of Victims** |  | 1.0 | .70\*\* | .33 | .18 | .06 |
| **Relative Value (Google Search)** |  |  | 1.0 | .23 | .25 | .27 |
| **Total Gun Sales Without Mass Shooting** |  |  |  | 1.0 | .74\*\* | .33 |
| **Total Gun Sales Month After Mass Shooting** |  |  |  |  | 1.0 | .54\*\* |
| **Total Gun Sales During the Month of a Mass Shooting** |  |  |  |  |  | 1.0 |

\*\* Correlation is significant at the 0.01 level

**References**

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