GEORGETOWN SCIENTIFIC RESEARCH JOURNAL
Volume Three
Edition One
Fall 2022

Trends in Pro-Gun Control Tweets Surrounding a Mass Shooting Event Suggest Time-Dependent Changes in Public Response

Lily Shytle

Trends in Pro-Gun Control Tweets Surrounding a Mass Shooting Event Suggest Time-Dependent Changes in Public Response

Lily Shytle[1]

[1] Department of Biology, Georgetown University, Washington, D.C.
Email: eas384@georgetown.edu
https://doi.org/10.48091/gsr.v2i2.33

Abstract

Over the period from May 25, 2015 to May 25, 2018, there were 1,296 mass shootings recorded around the United States. This article evaluates overall public support for gun regulation before and after a major mass shooting. Big data that accounted for outliers and other potential skewing points were included from Twitter. 250 Tweets that occurred immediately before, immediately after, or two weeks after a major mass shooting were analyzed. The Tweets were restricted to include at least one of the following hashtags (#): secondamendment, neveragain, shooting, NRA, guncontrol, gunviolence, and 2A. The Tweets were categorized as pro-gun control, anti-gun control, or neutral, defined by operational definitions. It was hypothesized that there would be more Tweets that opposed gun control 1-7 days before each mass shooting but fewer Tweets that opposed gun control 72 hours after each mass shooting. Three days (72 hours) after a major mass shooting, there was a significant decrease in the number of anti-gun control Tweets posted compared to 1-7 days prior to the shooting. There was also a significant increase in the number of anti-gun control Tweets 14-21 days after the mass shooting compared to 72 hours after the shooting, implying that the content of Tweets after two weeks was similar to the content before the shooting occurred.

Keywords: mass shooting, gun violence, Twitter, big data

1. Introduction

Mass shootings are an epidemic in the United States, taking hundreds of lives each year. In the first five months of 2018, gun violence killed 5,647 people and wounded 10,344 people.[1] A mass shooting is defined as a shooting that claims four or more victims, either killed or injured, in a single incident.[2] Many solutions for gun violence have been proposed, yet the Center for Disease Control and Prevention (CDC) is prohibited from researching gun violence and prevention. The Dickey Amendment (1996) states that "none of the funds made available for injury prevention and control at the Centers for Disease Control and Prevention may be used to advocate or promote gun control."[3] This law has severely limited research on gun violence and public

perception. Although it has been argued that some research is still possible, there are no training grants or federal funding available to researchers, effectively hindering most potential research initiatives. Despite federal funding blockages, a meta-analysis of data from 1999-2013 found that more restrictive firearm legislation was associated with lower pediatric, unintentional, suicide, and overall firearm-related fatality rates.[4]

1.1 Legislation Surrounding Gun Violence

Gun violence accounts for almost half of the deaths of female partners in domestic violence, making it by far the most lethal method. A study conducted by Gollub et al. (2018) found that areas with fewer firearm restriction laws had a higher number of incidences of murder by gun violence compared to those with more restrictive gun laws.[5] More restrictive gun control policies, including more thorough background checks and waiting periods longer than 72 hours, are associated with a 25% decrease in incidences of arrest for firearm violence. Additionally, laws requiring a permit to purchase firearms have been directly correlated with lower firearm homicide rates. Background checks have shown to be the most effective at decreasing firearm related fatalities, with universal background checks facilitating a 60% decrease in overall fatalities from firearms. Despite this staggering statistic, 22% of firearms sales in the United States occur without background checks, as transactions between private parties are exempted from these laws in many states.[6]

1.2 Utilizing Twitter as an Open Source for Big Data

Social media platforms provide valuable insight into public opinion, specifically as it relates to news and policy changes. Many researchers rely on polls and surveys, but these methods are subject to sampling bias and data collected directly from the source of public information is therefore preferred.[7] At the time of the data collection, Twitter was both one of the largest social media platforms in the world and one that had no option to make accounts private.[8] According to Jashinsky et al. (2016), people were approximately 30% likely to blame the government for poor gun laws before a mass shooting occurred, but up to 66% likely to blame the government afterward.[9] Therefore, the number of Tweets opposing and the number of Tweets supporting gun control restrictions were expected to show a significant difference before and after a major mass shooting occurred.

1.3 Experimental Goals

The goal of this research was to examine how the overall public perception of gun regulation changes after a major mass shooting.

2. Methods

The Tweets analyzed were first filtered using a web crawler known as Twarc to limit them to certain time frames and include specific hashtags.[10] For all the data collected, the Tweets had to include one or more of the following hashtags (#): secondamendment, neveragain, shooting, NRA, guncontrol, gunviolence, or 2A. The hashtags analyzed were chosen based

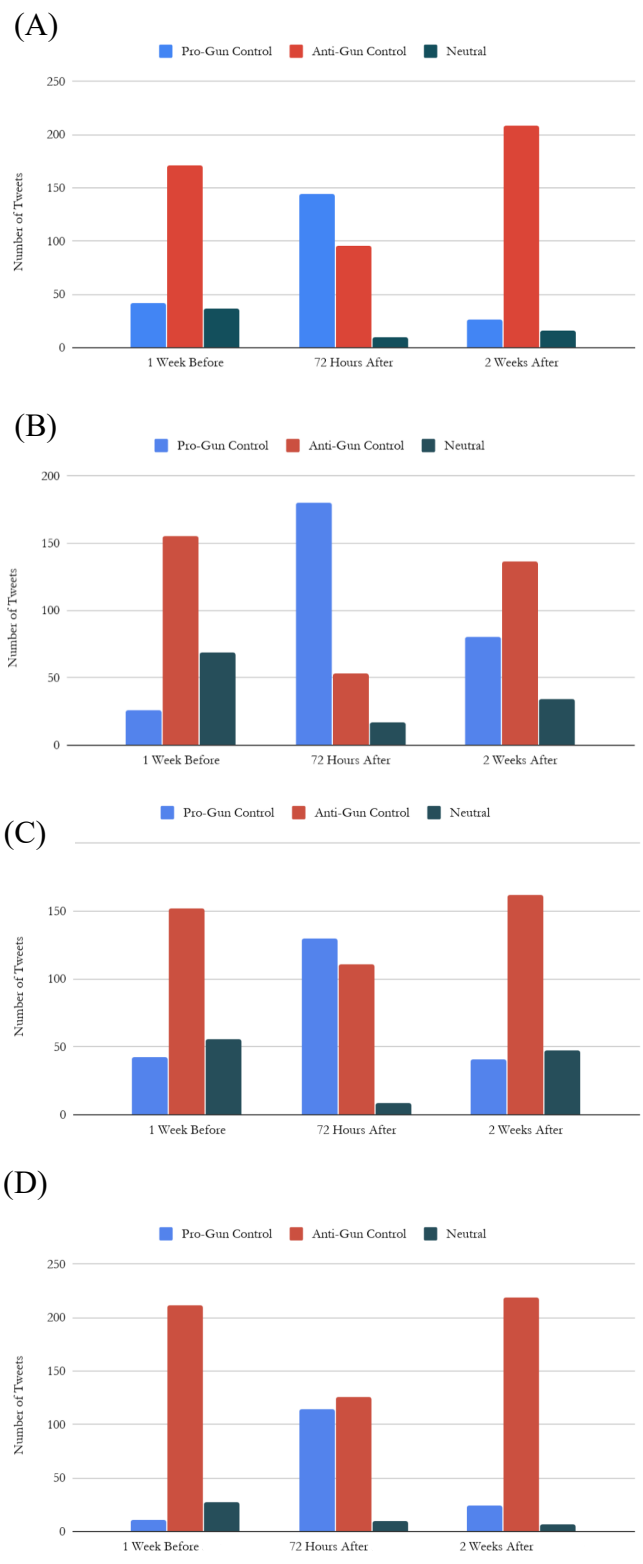
on their high activity both before and after a mass shooting and because they are neutral terms that would not unfairly skew the data. The Tweets were then restricted based on time frames 1-7 days before the chosen mass shooting and the three days following the event. The mass shootings selected were determined by those with the highest number of fatalities that occurred from May 31, 2015 - May 31, 2018. The chosen time frames are listed in Table 1. In addition to this, Tweets were collected 2 weeks following the shootings. From there, the Tweets that fit the above criteria were numbered in the order they appeared on Twitter, and a random number generator was used to select 250 of the Tweets for each time frame. In total, 3750 Tweets were analyzed before, immediately after, and 14-21 days after a major mass shooting occurred. The Tweets that were ultimately selected were then classified as being pro-gun control, anti-gun control, or neutral. Operational definitions were used to classify the Tweets into three categories. Tweets were classified as pro-gun control if they expressed negative attitudes towards the National Rifle Association and other gun advocacy groups, encouraged Congress to enact stricter laws and background checks for purchasing firearms, or expressed sentiments that access to guns was not restrictive enough in the United States. Tweets were classified as anti-gun control if they supported the National Rifle Association, encouraged a larger number of people to own guns to protect themselves, opposed restrictive gun laws, and specifically included their access to guns given the second amendment. Tweets that did not fit these definitions were classified as neutral. After collecting the results, a chi-squared analysis test was run on the data at $\alpha = 0.01$.

Table 1. Dates analyzed for mass shooting data. Dates reported as MM/DD/YY.

Location	Before	During	After	Fatalities
San Bernardino	11/25/15 – 12/1/15	12/2/15 – 12/5/15	12/16/15 – 12/22/15	14
Orlando	6/05/16 – 6/11/16	6/12/16 – 6/15/16	6/26/15 – 7/2/16	49
Las Vegas	9/24/17 – 9/31/17	10/1/17 – 10/4/17	10/15/17 – 10/21/17	58
Sutherland Springs	10/28/17 – 11/4/17	11/5/17 – 11/8/17	11/19/17 – 11/25/17	25
Parkland	2/06/18 – 2/13/18	2/14/18 – 2/17/18	2/28/18 – 3/6/18	17

3. Results

Figure 1 shows the results of the analysis of Twitter data for the mass shootings analyzed. The light blue bar represents the number of Tweets classified as pro-gun control, the red bar represents those classified as anti-gun control, and the dark blue bar represents neutral Tweets.



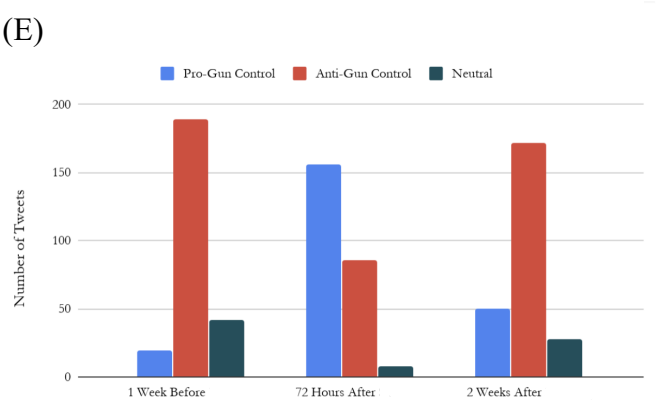


Figure 1. Gun Control Tweet Trends Proximal to Mass Shooting Events. For each of the three time periods (1-7 days before the event, the 72 hours after the event, and days 14-21 after the event), 250 Tweets were chosen by a random number generator from 3750 total Tweets. Subfigures (A)-(E) represent an individual event and analysis of the Tweets at the indicated intervals surrounding that event: (***A***) San Bernadino, (***B***) Parkland, (***C***) Sutherland Springs, (***D***) Orlando, (***E***) Las Vegas.

For all the shootings analyzed, there was a significant increase in the percentage of pro-gun control Tweets 72 hours after the shooting, which regressed towards the mean after 14-21 days with a p-value of <0.00001. The data taken before the shootings showed that, before a major mass shooting, the majority of the Tweets were anti-gun control for 4 out of 5 of the shootings studied. The relative percentage of anti-gun control Tweets were 68.4%, 62.0%, 60.8%, and 68.4% for San Bernadino, California; Parkland, Florida; Sutherland Springs, Texas; and Orlando, Florida; respectively. The raw data is included in Tables 3-7 below. The only shooting that had a larger percentage of pro-gun control Tweets immediately before the event was Las Vegas, which could be due to the proximity of the shooting in Orlando. All the

shootings analyzed showed a linear regression towards the original classification of Tweets 14-21 days after the shooting, with some shootings having an even larger number of anti-gun control Tweets than before. This trend was observed in San Bernadino, Sutherland Springs, and Orlando. Data can be found in the appendix at the end of the document.

4. Discussion

The purpose of this research was to examine how the public perception of gun control changes after a major mass shooting event. The United States of America has the highest rate of gun violence among all developed countries, as well as some of the least restrictive gun control laws.[11] All the trials showed a significant increase in the number of Tweets expressing sentiments arguing for stricter gun control 72 hours following a mass shooting compared to the baseline measured 1-7 days before the shooting. As predicted, there was a statistically significant decrease in the number of Tweets expressing the need for stronger gun control 14-21 days after the shooting compared to 72 hours after for each of the trials in this time frame. Although the Tweets classified as pro-gun increased immediately after the mass shootings analyzed, the percentage decreased two weeks after the mass shooting. This suggests a regression towards the baseline of a higher number of anti-gun control Tweets both immediately before and two weeks after a mass shooting.

Many people admit to posting sentiments online that they could never or would never say aloud, which is known as the online disinhibition effect.[12] This phenomenon allows online or anonymous surveys to often yield different results than traditional written or identifiable survey methods. In the case of gun control, where people often have strong, unwavering opinions, it is unlikely that actual opinions change significantly after a major mass shooting. However, people may feel emboldened after a traumatic event and take to social media to feel heard. Therefore, people who feel strongly about gun control but do not usually post or share their opinions may influence the percentage of pro- or anti-gun control Tweets after a mass shooting, giving the false appearance of societal changes in opinion. Additionally, introjection refers to the subconscious adoption of ideas or attitudes of others, and many people may become consumed by the overall message dominating the hashtags chosen. This phenomenon provides further reasoning as to why people do not contradict the opinions of the larger group, as well as presents an explanation for why overall social media message may change without massive policy or public opinion change. Furthermore, the mass shootings included in this project were carefully chosen to be in a relevant time frame in which Twitter was incredibly popular and to have a high enough number of fatalities to reach national news sources.

Other factors that could have contributed to the increase in Tweets advocating for stricter gun control laws immediately after the shootings investigated include people feeling more emboldened to speak up about beliefs that they already held before a mass shooting

but were less vocal about. This hypothesis cannot be ignored, and further studies surveying people throughout the country should be done to gather more holistic views, rather than just those of the people posting online. Although the data suggests that there may be a major change in opinion before and after gun control, it is also plausible that people who are in favor of gun control before a mass shooting are not emboldened or vocal about the issue until after a shooting. Before the studied shootings occurred, people may not have heard about shootings that occurred all over the country because they were not as lethal as the measured ones, resulting in decreased vocality. Mass shootings have become commonplace, and people typically react less extremely to events that happen more frequently.[13]

Policy changes regarding mass shootings have been much more frequent after increased vocal support, but many of these are laws that relax pre-existing gun regulation.[14] For example, the state legislature of Texas passed a permit-less carry bill just two years after two shootings in El Paso and Odessa claimed 30 lives.[15]

4.1 Previous Research on the Topic

Few previous studies have conducted a meta-data analysis of qualitative Tweet content regarding mass shootings before and after a mass shooting, as big data is still a relatively new science. Therefore, this research does not have other experiments to corroborate with, though it is expected that repeat experiments will yield the same results. It is possible that the scanned Tweets may have had a larger percentage of pro-gun control or anti-gun control sentiments than the whole of Twitter represented after a mass shooting. However, 3,250 Tweets were ultimately scanned and classified, so any random sampling bias should have been eliminated due to sample size. In the future, research should expand upon the findings of this study to analyze and further classify Tweets into categories from news outlets, politicians, and general social media use.

4.2 Continuation and Next Steps

In a continuation of this experiment, a larger span of time before and after the shootings could be analyzed to establish a more comprehensive baseline with which to compare the Tweets that occurred 72 hours after. Further research could also examine less fatal mass shootings to determine if the same trends are seen in these shootings, and at what point the fatalities are not great enough to cause a statistically significant difference in the data. Future research should analyze statistically significant differences in multiple social media interfaces, specifically those that include different key demographics than Twitter. Future experiments could be conducted to determine the impact of mass shootings on actual policy changes, rather than just the social media desire for policy changes to occur. To do this, proposed legislation and electoral promises would be followed in relation to dates of particularly lethal mass shootings. Additionally, future research could focus on the location from which the Twitter data is posted to pinpoint local pockets of data that could skew the results.

Acknowledgments

At this time, I would like to thank the faculty and staff at the Discovery Magnet Program at Spring Valley High School, specifically Mrs. Michelle Spigner and Dr. Michelle Wyatt. Additionally, I would like to thank the University of South Carolina and the research lab of Dr. Elaine Miller for the summer internship opportunity that allowed me to analyze and interpret the data in question.

References

1. Gun Violence Archive. (n.d.). *Mass shootings in 2018.* Retrieved from https://www.gunviolencearchive.org/reports/mass-shooting?year=2018
2. Gun Violence Archive. (n.d.). *Mass shooting methodology and reasoning.* Retrieved from https://www.gunviolencearchive.org/explainer/mass-shooting-methodology-and-reasoning
3. Zhang, S. (2018). Why can't the US treat gun violence as a public health problem? *The Atlantic.* Retrieved from https://www.theatlantic.com/health/archive/2018/02/gun-violence-public-health/553430/
4. Resnick, S., Smith, R. N., Beard, J.H., Holena, D., Reilly, P. M., Schwab, C. W., & Seamon, M. J. (2017). Firearm deaths in America: Can we learn from 462,000 lives lost? *Annals of Surgery*, *266*(3), 432-440. https://doi.org/10.1097/SLA.0000000000002376
5. Gollub, E. L. & Gardner, M. (2019). Firearm legislation and firearm use in female intimate partner homicide using National Violent Death Reporting System data. *Preventive Medicine, 118*, 216–219. https://doi.org/10.1016/j.ypmed.2018.11.007
6. Wintemute, G.J. (2018). How to stop mass shootings. *The New England Journal of Medicine, 379*(13), 1193–1196. https://doi.org/10.1056/NEJMp1807277
7. McGregor, S. C. (2019). Social media as public opinion: How journalists use social media to represent public opinion. *Journalism*, *20*(8), 1070–1086. https://doi.org/10.1177/1464884919845458
8. Smith, A. & Anderson, M. (2018). Social media use in 2018. *Pew Research Center.* Retrieved from https://www.pewresearch.org/internet/2018/03/01/social-media-use-in-2018/
9. Jashinsky, J. M., Magnusson, B., Hanson, C., & Barnes, M. (2016). Media agenda setting regarding gun violence before and after a mass shooting. *Frontiers in Public Health*, *4*, 291. http://doi.org/10.3389/fpubh.2016.00291
10. *Twarc.* (n.d.). Twarc. Retrieved from https://twarc-project.readthedocs.io/en/latest/
11. Masters, J. (2022). U.S. gun policy: Global comparisons. *Council on Foreign Relations*. Retrieved from https://www.cfr.org/backgrounder/us-gun-policy-global-comparisons
12. Suler J. (2004). The online disinhibition effect. *Cyberpsychology & Behavior*, *7*(3), 321–326. https://doi.org/10.1089/1094931041291295
13. Moyer, M. W. (2022). The 'Psychic numbing' of mass tragedies. *The New York Times*. Retrieved from https://www.nytimes.com/2022/05/26/well/live/coping-mass-shooting-tragedy.html#:~:text=There's%20a%20scientific%20term%20for,been%20studying%20since%20the%201990s
14. Luca, M., Malhotra, D., & Poliquin, C. (2020). The impact of mass shootings on gun policy. *Journal of Public Economics, 181,* 104083. https://doi.org/10.1016/j.jpubeco.2019.104083
15. McCullough, J., & McGee, K. (2022). Confronted with mass shootings, Texas

Republicans have repeatedly loosened gun laws. *The Texas Tribune*. Retrieved from https://www.texastribune.org/2022/05/24/texas-gun-laws-uvalde-mass-shootings/

Appendix

Table A1. Raw Data of Tweet Classification for Shooting on 2 December 2015 (San Bernardino)

	Pro-Gun Control	Anti-Gun Control	Neutral
1-7 Days Prior	42	171	37
72 Hours After	144	96	10
14-21 Days After	26	208	16

Table A2. Raw Data of Tweet Classification for Shooting on 14 February 2018 (Parkland)

	Pro-Gun Control	Anti-Gun Control	Neutral
1-7 Days Prior	26	155	69
72 Hours After	180	53	17
14-21 Days After	80	136	34

Table A3. Raw Data of Tweet Classification for Shooting on 5 November 2017 (Sutherland Springs)

	Pro-Gun Control	Anti-Gun Control	Neutral
1-7 Days Prior	42	152	56
72 Hours After	130	111	9
14-21 Days After	41	162	47

Table A4. Raw Data of Tweet Classification for Shooting on 12 June 2016 (Orlando)

	Pro-Gun Control	Anti-Gun Control	Neutral
1-7 Days Prior	11	212	27
72 Hours After	114	126	10
14-21 Days After	24	219	7

Table A5. Raw Data of Tweet Classification for Shooting on 1 October 2017 (Las Vegas)

	Pro-Gun Control	Anti-Gun Control	Neutral
1-7 Days Prior	19	189	42
72 Hours After	156	86	8
14-21 Days After	50	172	28

GSR Journal

Georgetown Scientific Research Journal