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Data Science
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Project Guns

Introduction:

There is no doubt that gun violence is a tough reality to come to terms with. Especially in instances where innocent people have their lives taken from them inhumanely and prematurely. Nothing strikes the hearts of Americans more than when gun violence claims the lives of children. As we saw in 2012 with the Sandy Hook School shooting which took the lives of 26 children and 6 adults, gun violence has the power to force us all to take a moment and reflect. However, moments like Sandy Hook and the Las Vegas shooting of 2017, which was the deadliest mass shooting ever recorded in American history, do not necessarily paint a clear picture of what is wrong in American culture or American public policy. Something is wrong, but what? This has led me to investigate what really makes guns dangerous, and what we are missing in the data; are mass shootings amplified by type of weapon used or the motive of the shooter? Before diving into the data analysis, I predicted that handguns would be just as deadly as rifles were (especially in relationship to mass shooting incidents) and that mental illness would be a serious determinant for the severity of the shooting. I found that while there are an infinite number of ways to look at and interpret the data, my predictions were mostly correct. My findings are important because they offer us (Americans), a much need alternative perspective on gun violence. I believe in the second amendment, but I also understand how dangerous guns can be. With my findings, hopefully reconciling those two realities can bring us closer to a solution.

Background:

There is a political divide in America that drives good people with good intentions farther apart from solving a much-needed problem. According to the FBI, an Active Shooter, someone defined as, "An individual actively engaged in killing or attempting to kill people in a populated area," is one of the most dangerous types of individuals to be wielding a gun.[1] The FBI also notes that from 200-2018, there were a total of 277 Active Shooter incidents resulting in 884 deaths.[2] And while every active shooter incident does not necessarily relate to a mass shooting incident (greater than 4 people killed), it does give some insight to what we can expect.

Hopefully that data will reveal that all guns are dangerous, regardless of type (rifle, handgun, etc.), but also reveal that smart legislation to prevent these incidents works. The FBI started to implement this Active Shooter protocol initiative after the Sandy Hook incident in 2012, which also coincides with Obama's presidency and policy push to curb gun violence. It is my belief that there will be a reduction in the severity of shootings after Obama assumed office compared to before.

Data and Approach:

The data set I chose to use for this project was titled "shootings.csv" and is from Stanford Mass Shootings of America (MSA). The dataset was originally supplied with 49 different variables consisting of 307 rows. However, after adjusting the dataset I was left with less than 15 of the original 49 variables and also an additional variable I added independently. The data is describing shootings that took place in America from the years 1966-2016 with the majority of shootings taken place after the year 2000.

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The key Variables I looked at for this data analysis were “TotalNumberofFatalities”, “TypeofGunGeneral”, “PossibleMotiveGeneral”, and “year”. TotalNumberofFatalities was coded as an integer ranging from 0-33. TypeofGunGeneral was coded as either “Handgun”, “Multiple guns”, “Shotgun”, “Rifle”, or “Unknown”. PossibleMotiveGeneral was coded as a description of the possible motive, but the only one I chose to focus on was “Mental illness”. During my analysis, the number of total fatalities tended to be my dependent variable. Whether I was studying the impact of gun type, motive, or year (all of which were my treatment), total number of fatalities was my y-axis value. In some cases where I used the total number of fatalities to express whether or not a mass shooting occurred, total number of fatalities was still indirectly influencing the data on the y-axis of my models. Since the majority of my focus was deaths around gun violence and mass shootings, my research was heavily dependent on fatalities. I also chose to look at groups of variables together, by which I used the cbind function to achieve. Also, by utilizing the tapply function and the subset function, I was successfully able to conduct the majority of my research.

While doing research, I found it extremely important to compare the means of different types of analyses. As far as gun violence go, which guns are more deadly? And in which ways are they more deadly? By using the mean function, I was able to compare just how dangerous a handgun is compared to a rifle. It quickly became apparent how dangerous all guns were based on a comparison of the mean killings in general and the mean of killings during a mass shooting incident. Also, being able to subset out the data allowed me to take specific variables needed to conduct appropriate research.

Results:

The first thing I needed to figure out was what was I working with in my data. By using the table function, I found that of the 307 shooting incidents in this dataset, 135 involved only handguns whereas only 30 shootings incidents involved exclusively a rifle. Right of the bat this told me just how much more common handguns are than rifles. In general, it was important to know just how dangerous each of these weapons were. According to the analysis, 587 total deaths were the result of handguns, 99 because of rifles, and 385 being a combination of guns used. Also, the average fatalities per shooting by weapon used showed that handguns continued to be more dangerous than rifles (table 1.)

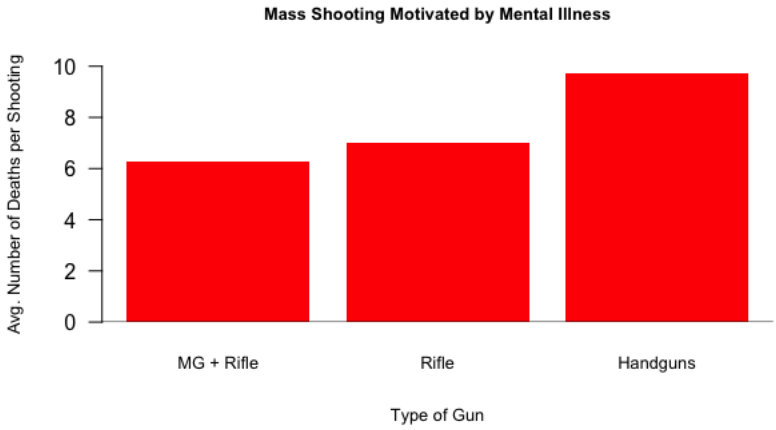
Table 1.	Handgun	Multiple guns	Rifle	Shotgun	Unknown
	4.348148	6.209677	3.300000	2.857143	1.909091

The data also showed that more shootings involving a handgun resulted in more mass shootings than a rifle did (table 2.).

Table 2.	Handgun	Multiple guns	Rifle	Shotgun	Unknown
	74	42	10	5	14

The next thing that was very important to identify was how much did mental illness play a motive in mass shootings and how much of a factor was the gun type used. If the conversation around mass shootings is helping guide and direct public policy, then it is important to understand if the claims made are correct. The idea that by placing tougher restrictions on assault weapons such as rifles will help reduce the prevalence of mass shootings turned out to be false. Especially when the conversation indicates that mental illness is a primary motivator for mass shootings and that tougher background checks to stop people from purchasing rifles will help reduce incidents of mass shootings. According to the graph below, roughly about 6 fatalities occur every time a mass shooting transpires that is motivated by mental illness. Handguns result

in an average number of 9 fatalities per mass shooting motivated by mental illness. That is about a 50% increase in fatality rate. In cases of mental illness resulting in a mass shooting incident, handguns are 50% more deadly than rifles are and should be treated as such in our public policy.



However, I also found that states with more strict gun control laws, such as New Jersey, tended to have fewer shooting incidents and lower fatality rates compared to States that had very lenient gun control laws such as Texas. In Texas, shooting incidents are 75% more likely to result in a mass shooting compared to New Jersey.

The last major aspect of my research was focusing on Obama's presidency and how the data reflected a tougher legislation on guns and gun related violence. Like I mentioned earlier, the overwhelming majority of incidents that were in the dataset occurred during Obama's term in office. Even though the data ranged from the years 1966-2016. To make an accurate assessment of whether or not Obama's presidency was successful in limiting the amount of gun related violence, I chose to focus on the difference-in-means of fatalities before and during his presidency. The conclusion of my data revealed that on average, 1.5 less people were killed during Obama's presidency compared to prior.

Conclusion:

I originally set out to find whether or not certain guns are more dangerous than others, specifically handguns compared to rifles. After conducting my research, I concluded that in all most every instance, handguns were far more dangerous than rifles were. Handguns resulted in more shootings, more fatalities, and more mass shootings. On top of that, handguns were more deadly than rifles in situations where mass shootings were motivated my mental illness. The most surprising to find however, was the fact that before and after Obama's presidency, handguns remained the perpetual leader in all those categories listed above.

These findings are important because they highlight where our conversation around gun violence is missing the point. All guns are dangerous, regardless of the situation and regardless of the time/era. Rather than look to ban firearms and the right of people to protect themselves, it would be much better to focus on what motivates people to kill.

The major limitation this dataset provided me with was insufficient data. 307 total incidents to retrieve data from is enough to get a general picture, but not enough to know the whole story. Also, I think it would have been important to know for my research whether or not the guns used in all of these incidents were either legally owned or illegally obtained. With that information, I could have better come to an understanding of what the conversation around guns should and should not be about.