

Effectiveness of Gun Control Laws in the USA

Introduction

Gun ownership is undoubtedly deeply entrenched in the culture of the US population, arguably in large part due to the US Constitution's Second Amendment. The Second Amendment was passed in 1791, which allows an individual to have the rights to keep and bear arms for lawful purposes (Kates, 1983). Thus, a person has the legal rights to own a firearm regardless of the city or state, and it is to be used for lawful purposes such as self-defence (Strasser, 2017). In 2017, it was estimated that US civilians owned over 390 million guns, which is more than the total number owned by civilians in the other top 25 countries, with about 1.2 privately owned guns per individual (Karp, 2018; Legault et al., 2019).

Over the last century, a number of legislations have been implemented to regulate activities such as the manufacture, trade, and possession of firearms (Office Of The United States Attorney, 2010). The first major federal firearms law that was passed was the National Firearms Act (NFA) in 1934, which imposed taxation and the mandatory registration of many categories of firearms, ostensibly in response to the increasing gang activities (ATF, 2016). Through the years, more gun control laws were passed in response to major incidents of gun violence (Rosenfeld, 2013). Additionally, to address the gaps of the federal laws, each state also introduced their own gun control laws, resulting in variation in gun control laws among the states. For instance, California has the most restrictive gun laws while Arizona has the least restrictive gun laws (Law Center to Prevent Gun Violence & The Brady Campaign, 2013).

However, the effort to regulate firearms was often impeded due to persistent opposition from anti-gun control lobbying groups such as the National Rifle Association (NRA). They have spent about 3 million USD to influence policies with the belief that having more guns helps to create a safer environment (BBC News, 2020). With the use of deception and misinformation, the NRA have been successful in their influence on policies and spreading their message of gun rights (Bhatia, 2019).

In recent years, the news coverage of mass shooting cases in the USA have been trending on social media platforms (Suciu, 2022). With the increasing frequency of such cases, there have been efforts to protest against the NRA (Barry, 2022). This has also led to more important discussions and research on gun policies (Newman & Hartman, 2017; Smart et al., 2020). In this case study, we employ the use of data visualisation to contribute to the current research efforts and to determine whether the gun policies are effective.

Data description

The data used in this analysis was acquired from MotherJones which was published by 3 authors; Mark Follman, Gavin Aronsen and Deanna Pan who conducted an in-depth investigation into mass shootings, covering cases from 1982 to 2022. There have been various definitions of what is defined as a mass shooting, but the most common definition is four or more fatalities by firearms, with the exclusion of the perpetrators (Fox & Fridel, 2016; Fox et al., 2019; Richardson & Krouse, 2015). However, the data acquired from Mother Jones defines mass shooting when there were three or more fatalities by firearms in a public place (Booty et al., 2019) in accordance with the new baseline set by the federal investigation into mass shootings mandated by President Barack Obama in January of 2013 (Follman et al., 2022).

This set of data consisted of 133 rows and 28 fields. Due to the fact that the dataset was not compiled from government sources, there is some missing information in certain parameters such as the legality of the weapons used by the perpetrators and prior signs of mental issues. Thus while it is not a large dataset, it is also not particularly complete. However, this dataset could provide interesting insights in some aspects such as the type of firearms used in mass shootings, the legality of the weapon, and the mental health of perpetrators, thus providing a groundwork for future investigations.

Business scenario (goal)

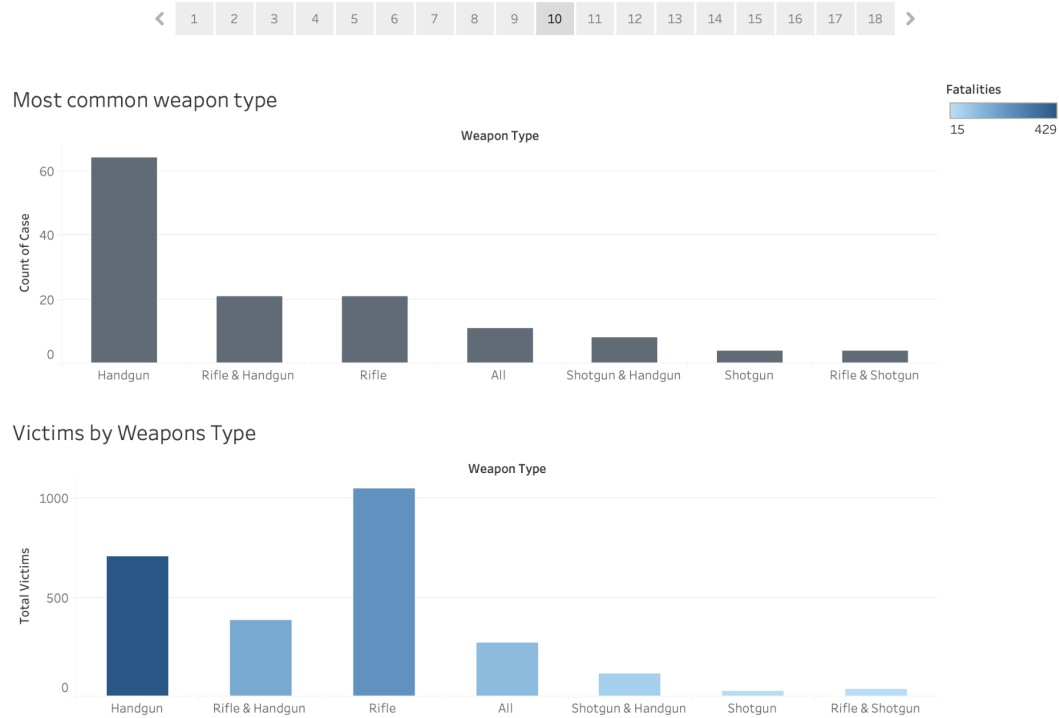
The objective of this project is to find out whether gun control laws are effective in the US. The questions that this project wishes to explore/answer are:

- ❖ Is the type of firearm used associated with the number of casualties & fatalities?
- ❖ What is the proportion of each type of firearm that was obtained legally?
- ❖ Which race do the shooters most frequently originate from in mass shootings?
- ❖ What is the proportion of the cases where the shooter had signs of mental issues?
- ❖ What is the geographical distribution of mass shootings?
- ❖ Did the number of cases change over time?

The target audiences are the relevant authorities and the citizens of the US. It is imperative to inform authorities about the trends and patterns of mass shooting events so that legislation can be made to tackle the root cause of mass shootings, curb the increasing frequency of mass shootings, as well as avoid the unnecessary loss of lives due to mass shootings. It is also equally vital that the public understands the trends and patterns of mass shooting events so that they will push the government for better legislation and support the associated policies.

The ultimate goal of this project is therefore to demonstrate the need for stricter and effective gun control laws, which will lead to the preservation of lives by preventing mass shootings. If this is not achieved, the continuation and potential escalation of gun violence will engender further gun violence and unnecessary loss of lives.

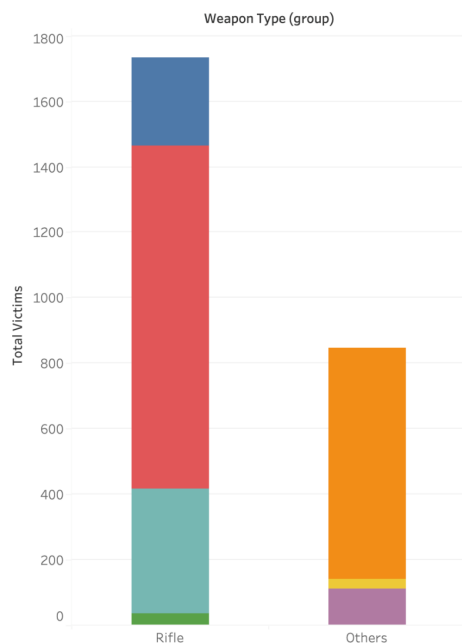
Visualisation analysis



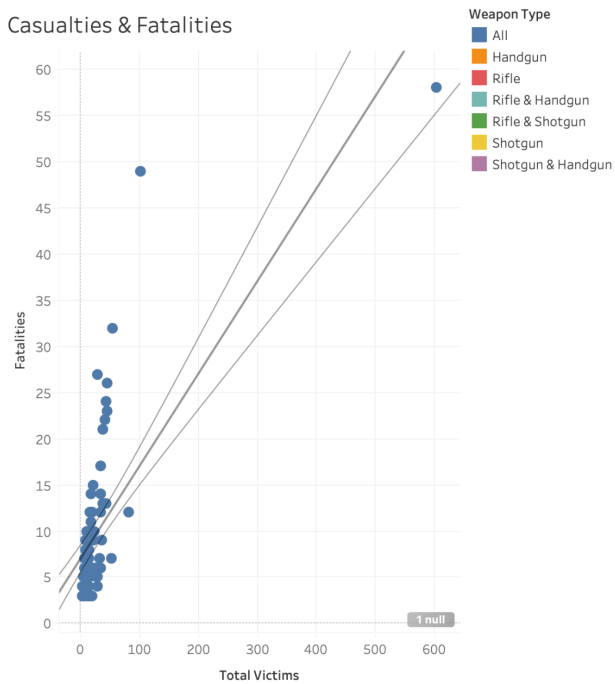
In America, owning a gun is ordinary. Every adult can either purchase or carry one. According to the Small Arms Survey, there are 393 million privately owned weapons in the US, or 120 firearms for every 100 citizens.

In the cases that are recorded in the dataset, handguns, rifles, and shotguns are the three main types of weapons involved in mass shootings. The majority of the cases were carried out using handguns, which could be due to the cheaper price and the ease of carry. When comparing the number of victims, the handgun did not surpass the rifle in terms of total casualties. There were 707 handgun-related casualties recorded where 60% of them had died. In contrast, there were 21 cases where rifles were used, yet 1,046 individuals were hurt, and 20% of them had died.

Rifle vs others



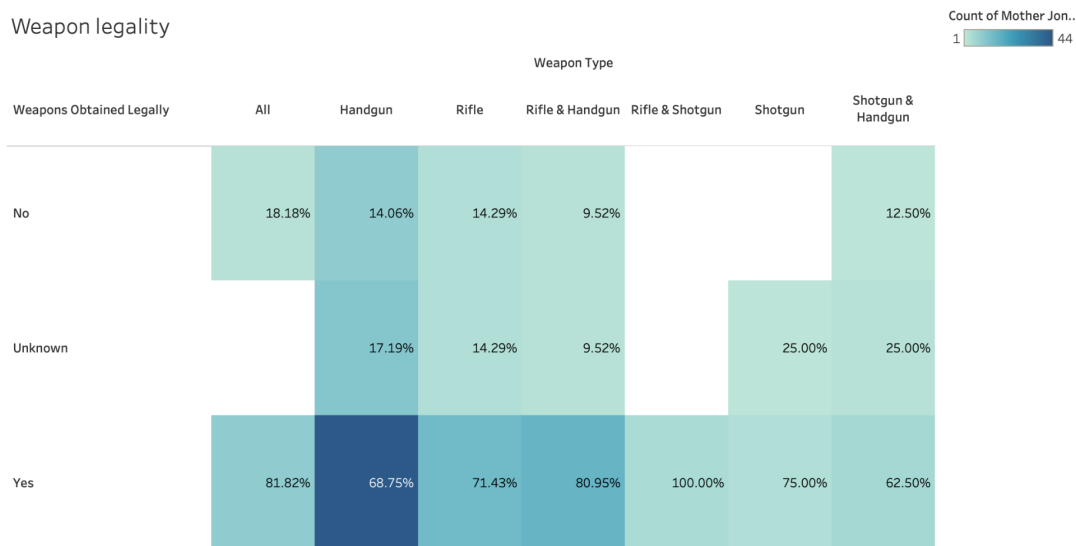
Casualties & Fatalities



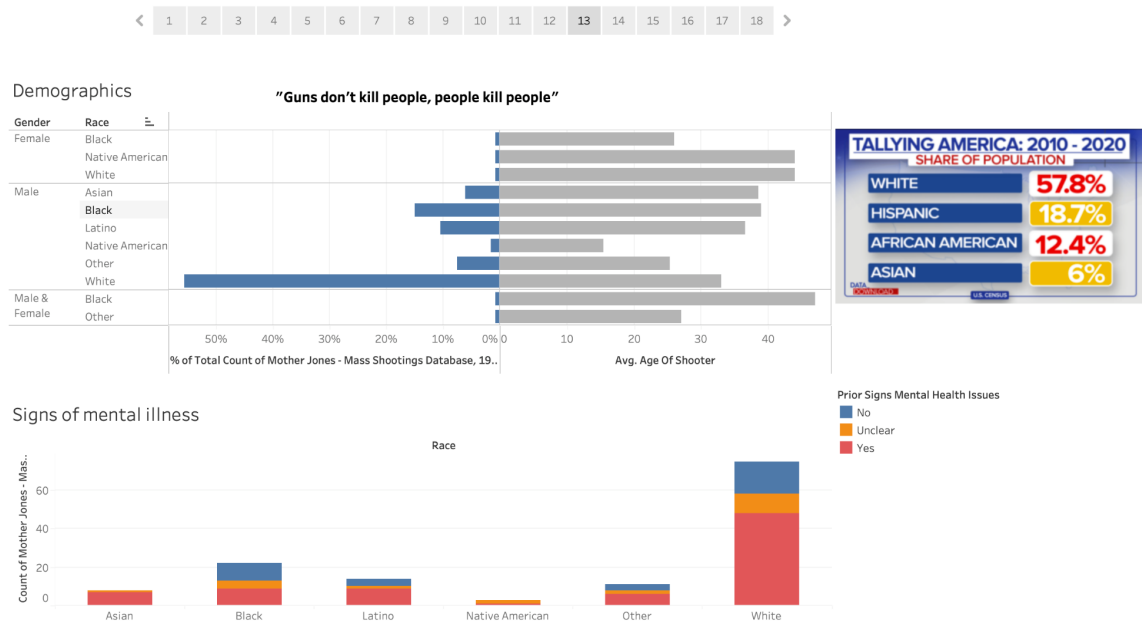
By grouping all cases where rifles were involved, the bar plot shows that the total casualties and fatalities are much higher than when other weapons were used. The scatterplot on the right demonstrates a positive correlation between the number of victims and fatalities, indicating that any weapon that could cause the most casualties will also cause the most fatalities. As rifles have greater shooting accuracy and ammo capacity than handguns or shotguns, it is a much more dangerous weapon than any other type that are commonly used by mass shooters.

Since mass shootings are intended to murder rather than hurt, perpetrators might gravitate towards using rifles to cause as many fatalities as possible. Combined with the frequency of handgun-related mass shootings, these conclusions indicate the need for gun control laws to target rifles and handguns.

Weapon legality



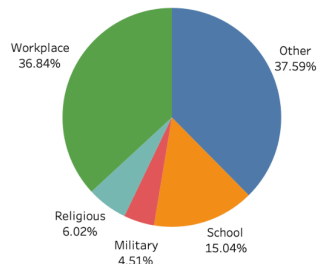
For all categories of firearms, the majority of the guns used by the shooters in this case study were legally obtained. This means that most of these shooters passed background checks and were able to buy firearms legally. Background checks, the foundation of gun violence prevention strategy, should have been able to reduce the proportion of legally-obtained firearms used in mass shootings. The federal law requires licensed gun dealers to perform background checks on the buyers, but since most guns used by the shooters are found to be legal, such processes are therefore inadequate at keeping firearms away from potential shooters. However in some cases, particularly younger shooters, the guns were stolen from their family members. This could point to the deeply rooted gun culture and ease of buying firearms, where the prevalence of firearms in households means that firearms may not always be stored and secured under lock and key and hence can be easily stolen. There are therefore two possible conclusions from this observation; either the current gun control laws are not strict or enforced enough to be effective at preventing potential shooters from obtaining firearms and thereby reduce mass shootings, or gun control laws are not at all useful for such an objective.



Next, we can look at the demographics of the shooters. The graph on the top shows that the majority of the shooters are white males which accounts for 55% of all cases and they have an average age of 33. The second most common demographic is African American males, accounting for 15% of all cases. While this implies that mass shooters tend to be white men, the statistics are extremely consistent with the racial population proportions in the US, where 58% of the population is white and 12% is African American, indicating that the larger numbers observed among whites or African Americans are not attributable to race but rather due to population size of each race. It is, however, very clear that mass shooters tend to be males.

One common argument by pro-gun activists is that mass shooters become shooters because they are mentally ill. In the 2nd graph, we can observe that most of the shooters, regardless of race, showed prior signs of mental health issues. In the US, there is a high prevalence of mental health issues, with one in five adults suffering from a multitude of mental illnesses ranging from mild to severe. While this seems to corroborate our analysis, since most of the shooters did not undergo psychiatric evaluation, we are unable to validate this conclusion. Moreover, in many cases the perpetrator came from a troubled background, suggesting the possible significance of social issues as a key motivating or contributing factor in the reasons why the perpetrators commit mass shootings.

Location of cases

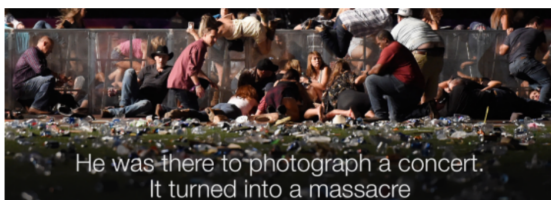


Location Type
 Other
 School
 Military
 Religious
 Workplace

"I think of them always," survivor of El Paso Walmart shooting says of those who were killed three years ago



'We're in trouble.' 80 minutes of horror at Robb Elementary School



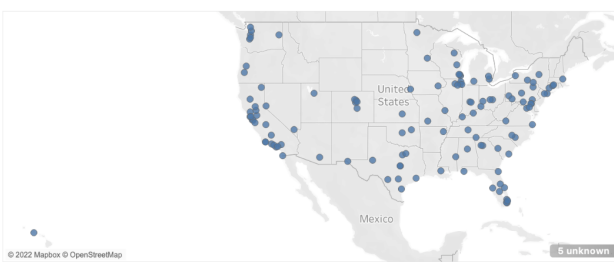
Workplaces, schools, religious institutions, and other settings are among those where incidents had occurred. The pie chart identifies a significant number of cases that have taken place in workplace settings. The El Paso Walmart shooting in Texas is an example that happened in 2019. There were 46 casualties, of which 23 had died. The incident has been investigated by the Federal Bureau of Investigation as a potential case of domestic terrorism and a hate crime. According to reports, the slaughter was the greatest assault against Latinos in contemporary American history. It is also the deadliest mass shooting in American history that resulted in a suspect being found alive and being prosecuted.

As the "Other" consists of many outdoor location types, one prominent example of a case that happened in this category was the Las Vegas strip shooting in 2017. Stephen Paddock, a 64-year-old resident of Mesquite, Nevada, opened fire on music fans at the Route 91 Harvest music festival. He shot over 1,000 rounds from his rooms on the 32nd story of the Mandalay Bay hotel, killing 60 people and injuring at least 413. He was discovered dead in his room from a self-inflicted gunshot wound about an hour later. Officially, the agenda of the horrific shooting remains unknown.

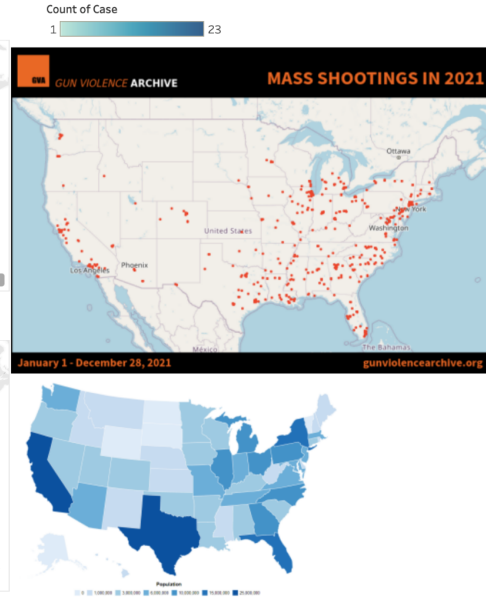
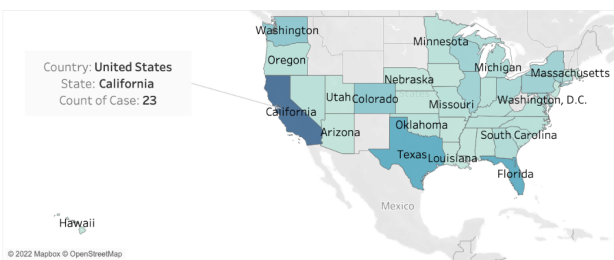
This incident is the worst solitary mass shooting in American history. It brought the issue of American gun regulations to light, specifically the use of bump stocks, which Paddock utilised to fire rounds in quick succession at a pace similar to automatic weapons.

Schools are where shootings frequently occur too. According to the Centers for Disease Control and Prevention, in the US, guns are currently the number one killer of children and teenagers. In one recent case, an 18-year-old teenager shot 19 students and two teachers at an elementary school in Texas, resulting in the worst shooting at a Texas public school.

Geographical distribution of cases



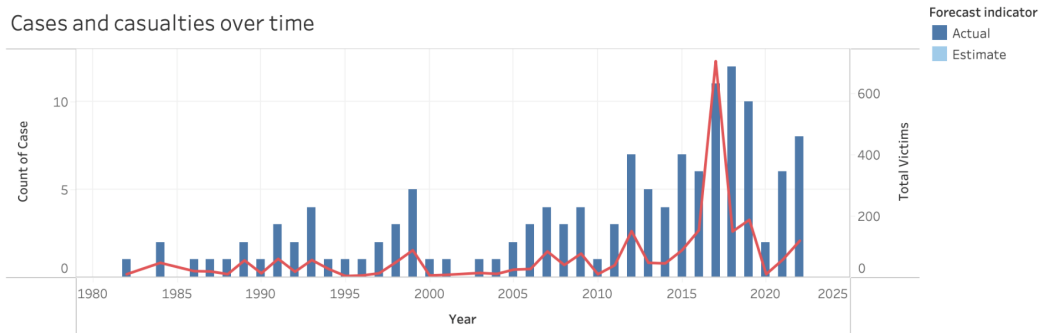
Cases per state



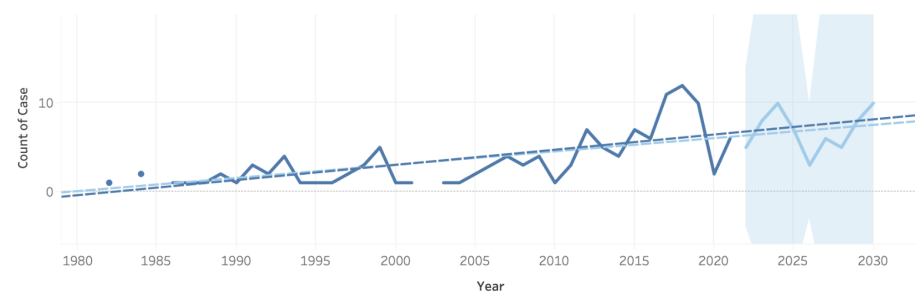
The map on the top left shows the location of the cases in this dataset. The cases are fairly widely distributed across the country, especially the right half of the country, but certain areas like the northern and central regions seem to have little to no cases of mass shootings. Compared with the geographical distribution of mass shootings in 2021 on the right, the distribution is very similar. Considering that the dataset consists of cases that happened between 1982 and 2022, what this suggests is that the geographical occurrences of mass shootings are very consistent, and they tend to happen in the same areas.

To investigate further, we categorised the cases according to states in the bottom left map, and we observed that some states did not have any mass shooting cases, and most states have about 1 or 2 cases. The top 3 states with the most cases are California with 23, Texas with 12, and Florida with 12. One might think that the huge variation in the number of cases might be due to the differences in gun laws among the states. However, considering that population size also differs greatly between the states, we found that the number of cases is consistent with population size of the states. The top 3 states with the greatest populations are also California (40 million), Texas (30 million), and Florida (22 million). The population of states without any cases varied between 500 000 to 1.2 million, which is vastly smaller than the top 3 most populous states. Despite California having the strictest gun laws, it still saw the most number of cases. Hence, the number of cases may be more associated with population size rather than gun laws, indicating that the current gun laws may not be effective enough at reducing mass shootings.

Cases and casualties over time



Number of cases over time



The dataset indicates that the number of cases and casualties have been fairly stable until 2010 and have rapidly shot up since then. Some of the recent years saw a much greater number of cases and casualties. In particular, 2018 saw the most cases with a count of 12, and 2017 was the deadliest, with 704 casualties and 117 fatalities in 11 incidents, primarily due to the aforementioned Las Vegas strip shooting.


Furthermore, using the current trends, a prediction graph on the bottom predicts that the number of cases will increase in the next 10 years. As the number of cases increase, so will the number of casualties, and the probability that the cases will become more severe will increase as well.

GVA - Seven Year Review	2014	2015	2016	2017	2018	2019	2020
Deaths - Willful, Malicious, Accidental	12,418	13,537	15,112	15,679	14,896	15,448	19,411
Suicides by Gun	21,386	22,018	22,938	23,854	24,432	23,941	Pending
Injuries - Willful, Malicious, Accidental	22,779	27,033	30,666	31,265	28,284	30,186	39,492
Children [aged 0-11] Killed or Injured	603	695	671	733	664	695	999
Teens [aged 12-17] Killed or Injured	2,318	2,695	3,140	3,256	2882	3,122	4,142
Mass Shooting	269	335	382	346	336	417	611
Murder-Suicide	624	530	549	608	623	632	573
Defensive Use [DGU]	1,531	1,393	2,001	2,107	1874	1,597	1,478
Unintentional Shooting	1,605	1,969	2,202	2,039	1691	1,905	2,315

Number of Deaths, Injuries, Children, Teens killed/injured [actual numbers]
Mass Shooting, Murder-suicides, Defensive Use, Unintentional Shooting [number of incidents]
Suicide numbers supplied by CDC End of Year Report [actual numbers]

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Considering that the dataset of this case study only consisted of a small subset of all mass shootings that happened in the US, it would be interesting to see what are the trends when all cases are included. This table from the Gun Violence Archive shows a similar trend as what was observed in this case study, and the number of cases of mass shootings have been increasing, particularly in the most recent years. The table also sheds light on other types of gun violence, demonstrating that gun violence is not restricted to just mass shootings. This highlights the urgent need for more effective gun control laws as well as other measures to curb gun violence to prevent the unnecessary loss of lives.

Conclusion

In summary, this study revealed that current gun control laws are not adequate for reducing the frequency of mass shootings, which could be due to a plethora of reasons such as being too lenient in its current extent and lack of enforcement of current gun control laws. The evaluation of the underlying reasons for the inefficacy of gun control laws at its present state was outside the scope of this case study and should be investigated in future studies. This study also suggests that social and mental health issues could be a key factor in why perpetrators would commit mass shootings, and propose this as another dimension that could be added to the approach to reduce the frequency of mass shootings. As the frequency and severity of mass shootings are projected to increase according to current trends, the call for more actions to be taken and preventive measures to be implemented has never been greater and more urgent. Should the status quo continue, many more lives will be needlessly lost.

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