Routledge
Taylor & Francis Group

Check for updates

ARTICLE

The effects of state and Federal gun control laws on school shootings

Mark Gius

Quinnipiac University, Hamden, CT, USA

ABSTRACT

School shootings are the highest profile type of murder in the United States. They are also the rarest type of murder. In 2014, there were only 17 firearm murders that were perpetrated in schools and colleges. The purpose of the present study is to determine the relationship between school shootings and state and Federal gun control laws. Using a Poisson, two-way fixed effects model, it was found that assault weapons bans reduced the number of school shooting victims by 54.4%. All other gun control laws (concealed carry laws, private sale background checks and Federal dealer background checks) had no statistically significant effects on school shootings. Although assault weapons bans may reduce the overall number of school shooting victims, the average reduction in murder victims may be less than 10 per year. Hence, it is unclear if gun control is the most appropriate policy to use to reduce the number school shooting victims.

1. Introduction

Although relatively rare, school shootings are among the highest profile type of murder in the United States. In 2014, there were 14 249 murders, 17 of which were firearm murders that were perpetrated in schools and colleges. As can be ascertained from Figures 1 and 2, the number of persons killed and injured by guns in schools varies dramatically from year to year, although it does appear as if both injuries and deaths resulting from school shootings are trending upwards.

Shortly after most school shootings, various public policy measures that may reduce the frequency of these shootings are suggested. Most involve some type of gun control measure. One problem with examining the effects of gun control, or any type of public policy, on school shootings is the relative rarity of such events. In most years, fewer than 20 people nationwide are shot and killed in a school setting. The infrequency of these events is one reason why there is so little empirical research on the effects of gun control on school shootings.

One of the few studies that has examined the effects of gun control laws on school shootings is Kalesan et al. (2016). In this study, the authors examined the relationship between background checks for firearm and ammunition purchases and school shooting incidents. Using state-level data for

the period 2013–2015 and various control variables, the authors found that states with background checks had lower incidents of school shootings. In addition, states with higher levels of mental health spending and educational spending also had lower rates of school shootings.

There are several issues with this study, however. First, all school shooting incidents were included in their analyses, even when no one was killed or injured. The authors admit that when they excluded those incidents with no killings, the statistical significance of their results was reduced. Second, their measure of gun ownership is not universally accepted and is based on a survey conducted by one of the authors of the study. A more appropriate measure of the prevalence of gun ownership would have been to use one of the more established surveys that examine gun ownership, such as the General Social Surveys, or to use a proxy measure, such as the proportion of suicides that are committed using a firearm. Third, the use of a K-12 educational spending variable is circumspect, especially given that they examined shootings in all educational settings, including shootings that occurred at colleges and universities.

Hence, even though the methodology used in Kalesan et al. (2016) is questionable, it is one of the
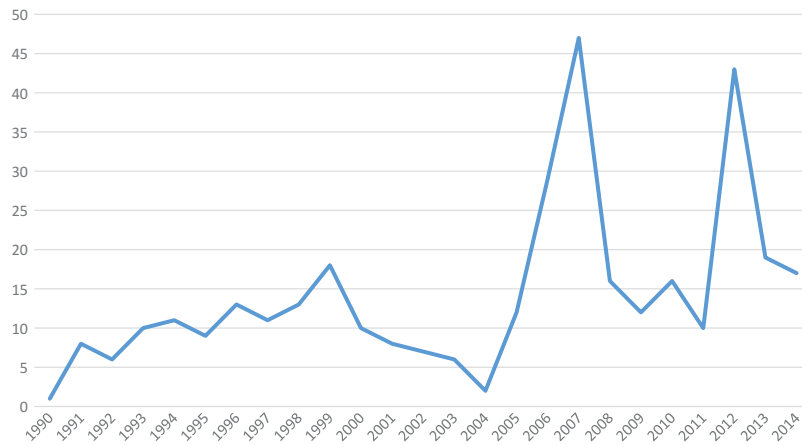
CONTACT Mark Gius ✉ Mark.gius@quinnipiac.edu 🖳 Quinnipiac University, Hamden, CT 06518, USA

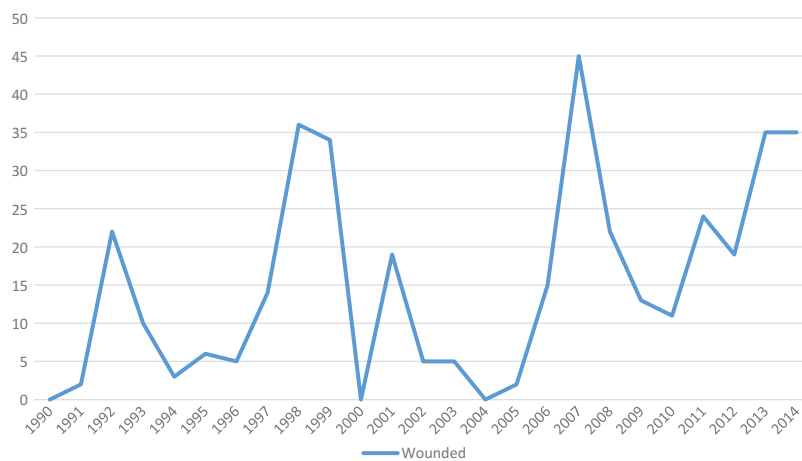**Figure 1.** Number of persons killed in school shooting: 1990–2014.

Figure 2. Number of persons wounded in school shooting: 1990–2014.

few studies that have examined the relationship between school shootings and gun control laws. In order to address that deficiency in the area of gun control research, the present study will attempt to determine the relationship between school shootings and state and Federal gun control laws. This study differs from prior research in several ways. First, a much larger data set will be used; state-level data for the period 1990–2014 will be analysed. Second, only school shootings that resulted in an injury or death will be included in the data. Finally, both state and Federal gun control laws will be examined.

2. Empirical technique

Using Gius (2015) as a guide, the following equation was estimated in the present study:

$$
\begin{aligned}
Y = {} & \alpha_0 + \alpha_1 \text{ State Assault Weapons Ban} \\
& + \alpha_2 \text{ State Background Checks} \\
& + \alpha_3 \text{ State Concealed Weapons Laws} \\
& + \alpha_4 \text{ Federal Background Checks} \\
& + \alpha_5 \text{ Control Variables} + \alpha_6 \text{ State Fixed Effects} \\
& + \alpha_7 \text{ Year Fixed Effects}
\end{aligned}
$$

$$(1)$$

where Y is the number of deaths and injuries due to school shootings. Control variables include the following: population density; percentage of population that has a 4-year college degree; per capita median income; annual unemployment rate; percentage of population that is ages 5–18; per capita alcohol consumption; and the proportion of suicides that are firearm suicides. The firearm suicide variable is used as a proxy for gun ownership prevalence (Lang 2013).

The following Federal and state gun control laws are examined in the present study: Federal assault weapons ban (1994–2004); Federal background checks for gun purchases from dealers (1994 to present); state-level assault weapons ban; state-level restrictive concealed carry laws; and state-level background checks for private party sales. The state assault weapons ban variable is expressed as a dummy variable that equals 1 if the state had an assault weapons ban and 0 otherwise. Since the Federal assault weapons ban was in effect during the period 1994–2004, it was felt that the most appropriate way to incorporate that law into the analysis would be to set the assault weapons ban dummy variable to 1 for all states during the Federal assault weapons ban period. Combining these similar laws into one variable should mitigate any issues that may have arisen due to multicollinearity or to misspecification of the model.

Concealed carry weapons (CCW) laws deal with how permits are issued to individuals who want to carry concealed weapons. The most restrictive types of CCW laws are 'may issue' and prohibited. In a 'may issue' state, local and state authorities can deny requests for concealed carry permits, even requests from qualified applicants. May issue CCW laws are considered restrictive. 'Prohibited' states do not allow private citizens to carry concealed weapons.

In the present study, the CCW dummy variable equals 1 if the state was may issue or prohibited and 0 otherwise.

Finally, both the Federal background check law (Brady Act) and state-level private sales background check laws are used in the present study. The Brady Act only imposed background check requirements on firearm purchases made from Federally licenced firearm dealers. Private party firearm sales are exempt from Federal background checks. Given that the Federal background check law went into effect in 1994, the Federal Background check dummy variable equals 1 for the period 1994 to present and 0 otherwise. Regarding state-level background checks, only state-level laws requiring background checks for private sales of firearm are included in the model. If a state requires a background check for any type of private sale, then the private sale background check dummy variable equals 1.

All data used in the present study are state-level and were obtained for the years 1990–2014. Socioeconomic data were obtained from the *Statistical Abstract of the United States* and other relevant Census Bureau documents. Data on alcohol consumption were obtained from the National Institute on Alcohol Abuse and Alcoholism. Information on state-level gun control laws were obtained from Ludwig and Cook (2003), the Law Center to Prevent Gun Violence and the National Rifle Association.

Data on school shootings were obtained from Kalesan et al. (2016), Klein (2012) and *Everytown USA*. According to this data, there were a total of 382 people injured and 354 people killed in school shootings during the period 1990–2014. The average number of school shooting fatalities per year was 14, and the average number of school shooting injuries per year was 15.

3. Results and concluding remarks

Equation 1 was estimated using a Poisson, two-way fixed effects model, controlling for both state and year fixed effects. All observations were weighted by state population. A Poisson model was used because the dependent variable is count data (the number of school shooting victims). Results are presented in Table 1.

According to these results, the only gun control measure that had a statistically significant effect on the number of school shooting victims was the assault weapons ban. When the assault weapons ban (state or Federal) was in effect, the number of school shooting victims was 54.4% less than when the assault weapons ban was not in effect, holding all other factors constant. This result is corroborated by the data presented in Figure 1. As can be seen from the chart, the number of persons killed in school

Table 1. Poisson fixed effects regression results.

Variable	Coefficient	Test statistic
Assault Weapons Ban	−0.785	−4.81***
Federal Background Checks	0.346	1.45
State Background Checks	0.223	0.94
Concealed Carry Laws	−0.185	−1.08
Population density	0.028	4.84***
Per capita median income	0.00007	4.29***
Proportion of population with college degree	0.596	0.33
Unemployment rate	10.054	3.94***
Proportion of population aged 5–18	22.25	3.45***
Per capita alcohol consumption	2.041	4.70***
Ratio of firearm suicides to total suicides	13.703	8.58***

Note: The incidence rate ratio can be obtained by exponentiating the coefficient.
***p-value <1%.

shootings was relatively low and stable until 2004, when the Federal assault weapons ban expired. After 2004, the number of persons killed in school shootings increased dramatically and became much more volatile. All other gun control laws (CCW laws, private sale background checks and Federal dealer background checks) had no statistically-significant effects on the number of school shooting victims.

Regarding the significance of the control variables, the unemployment rate, per capita alcohol consumption, median household income, the percentage of the population between the ages of 5 and 18, population density and the ratio of firearm suicides to total suicides (a proxy for the prevalence of gun ownership) were all significantly and positively related to the number of school shooting victims. Hence, those states that had above-average unemployment and gun ownership rates along with greater than average alcohol consumption and larger student-age populations had greater numbers of school shooting victims. Some of these control variables had much greater effects on the number of shooting victims than did the assault weapons ban.

School shootings are among the most horrific of crimes. Although they are a very small share of overall murders, they typically capture the attention of the entire nation. Places such as Sandy Hook and Columbine recall terrible moments in American history. One impediment to developing public policies that may reduce the number of school shootings, however, is the relative infrequency of these shootings.

Gun control is one of the more commonly proposed policies in response to school shootings. Unfortunately, as this study has shown, most gun control policies have no significant effects on school shootings. Although assault weapons bans may reduce the overall number of school shooting victims, the average reduction in fatalities may be less than 10 per year. Given these results, it is unclear if gun control is the most appropriate policy to use to reduce the incidence and severity of school shootings.

Disclosure statement

No potential conflict of interest was reported by the author.

References

Gius, M. 2015. "The Impact of State and Federal Assault Weapons Bans on Public Mass Shootings." *Applied Economics Letters* 22 (4): 281–284. doi:10.1080/13504851.2014.939367.

Kalesan, B., K. Lagast, M. Villarreal, E. Pino, J. Fagan, and S. Galea. 2016. "School Shootings during 2013-2015 in the USA." *Injury Prevention*. doi:10.1136/injuryprev-2016-042162.

Klein, J. 2012. *The Bully Society: School Shootings and the Crisis of Bullying in America's Schools*. New York, NY: NYU Press.

Lang, M. 2013. "Firearm Background Checks and Suicide." *The Economic Journal* 123: 1085–1099. doi:10.1111/ecoj.2013.123.issue-573.

Ludwig, J., and P. Cook, eds. 2003. *Evaluating Gun Policy: Effects on Crime and Violence*. Washington, D.C.: The Brookings Institution.