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How Gun Control Laws Affect Homicide

Abbey Maloney

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Abbey Maloney

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Student:	Abbey Maloney (Signature)
Thesis Advisor:	Maria Tcherni-Buzzeo (Signature)
Department Chair:	SBQuitton (Signature)
Honors Program Director:	Matthew Wranovix (Signature)

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Faculty Advisor: Maria Tcherni-Buzzeo, Ph.D.

University of New Haven

Abstract

Homicide is an ever-prevalent problem in the United States (U.S.). One solution that is often turned to is the implementation of stricter gun control laws. This causes much divide as many citizens are not in agreement about whether or not these laws do what they are intended to. The aim of this study was to determine whether or not gun control laws have an effect on homicide, and, if so, what this effect is. The U.S. states were evaluated in several different categories to determine how strict or lax their gun laws were. They were scored using the number of gun control and gun-friendly laws they had in place in recent years. These scores were used to group the states and analyze the differences in homicide statistics. In addition, the homicide statistics of three states were compared before and after these states had passed recent gun laws. Data about homicide statistics and the passage of gun control legislation were obtained from publicly available online sources. No clear associations between gun control laws and homicide rates, firearms homicide rates, or the percentage of homicides committed with firearms were found. Results from comparing homicide statistics before and after the passage of recent gun laws indicated an increase in all three categories of homicide data examined, despite the fact that some laws were aimed at loosening gun control some at tightening gun control. These results suggest that further research needs to be done on the effects of gun laws and other possible ways to prevent homicide since gun laws do not seem to have clear associations with homicide rates or with homicides with firearms.

Keywords: homicide rate, firearms homicide rate, restrictive gun law, pro-gun law, gun control

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Introduction

Homicide is a devastating problem in the U.S. and is a topic of great concern given how many people are affected by it. In 2017, there were 19,510 homicides committed in the U.S., making it the 16th leading cause of death (Kochnek, Murphy, Jiaquan, & Arias, 2019). This results in approximately 6 deaths per 100,000 population. While homicide itself is an immense problem which needs to be studied, homicides committed with firearms are currently of great interest. Of these 19,510 homicides in 2017, 14,542 involved a firearm (Kochnek et al., 2019). This means that approximately 75% of homicides committed in 2017 were firearm homicides. Not only are homicides in general important when looking to find a solution to this problem, but the choice of instruments used to commit these crimes is important and informative as well. Due to the fact that many homicides do involve firearms, the implementation of gun control laws is one solution that is turned to.

Research regarding homicide is of great importance because it can be used when attempting to prevent these wrongful deaths. Although gun control laws are thought of as a solution to homicide and firearms homicide, there is not much of a consensus in regard to how effective they are. Gun control laws are aimed at lowering overall gun violence, including homicide. However, there has been little agreement regarding what their effects truly are. There have been claims that they reduce, increase, or have no effect on homicide rates. It is also unclear if those who commit homicides turn to other methods if gun control laws do in fact prevent them from using firearms. It is important to understand the effects these laws have because their implementation has the potential to save or jeopardize the lives of citizens. If these laws prove to be effective at reducing homicide, then they are one solution to this problem. If they do not

reduce homicide, however, than these laws are restricting the rights of gun owners with no positive repercussions, while possibly endangering people.

In this study, research literature on the topic of gun control laws and their effects will first be reviewed. The current state of affairs will then be examined by classifying states according to their gun laws and comparing their homicide rates, firearms homicide rates, and percentage of homicides committed with firearms.

Literature Review

Support for Stricter Gun Laws

There is currently much debate over whether or not gun control achieves its goal of reducing violence. There have been many studies over the years, as well as conflicting results. Some states have very loose gun control laws that give owners many freedoms. For example, Duggan (2001) studied several states where laws changed between the years of 1985 and 1991 so that people were permitted to carry and conceal handguns. The idea behind this type of legislation was that criminals would be deterred if they thought more potential victims may be armed, and this would cause a decrease in crime rates. However, Duggan found that these new laws did not lead to an increase in gun ownership. Furthermore, this study found changes in gun ownership to be significantly positively related to the homicide rate. Therefore, these laws that loosened gun control were not effective at deterring crime.

In the U.S., there are many people who keep guns in their homes as a way of deterring crime. It is thought that by having a gun in one's home, people can deter or defend themselves against intruders. Like with Duggan's (2001) study, Miller, Azrael, and Hemenway (2002) also found evidence in support of stricter gun control in regard to this idea. They found that people who had guns in their homes were more (rather than less) likely to be victims of homicide than

those who did not. During this study, it was determined that in areas where firearm ownership was higher, so were rates of gun-related homicide. The authors found that handgun ownership in particular was positively related to higher rates of homicide and, while not as acute, non-gun-related homicide was more prevalent in these areas as well.

The study by Miller and his colleagues (2002) was not the only study that observed this trend. Wiebe (2003) also found an association between homicide and having a gun in the home. This was found to be true for a variety of demographics. This conclusion was reached using subjects selected from the National Mortality Followback Survey, which is a collection of data about those who die in the U.S. Next of kin were interviewed and asked various questions about the death, including whether or not the deceased had firearms in their home. Homicide rates were higher for both young and old individuals, people of different races, and both sexes. However, females were more likely to be victims, as were non-Whites. These two studies indicate a positive correlation between rates of household firearm ownership and rates of homicide. Their results would suggest stricter gun control laws in order to prevent more people from becoming victims.

Laws and restrictions that affect one's ability to own and carry a gun are believed to deter violence. There are also laws that may alter the process of purchasing a firearm or determine what is legal for a person to own. A more recent study looked specifically at how the waiting period for obtaining a firearm affected gun-related homicides. Waiting periods supposedly give people time to change their minds rather than act out of anger or other strong emotions. Koenig and Schindler (2018) found the waiting period had a negative relationship with killings where a gun was used. The proposed reason for this relationship is that the waiting period gives buyers who intend to kill out of anger time to calm down. Rather than allowing those who are in a fit of

rage to purchase a gun they intend to kill with, the waiting period allows for the situation to deescalate. Laws such as these are meant to target and avoid common scenarios that can lead to violence.

Guns and Intimate Partner Violence

Many recent studies related to the effects of gun control on gun violence look specifically at intimate partner violence (IPV) and intimate partner homicide (IPH). In an already violent situation such as this, the added threat of a firearm could inflict more serious consequences. For this reason, there are several gun control laws that pertain only to those who are perpetrators of IPV. These laws are meant to keep guns out of the hands of people who have proven to be violent and are a risk for future firearm violence. Diez and her colleagues (2017) observed laws that prevented individuals subject to an IPV related restraining order from owning firearms. While some of these laws required said individuals to surrender any firearms they already owned, others did not. The latter of these two categories is thought to be more dangerous because while these individuals cannot acquire new firearms, there is no telling what they might do with the ones they already own. A panel study consisting of state-level predictor and outcome variables was conducted by Diez et al. (2017), the outcome variable being IPH rates in a specific state during a given year. The types of laws examined were prohibition of firearm possession by people convicted of an IPV misdemeanor, people with a restraining order related to IPV, or people convicted of stalking, as well as those that allowed for firearms to be removed from scenes of domestic violence incidents. The laws required the surrender of firearms had an association with 10.8% lower rates of homicide committed by an intimate partner. Laws without this specification, however, had no significant relation to IPHs in which a gun was used.

Zeoli and her colleagues (2017) had similar findings; their results indicated that domestic violence restraining order firearm-prohibition laws had a significant negative relationship with intimate partner homicide. These laws were associated with intimate partner homicide reduction of 10%.

In addition to these findings, Zeoli et al. (2017) found that gun control laws that affected all individuals in a certain area were found to lower rates of IPH. Laws that affect only those who are already guilty of intimate partner violence are meant to deter those individuals from inflicting further harm. These laws can only affect those who have already caused some form of damage. However, having stricter gun laws that apply to all people in a certain area rather than just those who are guilty is thought to take a more preventative approach to IPV as a whole. This is believed to be because these laws make it more difficult to commit these acts of violence in the first place, or at least they are less likely to be fatal. According to Sivaraman (2019), states with a higher number of gun control laws had lower rates of IPH. In states with 40 or more provisions in effect, total female IPH was 56% lower relative to states that had zero to 39 provisions in effect.

Gollub and Gardner (2019) find the reduction in IPH to be particularly beneficial for women. It was determined that effective gun control legislation reduces firearm related IPH. Also, Gollub and Gardner argue in support of the idea that weapon substitution would not outweigh the female survival benefits when stricter gun laws are in place. Even in areas where non-firearm IPH rates are high, females would benefit from stricter gun control laws.

Ineffective Gun Control Laws

In order to achieve their ultimate goal, gun control laws should reduce the rates of a variety of different violent crimes. Otherwise, this would suggest that people are able to get

around these new regulations and commit the crimes these laws are meant to deter. Many people believe these laws to be ineffective, and that the only people who are harmed by them are law-abiding citizens. This is thought to be true because anyone who would commit a crime with a gun is not likely to obey gun laws. They may continue to obtain firearms illegally or substitute another weapon for a gun, while law-abiding citizens are restricted in the ways they can obtain a firearm.

This idea is supported by Moorhouse and Wanner (2006), who found gun control to have no statistically significant effect on violent crime. Even less strict gun control laws in neighboring states did not influence the effectiveness of state gun control laws. They propose that gun laws have no effect on the behavior of criminals, possibly because many may already be obtaining guns illegally. This gives some merit to the idea that gun laws do nothing to take the guns out of the hands of criminals, and instead make it more difficult for the average citizen to defend themselves. This would not lead to the decrease in violence which is promised by stricter gun laws.

Kleck and Patterson (1993) also found that gun control was not only ineffective at reducing homicide, but it also had no effect on the prevalence of gun ownership. They found that gun prevalence had no effect on violence (except for a positive relationship with suicide), and in fact, certain types of violence rates increased gun prevalence. Data from the U.S. cities with a population of 100,000 or more in 1980 was used to complete their study. Rates (per 100,000 resident population) of homicide, suicide, aggravated assault, robbery, rape, and gun accidents resulting in death were assessed. With the exception of rape and fatal accidents, these crimes were also reviewed separately based on whether or not a gun was used. While some gun control laws, such as requiring a permit or license and banning criminals and the mentally ill from

buying guns, were found to be effective, most others – such as waiting periods and gun registration – were not.

Gun control laws make obtaining a firearm more difficult, which would supposedly lead to a decrease in gun ownership. Because of this, if gun control laws were effective at reducing rates of violence, it could be assumed that this is due to the fact that fewer people have access to guns. However, Kleck, Kovandzic and Bellows (2016) found that higher gun ownership levels do not cause more crime. Data from U.S. cities with a population of 25,000 or above in 1990 were used. To measure violent crime rates, the study used rates (per 100,000 population) of total homicide, gun homicide, non-gun homicide, robbery, and aggravated assault. Firearm ownership was found to be negatively affected by some gun control laws, while most had no effect, and very few had a positive effect. Overall, gun laws had no significant negative effect on total violence rates, although some laws (such as such as requiring a license to own a gun and bans on gun purchases for certain risky categories of people) did have an effect in reducing gun homicides.

One of the deadliest forms of gun violence seen today are mass shootings. Due to the severity of these incidents, gun control laws are often turned to as a response to mass shootings. While some of these laws can affect a person's ability to obtain a gun, other ones focus on specific accessories which are thought to contribute to mass shootings. Kleck (2016) takes a closer look at gun laws that specifically target large-capacity magazines. It is argued that mass shooters could use these magazines to kill more victims because it would take them less time to reload. However, the study found that even with smaller capacity magazines, which would remain legal under these laws, it was not difficult for shooters to fire an equal number of rounds.

Concealed Carry Laws

In some instances, it can be assumed that gun control laws are not only ineffective at lowering rates of violence, but they also deny people the protection that more lenient gun control is thought to provide. This is thought to be true because, as mentioned previously, criminals may not be deterred by gun control laws, and instead those who hope to obtain a firearm for self-defense are left unprotected. Laws that allow for the concealed carrying of firearms (concealed carry laws) could be more effective because criminals may be deterred if they know potential victims may be armed, and those who carry guns may be able to use their weapons to prevent criminals from committing acts of violence. If this is indeed the case, gun control laws that prohibit the concealed carrying of firearms are not only ineffective, but they also promote the violence they are meant to deter.

Lott and Mustard (1997) found that allowing citizens who were not criminals or mentally ill to carry concealed handguns deterred violent crime. They argue that right-to-carry laws deter homicide, rape, robbery, and aggravated assault. They also estimated that in 1992, had right-to-carry laws been put in place in states that did not have them, the annual gain from prevented crimes would have been approximately $5.74 billion.

This was not the only instance where laws allowing the concealed carrying of firearms were found to decrease crime. Moody and Marvell (2008) observed the effects of shall-issue laws, which require authorities to provide individuals with concealed carry permits unless they had a criminal history or were mentally ill. These shall-issue laws had a significant negative effect on murder and burglary, while having a significant positive effect on assault. They also determined that there was a net benefit of $50 million per year since these shall-issue laws were passed, resulting in a total of $28 billon.

Finally, while it was not determined that crime decreased, Hammill (2018) determined that homicide and violent crime did not significantly increase after laws regarding concealed-carry permits were loosened. This conclusion was reached using data about violent crime and homicide which were gathered by the Uniform Crime Reporting Program and the Center for Disease Control and Prevention. The data ranged from 1986 to 2015, and state-level concealed-carry laws were evaluated for each year. States were classified as "no carry," "may issue," "shall issue," and "unrestricted carry." Unlike the previously mentioned studies, laws allowing for the concealed carrying of firearms did not appear to decrease violent crime. Thus, according to this study, although criminals knew that possible victims might be armed, they were not deterred. However, these laws did not cause a rise in violent crime either.

Despite the many studies which have been conducted regarding gun violence and gun control laws, it is still unclear what effect this legislation has on certain types of crime. While some studies have found a connection between violence and looser gun laws, others have observed more relaxed gun laws, such as concealed carry, to be associated with lower crime. Also, although some stricter gun laws appear to be effective in protecting victims of IPV, others have shown to be ineffective. There is evidence supporting both sides of this issue.

This study seeks to further examine the effects of gun control laws by determining their associations with homicide at the state level. By finding if and how much homicide increases or decreases after gun control legislation is put into effect, it will help determine how effective these laws are. This study can help guide future decision-making about gun policies in order to protect people in the U.S.

Data and Methods

The information regarding what types of gun laws each state has was examined as an independent variable. This is also true for the information regarding when these laws were put into place. The statistics about homicide are the dependent variables. These variables were examined to determine if and how homicides changed due to laws regarding gun control.

Measures

Statistics and information were gathered regarding gun control and gun-friendly laws in each state. This started with determining what specific laws would be included in this research. To gather this information, data from several online resources were utilized. Information gathered from "Giffords Law Center" (2018) included which gun laws are currently in effect in each state. Giffords Law Center is an organization which seeks to research and educate on the topic of gun laws and programs. Similar information was available on "Guns to Carry" (2017). While this website includes information on the gun laws in effect in each state, it also includes information for gun owners such as gun-related news and reviews on firearm accessories. Information from the article "Gun Laws in the United States by State" (2019) was used as well. In addition to providing information on which gun laws are in place in each state, this resource included details about the individual laws. Finally, information regarding years that gun laws were passed was obtained from "Every Town for Gun Safety" (2014). This organization seeks to educate users about the causes of gun violence and how it can be reduced, and it provides information about gun violence and gun policies. From these online resources, information was gathered on what gun laws were in effect in each U.S. state. Both the laws that called for stricter control of firearms and those that allowed gun owners more freedoms were indexed for each state. The following are laws that restricted gun rights (hereinafter: restrictive gun laws):

- requirement of a state permit or owner license,
- ban of assault weapons,
- firearm registration,
- magazine capacity restriction,
- loss of right to possession under mental health laws,
- duty to inform,
- waiting periods, and
- restriction of NFA weapons.

The laws which were considered favorable to gun owners (hereinafter: pro-gun laws) include:

- peaceable journey laws,
- castle doctrine or "stand your ground",
- vehicle carry,
- concealed carry, and
- open carry.

States which were determined to have a given law in effect were scored with a 1 for that category of law, while states that did not have the law in place were given a 0. Information from several sources listed above was cross-checked to confirm that states were correctly assigned a 1 or a 0 for each category. When no information was available regarding whether a certain law was in effect in a certain state, it was assumed that said law was not in effect, and the state was given a 0 for that category. Some states had certain laws partially in effect: for example, a law applied to either handguns or long guns, but not both. These states were awarded a 1 in the categories to which these exceptions applied. In order to be awarded a 0 for any category or law, a state had to have a complete absence of that law.

Next, the year in which each one of these laws went into effect was coded. In order to obtain this information, data from "Every Town for Gun Safety" (2014) was used. Again, this was another method to confirm that states which were awarded a 1 in certain categories did in fact have those laws in place, while states that were assigned a 0 did not. Even though the years the law went into effect were recorded, however, the year of implementation could not be determined for every law. The one law that was considered to be a special case was concealed carry law in Washington D.C. that allowed carrying of concealed weapons. The law was in effect from 1991 until 2008. In 2009, the law was changed and concealed carrying of firearms was no longer permitted, but the law was brought back into effect again in 2015.

States were given several different scores to determine how strict or loose their gun laws were. In order to prevent results from being influenced by outliers, individual score categories were grouped to create several ranges of scores. The first score that states were given was their Restrictive Gun Laws score. This was determined by adding up the number of gun laws that restrict gun ownership rights (see Table 1).

Table 1

State Scores for Restrictive Gun Laws

Category	0	1-3	4-5	6-7
Restrictive Gun Laws	26 (51.0%)	13 (25.5%)	7 (13.7%)	5 (9.8%)

Note: Numbers not in parentheses are the number of states, while those in parentheses are the percentages of states that earned a specific score for each given category.

The next score given to each state was their Pro-Gun Laws score. This score was determined in a similar fashion, by adding up scores to determine the number of gun-friendly laws in effect for each state (see Table 2). Laws that went into effect in 2013 or later were not

included when calculating the score each state had earned in these two categories. These laws were considered too recent to have a measurable effect.

Table 2

State Scores for Pro-Gun Laws

Category	0-1	2	3	4-5
Pro-Gun Laws	2 (3.9%)	30 (58.9%)	9 (17.6%)	10 (19.6%)

Note: Numbers not in parenthesis are the number of states, while those in parenthesis are the percentages of states that earned a specific score for each given category.

Next, an Overall Gun Control score was calculated for each state. This score was determined by subtracting the score each state had earned in the Pro-Gun Laws category from the score it had earned in the Restrictive Gun Laws category (see Table 3). This resulted in some states receiving a negative Overall Gun Control score. For this reason, 4 points were added to each state's Overall Gun Control score to ensure that no state scored less than 0 for this category.

Table 3

State Scores for Overall Gun Control

Category	0-1	2	3-4	5-7	8+
Overall Gun Control	10 (19.6%)	19 (37.3%)	11 (21.6%)	7 (13.7%)	4 (7.8%)

Note: Numbers not in parenthesis are the number of states, while those in parenthesis are the percentages of states that earned a specific score for each given category.

Finally, state scores were recorded as awarded by "Guns to Carry" (2017) (hereinafter: Guns-to-Carry score). On this pro-gun website, each state was awarded a score between 1 and 5

depending on how gun-friendly their gun laws were. States that had the most restrictive gun laws were awarded a 1, while states with the most gun-friendly laws were awarded a 5 (see Table 4).

Table 4

State Scores for Guns-To-Carry

Category	1	2	3	4	5
Guns-To-Carry	5 (9.8%)	5 (9.8%)	12 (23.5)	18 (35.3)	11 (21.6%)

Note: Numbers not in parenthesis are the number of states, while those in parenthesis are the percentages of states that earned a specific score for each given category.

As a final measure for the effectiveness of gun laws, laws that were passed recently (in the last 10 years) were used to compare homicide before and after the law was passed (see Table 5). Laws passed in 2015 or later were not examined because they are too recent to have had a significant effect. Since year 2017 homicide data is the latest available, two years or less of homicide data since the passage of laws in 2015 or later is not enough to derive stable homicide estimates – the cut-off of three years or more was used as a guideline for calculating homicide averages.

Table 5

States with Recent Gun Law Passage

State	Type of Law	Year of Recent Law Passage
Alaska	Concealed carry (Pro-Gun)	2013
Colorado	Background check (Restrictive)	2013
Washington	Background check (Restrictive)	2014

The information used to construct dependent variables was collected using the WONDER database made available by the Centers for Disease Control and Prevention (n.d.). This online database includes statistical data about a wide variety of public health issues, such as births, cancer, and mortality. Information regarding homicides was used for this research, which is obtained from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, Division of Vital Statistics, the Mortality Statistics Branch. Each state's data come from medical examiner's or coroner's reports. Data about homicide counts and rates for each state between the years of 2013 and 2017 were obtained. The homicide rates for each state during this time frame were also obtained for murders committed with a firearm. Finally, by dividing the number of homicides committed with a firearm by the total number of homicides, the percentage of homicides committed with firearms was determined for each state (see Tables 6 and 7).

Table 6

Descriptive Statistics for Dependent Variables

Variable	Minimum	Maximum	Mean	SD
Homicide Rate	1.4	16.9	5.4	3.04
Firearms Homicide Rate	0.6	12.6	3.8	2.55
Percent of Homicides w/Firearms	26.2%	81.3%	65.6%	12.31%

Table 7

Homicide Statistics by State, 2013-2017

State	Homicide Rate Per 100,000	Firearms Homicide Rate Per 100,00	Percent Homicides with Firearms
Alabama	9.9	8.1	81.3
Alaska	7.4	4.7	63.1
Arizona	5.7	3.8	67.1
Arkansas	7.9	5.7	71.8
California	5	3.5	69.9
Colorado	3.9	2.4	62.7
Connecticut	2.9	1.8	63.7
Delaware	6.4	4.9	76.7
District of Columbia	16.9	12.6	74.3
Florida	6	4.4	73.2
Georgia	7.2	5.6	78.9
Hawaii	2.4	0.6	26.2
Idaho	2.2	1.2	55.0
Illinois	7.4	5.9	79.6
Indiana	6.3	4.8	76.1
Iowa	2.6	1.4	55.0
Kansas	4.7	3.4	72.6
Kentucky	5.7	4.1	72.0
Louisiana	12.7	10.2	80.5
Maine	1.7	0.8	48.7
Maryland	8.6	6.3	73.3
Massachusetts	2.2	1.3	62.0
Michigan	6.1	4.6	74.5
Minnesota	2.3	1.4	61.6
Mississippi	11.1	8.8	79.6
Missouri	8.6	6.9	80.9
Montana	3.6	1.7	47.0

Nebraska	3.4	2.3	66.3
Nevada	6.6	4.3	65.7
New Hampshire	1.4	0.6	45.7
New Jersey	4.3	3.1	72.4
New Mexico	7.5	4.4	59.0
New York	3.3	1.9	56.6
North Carolina	6.2	4.6	74.4
North Dakota	2.2	1.1	50.0
Ohio	5.9	4.4	73.5
Oklahoma	7.6	5.2	69.4
Oregon	2.9	1.7	60.4
Pennsylvania	5.4	4.1	76.0
Rhode Island	2.5	1.2	49.2
South Carolina	8.2	6.3	77.2
South Dakota	3.6	1.2	34.0
Tennessee	7.3	5.7	78.6
Texas	5.5	4	71.9
Utah	2.2	1.4	63.4
Vermont	2.2	1.2	52.9
Virginia	4.7	3.4	73.7
Washington	3.2	2	62.4
West Virginia	5.2	3.2	62.5
Wisconsin	3.6	2.6	72.7
Wyoming	3.2	1.7	52.1

Note: Rates and percentages in this table represent 5-year averages for the years of 2013 through 2017.

Procedure

The associations between the four different scores regarding gun laws and the state's statistics regarding homicide were examined using Microsoft Excel for calculating correlations and averages (means) as appropriate.

First, correlations were calculated between the states' gun law scores and their homicide rates, firearms homicide rates, and percentages of homicides committed with firearms. Next, averages (means) were calculated for homicide rates separately for each category the states were scored in: that is, states were grouped by the score they had earned for various categories of gun laws. For example, average homicide rate, firearms homicide rate, and percentage of homicides committed with firearms were compared between states that had earned a 0 for their Restrictive Gun Laws versus those that earned a 7. This was done for every group of states in each category to determine whether any important differences exist between groups of states with different sets of gun laws.

For laws passed in 2013 and 2014, homicide statistics from before the law's passage were compared to more recent statistics. This determined whether or not the law was effective. If a law was effective, the homicide rates are likely to show a decrease after its passage.

It was determined that tests of statistical significance were not applicable to this study. This is because the concept of statistical significance is based on probability sampling and making inferences from a sample to a population. This would not apply because this study uses a population rather than a sample.

This study was confirmed as exempt by the Institutional Review Board as it has only aggregate-level data with no personal identifiers.

Results

The main question that guided this research was how gun control laws affect homicide. To answer this question, this research sought to determine if different types of gun control laws are associated with rates of homicide, and if so, how they affect these rates. Overall homicide rate was used as a dependent variable to determine this effect, if any. Rates of homicides

committed with firearms was another dependent variable. The decision was made to include this variable to find if these laws had an effect on all homicide, or just homicides committed with guns.

Some interesting patterns emerged when data were collected regarding homicide, firearms homicide, and percentages of homicides committed with firearms. For example, New Hampshire was found to have both the lowest homicide rate (1.4) and firearms homicide rate (0.6), Hawaii had the lowest percent of homicides committed with firearms (26.2%). This pattern was similar for highest values in these categories: the District of Columbia had the highest homicide rate (16.9) and firearms homicide rate (12.6), but Alabama had the highest percent of homicides which involved a firearm (81.3%).

With the exception of the correlation between Pro-Gun Law scores and homicide rates, all correlations between the scores each state received in the four categories of gun friendliness or restrictiveness and homicide rates were weak (see Table 8). Overall Gun Control scores had weak positive correlations with homicide rates (.13) and firearms homicide rates (.11). However, these scores had a weak negative correlation with percentage of homicides committed with firearms (-.08). Restrictive Gun Law scores also had a mix of positive and negative correlations with homicide data. The correlations between these scores and homicide rates as well as firearms homicide rates were positive, while the correlations between this score and percentage of homicides committed with firearms was negative.

Table 8

Correlations Among Variables

Variable	1	2	3	4	5	6	7
1. Restrictive Gun Laws	-	.06	.92	.08	.02	.00	-.11
2. Pro-Gun Laws		-	-.34	.00	-.30	-.29	-.06
3. Overall Gun Control			-	.08	.13	.11	-.08
4. Guns-To-Carry				-	-.14	-.14	-.07
5. Homicide Rate					-	.99	.65
6. Firearms Homicide Rate						-	.73
7. Percent Homicides w/Firearms							-

Correlations between the three categories of homicide data and each state's Pro-Gun Law score, on the other hand, were all negative. The correlation between Pro-Gun Law scores and homicide rates (-.30) was interesting because it is the only correlation between an independent variable and dependent variable which is moderately strong. The correlation between Pro-Gun Law scores and firearms homicide (-.29) was approaching a moderate correlation, but at the same time, the correlation between Pro-Gun Laws scores and percentage of homicides committed with firearms is almost non-existent (-.06). Guns-to-Carry scores also had weak

negative correlations with homicide rates (-.14), firearms homicide rate (-.14), and percentage of homicides committed with firearms (-.07).

Strong correlations can be seen between the dependent variables. Homicide rates had the strongest positive relationship with firearms homicide rates (.99), firearms homicide rates had a strong positive relationship with percentages of homicides committed with firearms (.73), and overall homicide rate is fairly strongly correlated with the percentage of homicides committed with firearms (0.65). This means that those states that have higher homicide rates also have higher proportions of homicides committed with firearms.

There was also a moderate negative relationship between Pro-Gun Law scores and Overall Gun Control scores (-.34). This indicates, as expected, that states with friendlier gun laws have fewer gun control laws. Finally, a strong positive correlation was found between Restrictive Gun Law scores and Overall Gun Control scores (.92). This means that states with more restrictive gun laws have more gun control.

The means that were found for the different homicide variables by each state's Restrictive Gun Law score were interesting due to their lack of uniformity (see Table 9). For states that scored a 0 or 1-3, average homicide rates were very similar (see Figure 1). The average dipped very low for those which scored 4-5, and spiked higher than the first averages for scores 6-7.

Table 9

Average Homicide Statistics by Restrictive Gun Law Score

Score	Homicide Rate M(SD)	Firearms Homicide Rate M(SD)	Percent Firearms Homicide M(SD)
0	5.6 (2.9)	3.9 (2.5)	65.2% (12.9%)
1-3	5.1 (2.1)	3.8 (1.8)	69.7% (7.8%)
4-5	3.4 (1.8)	2.2 (1.7)	61.2% (9.6%)
6-7	7.4 (5.7)	5.2 (4.6)	63.25 (20.8%)

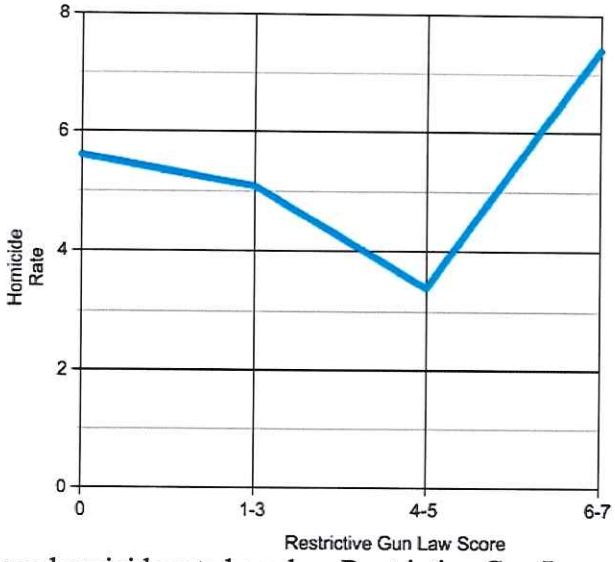

Figure 1. Average homicide rate based on Restrictive Gun Law score

Averages for firearms homicide rates are similar in that lower scores for Restrictive Gun Laws (0 and 1-3) begin with averages that could be considered the middle of this group (see Figure 2). Average rates become lower for states that scored 4-5, then rise higher than the rest for those states which scored 6-7.

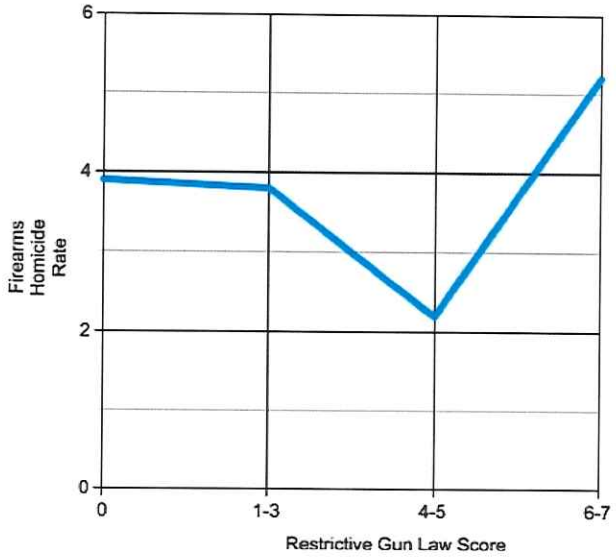

Figure 2. Average firearms homicide rate based on Restrictive Gun Law score

Average percentages of homicides committed with firearms increase very rapidly between the scores of 0 and 1-3 for Restrictive Gun Laws, then drop lower for scores 4-5 (see Figure 3). The average slightly increases again for scores 6-7, but nowhere at high as scores 1-3.

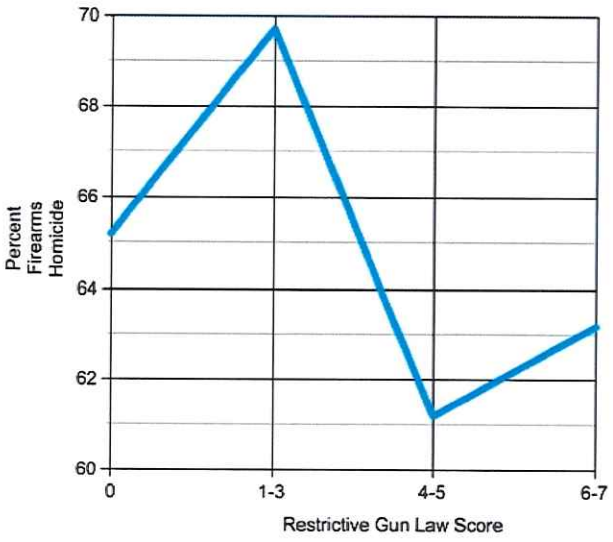

Figure 3. Average percent firearms homicide based on Restrictive Gun Law score

The results found for the category of Pro-Gun Law scores were interesting due to the uniformity of the scores (see Table 10). With the exception of a slight increase for score 3, the mean for overall homicide rates decreased as the Pro-Gun Law score increased (see Figure 4).

Table 10

Average Homicide Statistics by Pro-Gun Law Score

Score	Homicide Rate M(SD)	Firearms Homicide Rate M(SD)	Percent Firearms Homicide M(SD)
0-1	11.5 (7.7)	8.5 (5.8)	73.7% (0.7%)
2	5.3 (2.7)	3.7 (2.3)	65.1% (14.9%)
3	5.5 (3.3)	3.9 (2.9)	66.5% (12.1%)
4-5	4.5 (1.8)	3.0 (1.4)	64.8% (8.7%)

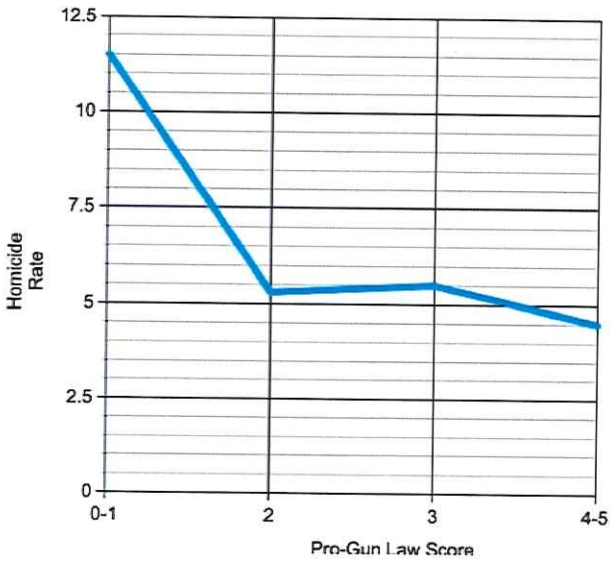

Figure 4. Average homicide rate based on Pro-Gun Law score

For firearms homicide rates, this pattern remained the same. Overall, the average rate of firearms homicides decreased as Pro-Gun Law scores increased (see Figure 5). Like with average homicide rate, the average firearms homicide rate was much higher than the rest for scores 0-1, and there was a slight increase at score 3.

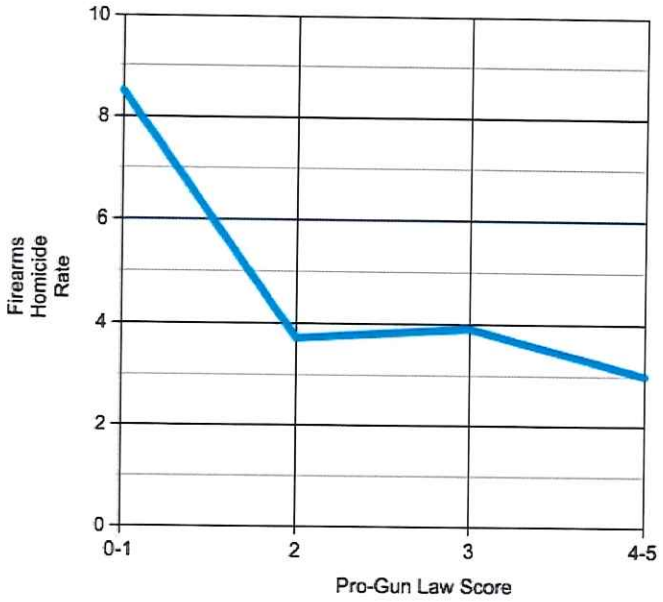

Figure 5. Average firearms homicide rate based on Pro-Gun Law score

The averages for percentage of homicides committed with firearms was another area of interest. Due to the similarity of average homicide and firearms homicide rates for Pro-Gun Laws, the average percent of homicides committed with firearms abided by the same decreasing pattern (see Figure 6). Again, the average increased slightly for states which had scored a 3. The general decrease in averages for homicide data by Pro-Gun Law score is interesting given that this pattern remains consistent for all categories of homicide data.

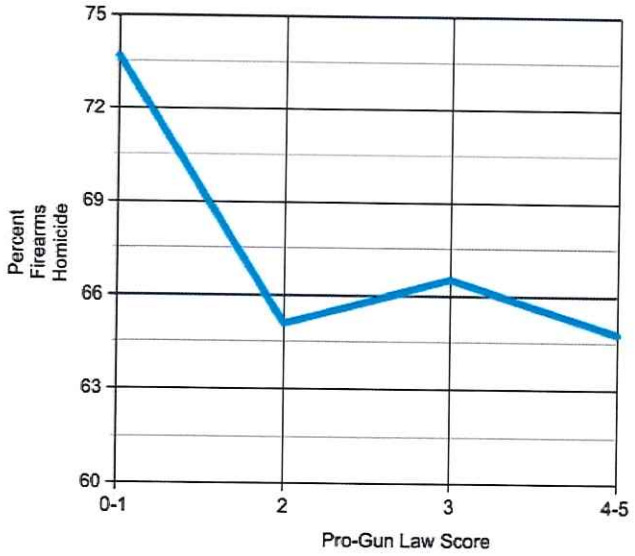

Figure 6. Average percent firearms homicide based on Pro-Gun Law score

Averages for the homicide statistics in regard to Overall Gun Control scores were interesting due to how varied they were (see Table 11). These averages were unique in how they did not seem to have any clear association with the scores towards either end of the spectrum (see Figure 7). There was no consistent increase or decrease in average homicide rates by Overall Gun Control score. Averages spiked and dipped between all score groups.

Table 11

Average Homicide Statistics by Overall Gun Control Law Score

Score	Homicide Rate M(SD)	Firearms Homicide Rate M(SD)	Percent Firearms Homicide M(SD)
0-1	6 (2.9)	4.2 (2.5)	67.3% (10.6%)
2	5.1 (2.9)	3.5 (2.5)	63.9% (13.6%)
3-4	5.5 (2.2)	3.9 (1.8)	69.1% (9.5%)
5-7	3.8 (1.8)	2.5 (1.6)	64.2 (8.4%)
8+	8.1 (6.4)	5.7 (5.2)	61.5% (23.6%)

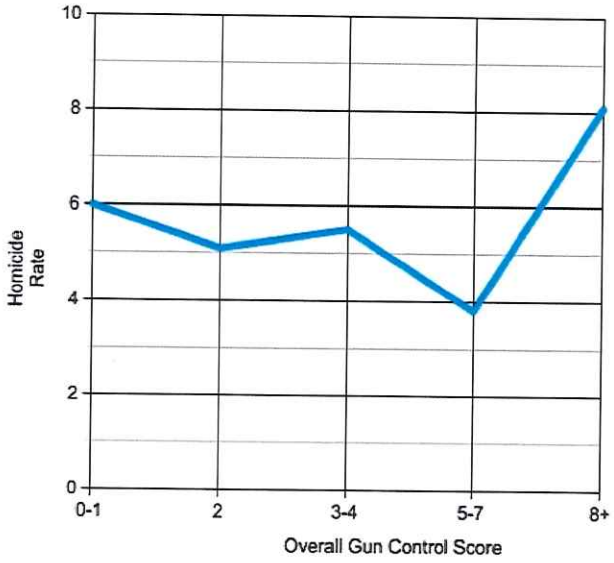

Figure 7. Average homicide rate based on Overall Gun Control score

For means regarding firearm homicides rate, scores appeared to have similar outcomes (see Figure 8). As expected, averages for firearms homicide rates were lower than overall

homicide rate averages. However, they did adhere to the same pattern with no consistent increases or decreases between scores.

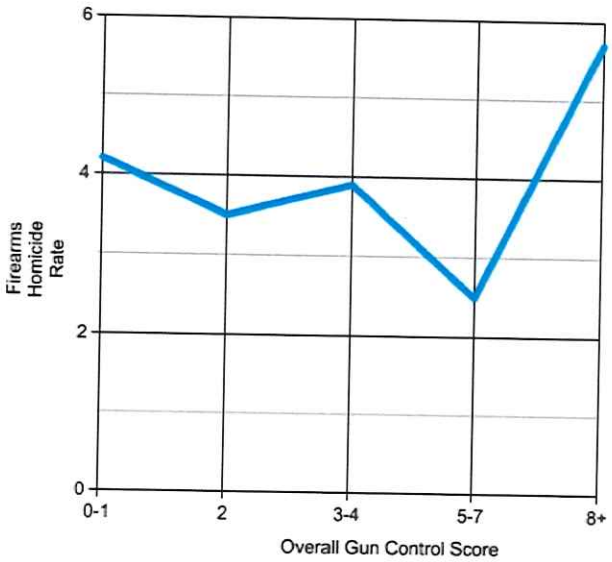

Figure 8. Average firearms homicide rate based on Overall Gun Control score

The averages for the percentages of homicides committed with firearms had very little uniformity as well (see Figure 9). There was a decrease between scores 3-4 and 8+. Otherwise, average percentages of homicides committed with firearms appeared to vary greatly by Overall Gun Control score.

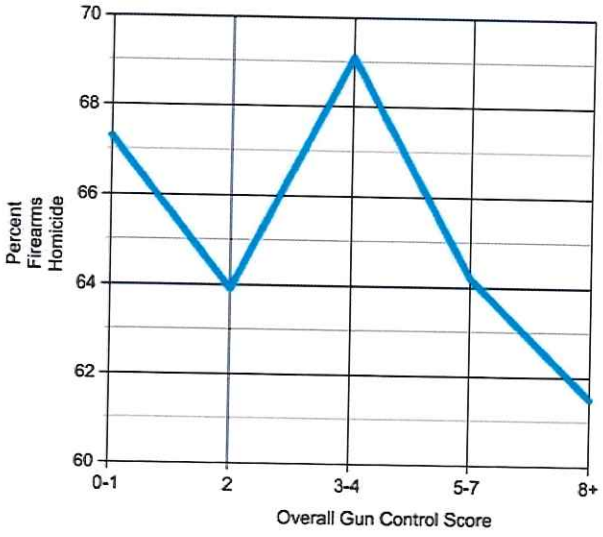

Figure 9. Average percent firearms homicide based on Overall Gun Control score

The averages that states were determined to have based on their Guns-to-Carry score were interesting due to where the averages were uniform and where they were not (see Table 12). For average homicide rates, states which had earned a 1, 3, or 4 had very similar averages (see Figure 10). Those for scores of 3 and 4 were nearly the same. States which scored a 2 had the highest average, though it was close to the averages of scores 3 and 4. States which had scored a 5 had the lowest average.

Table 12

Average Homicide Statistics by Guns-to-Carry Score

Score	Homicide Rate	Firearms Homicide	Percent Firearms Homicide
1	5.3 (2.2)	3.7 (1.9)	67.7% (11.0%)
2	6.1 (3.8)	4.4 (3.2)	66.8% (12.7%)
3	5.8 (3.3)	4.1 (2.8)	64.8% (14.6%)
4	5.8 (3.5)	4.1 (2.9)	66.6% (13.1%)
5	4.0 (1.8)	2.7 (1.5)	63.5% (10.5%)

Note: Numbers not in parentheses are the means, while those in parentheses are the standard deviations.

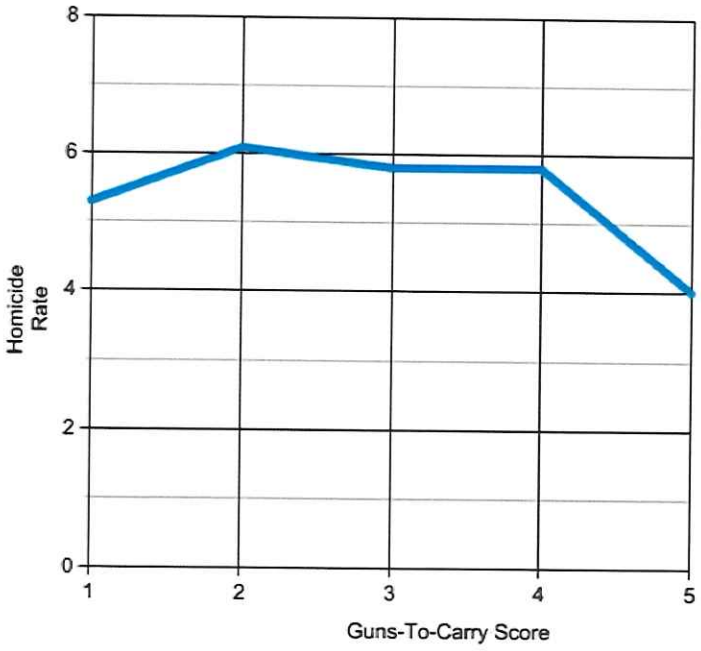

Figure 10. Average homicide rate based on Guns-to-Carry score

Since firearms homicide rates are correlated closely with overall homicide rates, it is not surprising that these scores adhered to the same pattern. The average percentage of homicides

committed with firearms progressively became lower as the Guns-to-Carry score increased, with the exception of states which had scored a 4 (see Figure 11). Although this average was not completely out of place for this category, it increased slightly, making it stand out from the continuously decreasing scores.

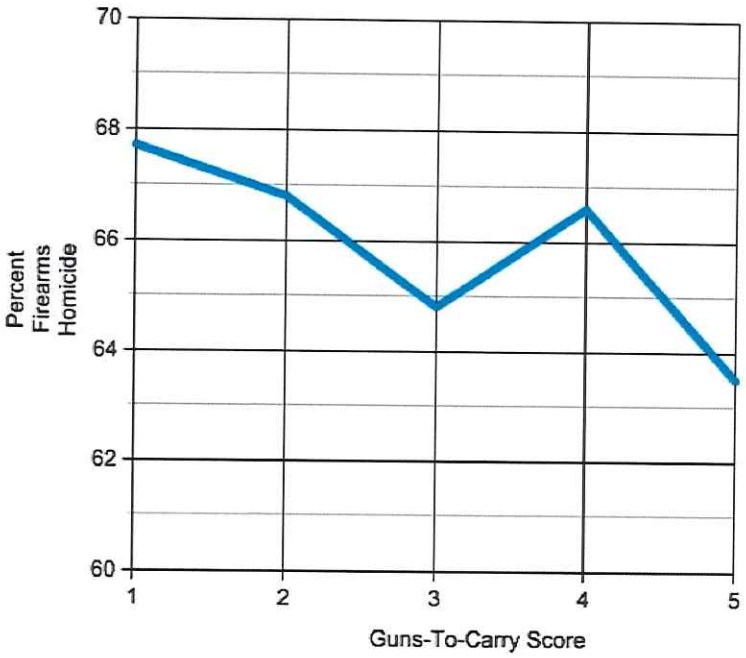

Figure 11. Average percent firearms homicide based on Guns-to-Carry score

Supplemental Analysis

Homicide rates, firearms homicide rates, and percentages of homicides committed with firearms were also collected for the three states that had gun laws passed in the recent 10 years but no later than 2014. For the two states (Alaska and Colorado) that had a law passed in 2013, homicide data were collected for four years before and four years after the passage of the law (see Table 13). For the state that passed a law in 2014 (Washington), homicide data were

obtained for three years before and three years after this law was passed (see Table 5). This difference in the number of years analyzed before and after the passage of a law was due to the fact that data after 2017 are not available.

Table 13

Homicide Statistics for the States with Recent Changes in Laws

State	Pre-Law Homicide Rate	Post-Law Homicide Rate	Pre-Law Firearms Homicide Rate	Post-Law Firearms Homicide Rate	Pre-Law Percent Firearms Homicide	Post-Law Percent Firearms Homicide
Alaska (Pro-Gun Law in 2013)	5.0	7.8	2.9	5.2	58.0%	66.7%
Colorado (Restrictive Gun Law in 2013)	3.7	3.9	2.1	2.6	56.1%	65.6%
Washington (Restrictive Gun Law in 2014)	2.9	3.2	1.6	2.2	55.0%	67.5%

For the three states that passed a new gun law in 2013 or 2014, there were interesting changes in homicide rates. For each state, after the gun law was passed, there was an increase in homicide rates (see Figure 12). This increase was most dramatic in Alaska, which was the only state to pass a Pro-Gun Law.

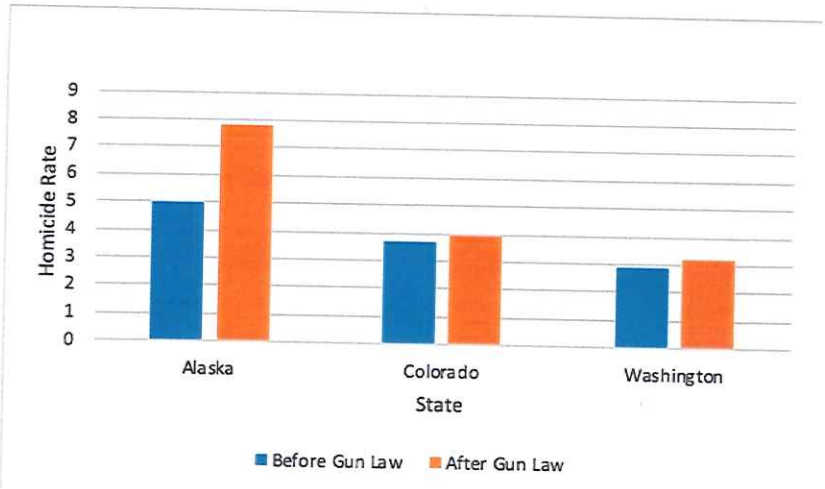

Figure 12. Changes in homicide rates after the passage of recent gun law

With the increase in homicide rates, these three states saw an increase in firearms homicides as well (see Figure 13). Again, while the highest increase occurred in Alaska, each state was observed to have a higher rate.

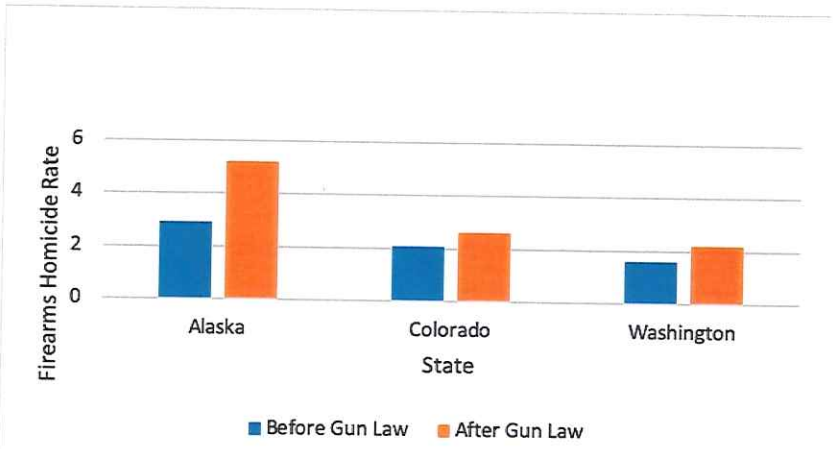

Figure 13. Changes in firearms homicide rates after the passage of recent gun law

The previous two categories of homicide statistics were not the only ones to see an increase. After the recent gun laws were passed, all three states saw an increase in the percentage of homicides committed with firearms (see Figure 14). This was an interesting outcome because all three states experienced an increase for all three sets of statistics.

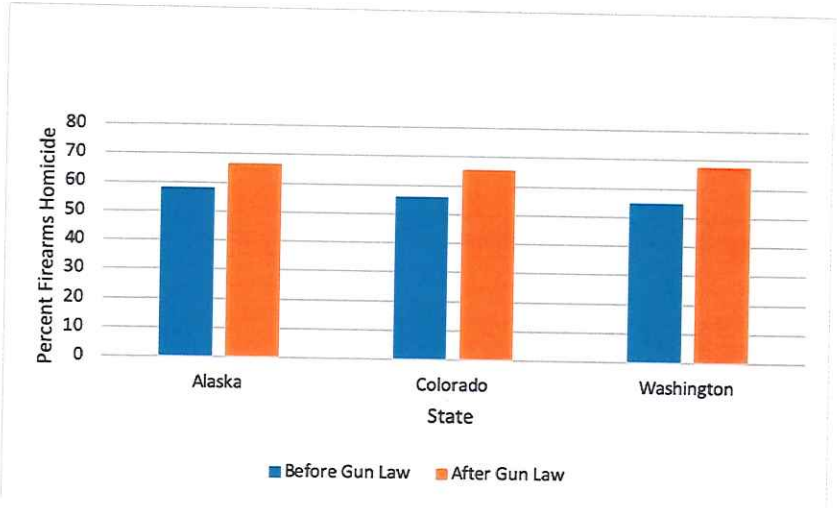

Figure 14. Changes in the percent of homicides committed with a firearm after the passage of recent gun law

Since the tests of statistical significance are not applicable in these cases, it is important to put these recent increases in perspective. Thus, data regarding homicide rates, firearms homicide rates, and percentages of firearms homicides were analyzed for each of these three states from 1999 to 2017. For all three states, a general increase in homicide rates, firearms homicide rates, and percentages of firearms homicides can be seen after the recent law passages in comparison to other years (see Figures 15, 16, and 17). At the same time, only the homicide rates and firearms homicide rates in Alaska seem to reflect a serious jump compared to the overall trendline. It still may be too early to make any far-reaching conclusions though since the spike in year 2016 follows a large dip in years 2012-2013 (Figure 16) and still may be followed by another large dip in subsequent years.

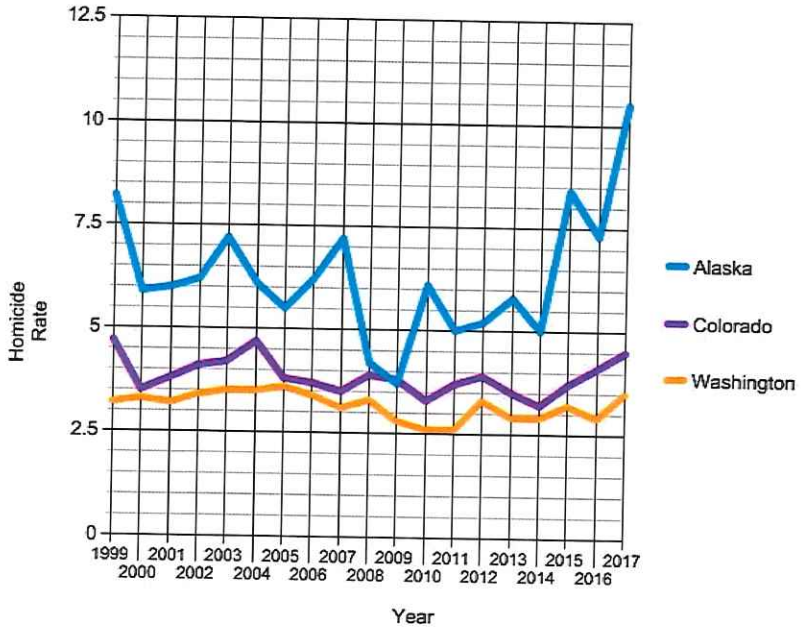

Figure 15. Changes in homicide rates from 1999 to 2017

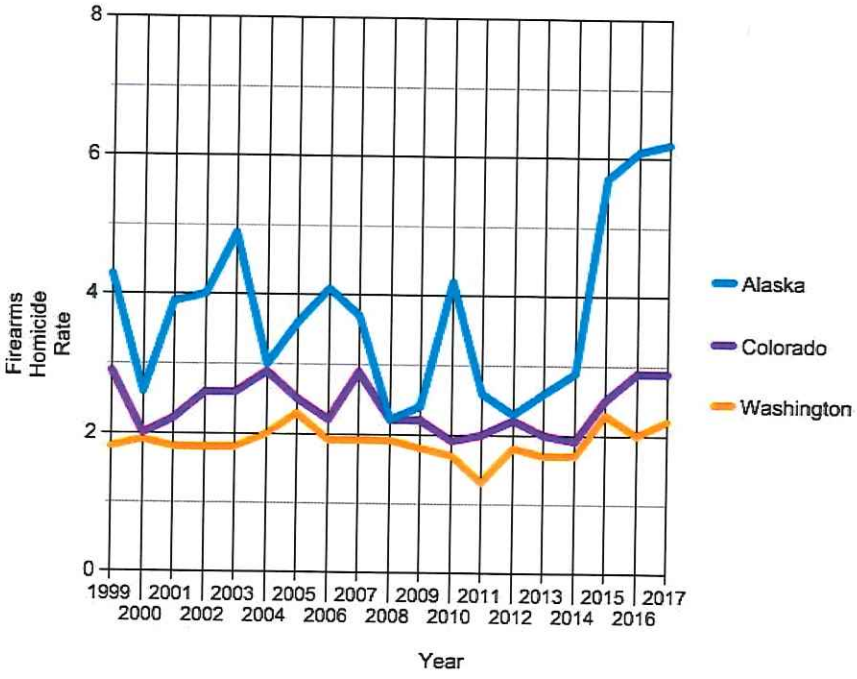

Figure 16. Changes in firearms homicide rates from 1999 to 2017

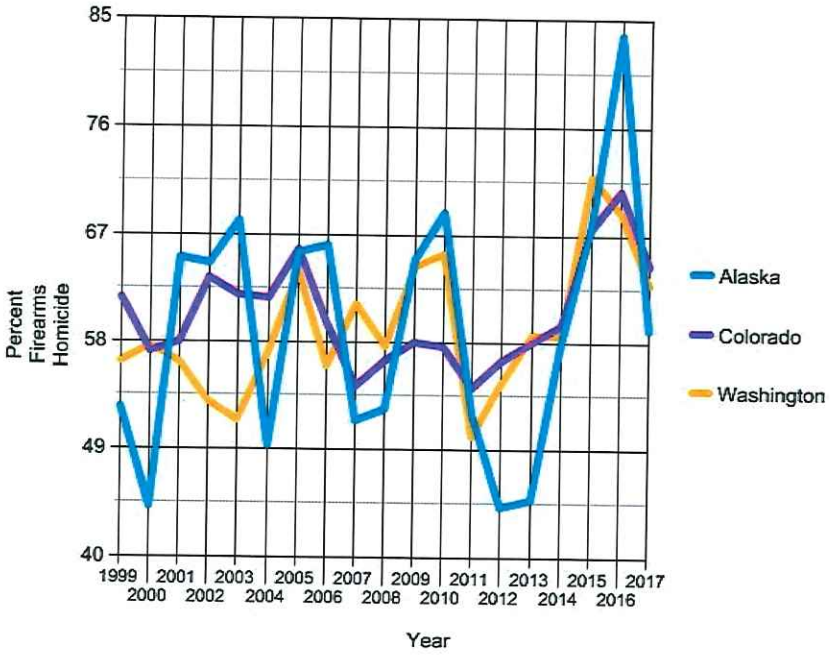

Figure 17. Changes in the percent of homicides committed with firearms from 1999 to 2017

Discussion

The purpose of this study was to determine if and how gun control laws affect homicide. Overall, the results of this study are inconclusive. There was little consistency among the results, with both gun-friendly laws and gun control laws correlating with a mix of increases and decreases in homicide data. In addition to these inconsistent results, the correlations between all categories pertaining to gun laws, regardless of friendliness or restrictiveness, and homicide statistics are weak. Perhaps this lack of uniformity gives an idea of why there is little consistency among studies that seek to determine the effectiveness of gun control laws. At this point in time, there is not much agreement regarding the effects that gun control laws have on homicide and on violence and crime overall. While there have been studies that have shown these laws to reduce violence (Diez et al., 2017; Duggan, 2001; Gollub & Gardner, 2019; Koenig & Schindler, 2018;

Miller et al., 2002; Sivaraman, 2019; Wiebe, 2003; Zeoli et al., 2017), others have found the effects to be minimal or nonexistent (Hammill, 2018; Kleck, 2016; Kleck et al., 2016; Kleck & Patterson, 1993; Moorhouse & Wanner, 2006). Several studies have even found such laws to increase rates of violence (Lott & Mustard, 1997; Moody & Marvell, 2008). The results of the present study seem to demonstrate why this is the case. Between the weak relationships, mixed results, and inconsistent effects, it is clear that the effects of gun laws are difficult to determine.

Limitations

Throughout this study, there were several limitations which added to the difficulty of finding the effects that gun laws may have. First, due to the fact that this was a cross-sectional study, correlations between two data series can be determined, while causation cannot. Therefore, it cannot be confirmed that the independent variables (gun law categories) were completely responsible for the effect on the dependent variables (homicide statistics). There may have been outside factors not related to gun control laws which had an effect on homicide. In addition to this, it is unclear if homicide and firearms homicide rates had an effect on gun control laws. For this study, it could not be determined if gun laws and any changes which occurred among them had an effect on homicide, or if these gun laws were implemented or changed in response to homicide statistics.

Further limitations include the fact that years of implementation could not be found for every law. This causes a hindrance because it is unknown if a law is too recent to have made an impact on homicide in the state it was passed in. After such laws are implemented, it may take time for them to have a significant effect. Also, it cannot be determined if any significant changes in homicide were due to a law passed at that time, or if another variable is responsible. If a change in homicide data occurred around the time a law had been passed and taken effect, it is

possible that the law may have some responsibility for this change. However, not knowing details of law implementation in each state makes the amount of influence this law had on such a change unclear.

Recommendations for Future Research

The inconsistencies in previous literature, which were also reflected in the lack of uniformity in this study's results, demonstrate a need for further research on this topic. It is clear that little is known about how effective gun laws are and what the exact effects of these laws are. These laws have an influence on the lives of all people in the U.S. Depending on the effects of these laws, they can be responsible for preventing or increasing the incidence of homicides. If possible, future studies on gun control laws should analyze specific laws rather than overall gun control laws. This could help to determine if different individual laws or different types of laws have an impact on homicide rates. Also, outside factors, such as poverty rates and events that may cause an increase in crime, should be taken into consideration when attempting to determine how gun control laws affect homicide or any type of violence. These variables can help account for the effectiveness of gun laws or lack thereof in certain areas. This can also help to determine why certain gun control laws may be more or less effective in different states.

Future studies should also focus on discovering different and more clearly effective ways of preventing gun violence and homicide. Gun control laws are aimed at protecting individuals from homicide and other gun-related violence. However, this study found no clear association between these laws and homicide rates. In addition, there is little uniformity amongst other studies regarding how effective these laws are. Other solutions must be researched because the purpose of gun control laws is to prevent homicide and other types of violence. If the effects of these laws cannot be determined, or are found to not be as intended, then they may not be

preventing such heinous crimes. In this case, other solutions must be found in order to provide protection. This research can help to guide future policies that will be successful in protecting the people of the U.S.

Conclusions

While it cannot be said with certainty that gun control laws are ineffective or harmful, it can also not be said that they have proven to be effective at reducing homicide. The results of this study are not uniform, and do not demonstrate these laws to be consistently effective. It is important that these laws, or any which are intended to replace them in the future, have the intended effects. These laws affect every person in the U.S. and may be responsible allowing or preventing homicide and other types of violence. Future research is needed to determine the effects of these laws, as well as other ways that homicide and other forms or violence can be prevented.

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