3-2020

AN INTERRUPTED TIME SERIES ANALYSIS EVALUATING THE IMPACT OF HELLER ON VIOLENT GUN CRIME TRENDS IN WASHINGTON D.C. AND DETROIT, MICHIGAN

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AN INTERRUPTED TIME SERIES ANALYSIS EVALUATING THE IMPACT OF HELLER ON VIOLENT GUN CRIME TRENDS IN WASHINGTON D.C. AND DETROIT, MICHIGAN

A Thesis

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Criminal Justice

by

Naveen Raj Madahar

March 2020

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ABSTRACT

This thesis set out to determine whether the Supreme Court's abolishment of Washington D.C.'s Firearms Control Regulations Act handgun ban in 2008 had any impact on the city's violent gun crime rates. Using an interrupted time series design, analysis of FBI Uniform Crime Report monthly data revealed no statistically significant association between the removal of the FCRA's handgun band and decreasing gun violence in Washington D.C. from 1998 to 2015.

ACKNOWLEDGMENTS

I want to acknowledge my Committee Chair, John Reitzel, for the guidance and countless hours devoted to chairing this project as well as the committee readers, Andrea Schoepfer, Douglas Weiss, and the late Stephen Tibbetts for their time and support.

DEDICATION

I dedicate this project to my parents Renu and Pardeep Madahar. If it were not for their unconditional support and encouragement, this paper would not have been possible.

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CHAPTER ONE

INTRODUCTION

Gun Crime

Gun crime is prevalent in the United States. According to the U.S. Department of Justice's Bureau of Justice Statistics, between 1980 and 2008, 59.7% of individuals between the ages of 18-34 and 22% of individuals between the age of 35-49 have been victims of gun homicide across the United States (Cooper and Smith, 2012). The US government and the public are generally well-aware of our long history of gun violence, with an increasing public awareness of how this is not only a problem for law enforcement officials but a public health issue too, with about half of the country perceiving gun violence to be a significant problem (Parker, Horowitz, Igielnik, Oliphant, and Brown, 2017). The public, however, is divided over the most effective way of combating problems associated with gun violence given the regnant culture of gun ownership and gun rights assured by the Second Amendment, which for many Americans is the defining feature of the nation's history and national character, inextricable from the very meaning of freedom itself. According to a survey conducted in September of 2019 by the Pew Research Center, 60% of Americans say gun laws in the U.S. should be more stringent, whereas 28% believe the laws are strict enough, and 11% believe the laws should be less strict (Schaeffer, 2019). Although many citizens can agree on a common goal, which is to reduce gun crime and the significant harm that is its result, there are starkly contrasting

opinions about what is necessary and the most effective way to achieve this end. The gun debate is, therefore, an intricate balance between gun ownership as a right and primary manifestation of freedom and the ability of society to legislatively combat persistent and harmful violence associated with guns.

Two of the most popular ideologies behind reducing gun crime are gun control and gun decontrol. Proponents of gun control argue that reasonable government regulation of firearms is the best way to reduce gun violence. On the other side are gun decontrol proponents, who argue that if individuals have a considerable amount of liberty regarding firearms such that every citizen has the right to own and carry a firearm with minimal regulation, then they can protect themselves, their property, and communities from harm. Underlying gun decontrol proponents' thinking is the idea that others intending to harm will be deterred by the expectation that otherwise, potential targets of gun violence are likely to have the capability of defending themselves and, therefore, possibly bringing harm to the potential offender.

The empirical literature pursuing different lines of gun control and gun violence is plentiful and growing, yet often easy to either misinterpret or be misused for political ends. Moreover, despite this literature, there does not seem to be a clear empirically-supported answer as to which approach or combination of approaches works best, even though the US has experienced a precipitous decline in gun and other violence since the early 1990s. As discussed below, for example, there are a variety of gun control measures that have been heralded by

various political leaders and other public officials over the years, but few, if any, have been demonstrated as having any demonstrable effect in reducing gun violence. Conversely, the literature on guns used as a deterrent is also mixed, and controversial, often eluding agreement among researchers.

Washington D.C. v. Heller 2008

The first case in nearly seventy years to consider firearm rights at the individual level is Washington D.C. v. Heller (2008), which was a challenge to the constitutionality of Washington D. C's handgun ban and to the requirement that firearms permitted under the act be trigger locked and remain unloaded and disassembled when not in use (Carter, 2006). The Heller decision is useful in assessing gun prohibition such that this case reversed Washington D.C.'s 1976 Firearms Control Regulations Act (FCRA), which until 2008, was generally considered one of the most restrictive gun policies in the nation (Collin et al., 1991).

The Heller case was brought by Dick Anthony Heller, a D.C. metropolitan special police officer. Heller filed a complaint to the district court because, under D.C.'s Firearms Control Regulations Act of 1976 (FCRA), his request for a license to own a firearm was denied. Heller was shocked to learn that even though he was a police officer who was authorized to carry a gun for work, he could not own a private handgun under the FCRA. Heller believed that his Second Amendment right to keep and bear arms was being violated. The district court, however, did not entertain his complaint, and therefore, Heller turned to the

U.S. Court of Appeals, which subsequently agreed with his contention. The case was eventually heard by the Supreme Court, which on June 26, 2008, ruled in favor of Heller, striking down the FCRA's registering requirement, as well as overturning the restrictive storage requirements for all firearms, noting that these parts of the FCRA violated the Second Amendment.

Justice Scalia wrote the majority opinion for the court; finding that an individual does not have to be in service to a militia in order to possess the right to own a firearm and use it within the scope of the law, for example, in self-defense while in one's residence (District of Columbia v. Heller, 2008). In the ruling, the court addressed what have come to be known as the prefatory clause, which involves service in a militia, and operative clauses, which is the right to keep and bear firearms, in deciding on whether the Second Amendment applies to individuals or whether it is a collective right tied to service in a militia. The only other time the Supreme Court addressed this point of contention was in United States v. Miller (1939). However, in the Miller case, the Court did not take up the relationship between the prefatory and operative clauses (Klukowski, 2009). Nevertheless, the court found that the framers of the Constitution did not only grant the right to bear arms specifically to an army or "militia," but that the term can be interpreted to encompass all men who are able-bodied to serve in a militia. The operative clause, according to the majority, therefore, is not to be limited by the prefatory clause regarding an individual's right to keep and bear arms, including handguns.

Purpose of this Study

From 1976 to 2008, the FCRA remained in full effect; therefore, this period in D.C.'s history is useful in analyzing changes to a long-established gun policy. As such, this study will focus on changes to violent gun crime trends as a result of the Washington D.C. v. Heller 2008 Supreme Court decision overturning D.C.'s ban on handguns and other restrictive provisions of their 1976 Firearms Control Regulations Act. In other words, the research question driving this study asks whether the Heller decision, which reversed Washington D.C.'s 1976 FCRA had any significant effect on gun-related violent crime trends in Washington, D.C. Additionally, using Detroit, Michigan, as a comparison city, this study aims to determine if a change in policy regarding a handgun ban had any similar or dissimilar effects on a city with comparable rates of violent gun crime and similar population size?

The introduction of this study provided a brief overview of the Washington D.C. v. Heller (2008) case at the center of this study, as well as the laws that precede it. What follows this chapter is a review of relevant empirical literature that includes a review of the history of gun ownership, violent gun crime and gun control and decontrol policies, and public perceptions about gun control and gun violence that frames our understanding of gun crime and policy in the United States. Utilizing twenty years of data on violent gun crimes from Washington D.C., that covers the decade before the 2008 Heller decision and five years after, it will be possible to make an accurate statistical determination about whether a

de facto gun decontrol policy had significant effects on serious gun violence in Washington D.C. and Detroit, Michigan.

CHAPTER TWO

REVIEW OF LITERATURE

Gun Culture in the United States

Before assessing the Handgun Ban set forth by Washington D.C. and delving further into details of the Heller case and how it situates within the gun control/gun crime debate, this study seeks to test a change of policy as a result of the Heller ruling. Therefore, it is necessary to investigate the culture in which the right to bear arms in the United States relates to crime that is associated with licit and illicit gun availability, legislation, and other policies that have been enacted to address the latter. Furthermore, an examination of the history of gun legislation and firearms utilitarianism in the United States is vital information to making sense of the present. Technological advances and inevitable change in cultural dynamics have a profound effect on how US citizens interact with firearms and perceive them in the 20th and 21st centuries. Thus, this next section provides a brief history of firearms and the issues which have arisen because of them in the US.

The Second Amendment and History of Gun Ownership

The United States was founded on several principles that are still valued today. These principles were documented by the framers of the United States Constitution, which delineates the operation of government and the rights of the country's citizenry, one of them, the fundamental right, outlined explicitly in the Second Amendment, for citizens to have the ability to bear arms. This right to

own and carry weapons has been an integral part of being a citizen and, thus, US culture, and the people have maintained this right since this country's inception. Despite this history, there has been considerable debate about the interpretation of the Second Amendment, regarding whether it is directed toward individual citizens or states as a whole.

For roughly one-hundred years since the founding of the United States, the ownership of a firearm was considered a fundamental aspect of being a United States citizen. In a paper by Bellesiles (1996), the author explores the historical origins of gun culture in the United States, analyzing the years 1760 to 1865. He found that gun culture is deeply rooted in American society due to frontiersmen needing guns to establish modern America (Bellesiles, 1996). Further, he points out that due to the necessity of firearms for self-defense and the gathering of food, guns became an integral part of what it means to be an American directly due to the fact that almost all of the early American settlers owned one to fulfill such needs; thus spawning a gun culture (Bellesiles, 1996).

Taking from probate records, Bellesiles (1996) also found that around the beginning of the nineteenth century, gun ownership was highest in the southern region of the United States, especially in urban centers, and primarily owned by whites. The period from 1820 to 1850 signified the beginning of the industrialization of the arms industry. Moving forward, during the post-Civil War reconstruction era of the 1870s, the first melting pot laws were passed, which were effectively geared towards African-Americans (Funk, 1995). Melting pot

laws are laws that remove the cheapest available firearms from the market; many scholars theorize that such laws are, in effect, discriminatory to the poor (Funk, 1995). Even before the establishment of the United States, during the new world era, there were laws passed that prevented African-Americans and low socioeconomic status individuals from owning guns.

Moreover, in 1644, Virginia passed laws specifically barring African-American people from owning firearms (Funk, 1995). In fact, according to Bellesiles (1996), in antebellum America, many states had similar laws in place barring African-Americans from possessing firearms. After the American civil war, many southern legislatures were opposed to African-Americans owning guns due to fear, and so these legislatures enacted laws known as the *Black Codes*. Primarily, the Black Codes were laws that continued to bar the freed black slaves from fundamental rights that had always been available to whites, rights such as that to bear firearms (Funk, 1995). In United States v. Cruikshank (1875), discriminatory laws such as the Black Codes were disputed. However, unfortunately, the Supreme Court sided with the oppressors and continued to deny rights to African-Americans, rights that were available to whites (Funk, 1995). African Americans were not the only population discriminated against via government legislation; in 1911, the Sullivan law was drafted and enacted to bare Italian immigrants from owning firearms (Funk, 1995).

Upon the beginning of the 20th century, subsequent to the first world war, firearms came to be viewed as a potential cause of violence, and a means to

maintain general disobedience towards the law (Miller, 2009). The United States government first recognized firearms as a means to disobey the law during the era of prohibition. The main reason was that organized crime syndicates began to utilize firearms in order to facilitate the black market for alcohol and to fight off any resistance met by the federal government (Miller, 2009). Due to the abuse of firearms by organized crime groups, the federal government intervened by enacting restrictive legislation regarding firearms in order to combat the general disobedience concerning the law exhibited by the public. Laws such as the National Firearms Act of 1934 and the Federal Firearms Act of 1938 were implemented in the hopes of gaining back some control over the public (Miller, 2009). The National Firearms Act of 1934 was an attempt at regulating the ownership of automatic machine guns and went as far as to impose a 200-dollar tax on all gun sales.

Furthermore, the National Firearms Act of 1934 mandated that all individuals who purchase a gun of any kind, have it registered with the authorities (Miller, 2009). The Federal Firearms Act of 1938 mandated that all firearm sellers obtain a federal license to sell firearms in the United States legally (Miller, 2009). Three decades later, and after the assassination of Robert F. Kennedy, the US responded with the Gun Control Act of 1968. This piece of legislation is significant because it required tighter record-keeping on firearms, prohibited the sale of firearms to persons with mental illness, as well as individuals charged with a felony and who use illegal drugs, and it outlawed the sale of firearms

between states and the sale of rifles by mail (Miller, 2009). Another significant piece of gun regulation legislation is the Brady Handgun Violence Prevention Act of 1994. The Brady Act mandated a five-day waiting period and required a background check before a licensed firearms seller could sell a gun (Miller, 2009). However, it is essential to note that as of 1998, the mandates for handguns are no longer in effect; all other firearms are still covered under the Brady Violence Prevention Act.

Relevant Supreme Court Cases

The first time that the Supreme Court dealt with a case concerning firearms was in United States v. Cruikshank (1875). This case carried much racial tension, as it had to do with the Ku Klux Klan attempting to bar African Americans from owning firearms. Unfortunately, the Supreme Court ruled in favor of the Klan, based on an interpretation of the Constitution's clause about the right to bear arms. The court claimed that nowhere in the constitution did it say that individual citizens have the right to own a gun, and therefore, it is not unconstitutional to bar some citizens from owning one.

In 1984, the Supreme Court dealt with another firearm-related issue. The case was Miller v. Texas (1984), in which the court ruled that the federal government did not have the authority to restrict individual gun rights; however, the states had the power to do so. In 1939, the Supreme Court heard the case of Miller v. the United States, a case that dealt with the interpretation of the second amendment according to the language of the Constitution. The Court determined

whether the federal government has the authority to rule on firearms, which are not needed to facilitate a well-regulated militia. Essentially this ruling dictated that sawed-off shotguns are not necessary for a well-regulated militia according to the federal government.

Gun Crime Trends

Gun violence has become a pressing issue in the United States of America. Data from The National Center for Health Statistics and the Centers for Disease Control and Prevention (CDC) show firearms becoming more involved in homicides in recent years (Pifer and Minino, 2018). According to a CNN news report, firearms have been shown to facilitate over two-thirds of homicides since 2014 (Scutti, 2018). Wintemute (2014) concurred with Scutti's assertion, finding that in 2012 alone, firearms were utilized in 69.9 percent of every homicide for that year.

Considering the number of legislative actions related to firearms taken up by the United States government and state and local governments throughout the 20th century, there have been two pivotal periods regarding crime trends. The first, from 1965 to 1980, during which researchers saw a sharp increase in homicide rates and suicide rates, and the second period of interest is from 1993 to the present, during which researchers have noticed a sharp decline in overall crime trends (Cook and Ludwig, 2000). Incidentally, there has not been a definitive accepted explanation for the sudden decrease in crime rates since

1993, despite many different explanations offered (Rosenfeld, 1997). The Bureau of Justice Statistics (BJS) has also documented a steady decline in firearm-related homicides from 1993 to 2011, resulting in a 39 percent decrease.

Furthermore, BJS researchers also found that non-fatal firearm crimes decreased by 69 percent over the same period. The year 1993 is significant in this context because gun-related homicides were at an all-time high for which we have data (Cook and Ludwig, 2000). Additionally, between 1985 and 1993, African American and Hispanic populations were observed as being over-represented in gun violence (Cook and Ludwig, 2000). In an article by Pahn, Knopov, and Siegel (2017) in *The Conversation*, the authors affirm Cook and Ludwig's assertions, finding that African Americans, in particular, are eight times more likely to be killed by a firearm-related incident than white Americans. Also, in 1997, Messner and Rosenfeld concluded that as of 1991, homicide is the leading cause of death among African American adults. Messner and Rosenfeld (1997) compared the ratios of homicide among African Americans and whites in the early 1990s and noted that the lifetime probability of a black male being a victim of a homicide is 1 in 26, whereas for whites, it is 1 in 170. Therefore, there is a significant discrepancy between the chances of a black male adult dying compared to a white male adult.

Recent statistics from the Centers for Disease and Control and Prevention (CDC) in 2015 show that homicide was the leading cause of death among black males aged 15-34. For the same year, the CDC also found that white males aged

15-19 and 20-24 are most likely to die from unintentional injuries, with homicide being the third leading cause of death for white males aged 15-19 and 20-24. Overall 38,658 individuals died due to a firearm-related injury in 2016. For that year, the age-adjusted death rate for white males was 55.7% lower than for black males, and the rate for white females was 20.8% lower than for black females (Xu et al. 2017). Also, particular states are impacted more than others concerning gun homicide rates. For instance, Texas and California exhibited more firearms deaths per capita than any other state for the years 2014 through 2016 (Xu et al. 2017).

There is considerable speculation as to why young black males have been disproportionately involved in homicides by firearm. Perhaps the most cogent explanation is one grounded in routine activities theory, as put forth by Sampson (1997). That is, the combination of time, space, suitable targets, and the lack of guardians facilitates an environment where crime can flourish (Sampson, 1997). Furthermore, African Americans are segregated into improvised communities where crime is more rampant, resulting in more African American individuals becoming involved in the crime by which they are surrounded.

A Brief History of Firearm-Related Homicide

Another relevant trend is that firearm-related homicides had been varying considerably between the years 1950 and 1995, such that some years demonstrated high rates of firearm-related homicides while other years demonstrated relatively lower rates, with homicide peaking in 1980 (Cook and

Ludwig, 2000). Since the 1980s after the peak years for violence associated with crack turf wars, the country evolved technologically and culturally, yet despite serious violent and property crime rates having declined between 50 and 69% nationally between the years 1993 and 2017 (Gramlich, 2019), gun violence and gun-control remain hot-button political issues with guns accounting for a noteworthy portion of serious crime. For instance, in the year 2000, firearms had some involvement in 66 percent of homicides, 26 percent of robberies, 6 percent of aggravated assaults, and 8 percent of all violent part 1 index crimes in general (Kovandzic & Marvell, 2003). Furthermore, criminological and public health research has shed light on other gun-related trends. For example, between 1950 and 1990, suicide rates increased by 60 percent (Cook and Ludwig, 2000). Data collected by the CDC for the years 1950 to 1993 also demonstrated that the United States had the highest rates of childhood suicide and firearm-related deaths than any other developed country, according to a cohesive report by the Division of Violence Prevention, National Center for Injury Prevention and Control, and the CDC. According to this same report, overall firearm-related suicides from 1950-1993 was 77 percent higher than all other countries combined (Singh, 1994).

Gun Crime in the 2000s and the Emergence of Mass Shootings

A more recent phenomenon elevating the moral panic over gun violence is the increase in mass shootings in the United States[1]. The moral panic seems due to the public's perception that their occurrence is making a significant contribution to gun violence in the United States. It is also likely due to the harm to society that comes from senseless and frightening deaths and the manner in which these events are occurring. In a bit of a twist to the gun crime/gun control debate, the United States has experienced a rise in mass shootings. According to data compiled by Mother Jones magazine, since 1982, there have been 118 mass shooting incidents where four or more casualties occurred, not including the perpetrator, with 19.49% of them occurring in 2018 and 2019 (Follman, Aronsen, and Pan, 2019). As stated in an article by the online news site, VOX, the Mayors Against Illegal Guns examined FBI crime data and found that fewer than 1 percent of individuals killed by homicide in 2010, were associated with a mass shooting incident where there were four or more victims (Matthews, 2018). News media coverage on mass shootings, however, might be facilitating a false impression that they are a bigger problem than they are. Though this might be driven by a variety of factors, including that several of the more recent mass shootings have been the deadliest in modern history, and because such incidents are amplified by not only traditional media but by social media as well.

[1] There is an ongoing disagreement over the definition of a mass shooting, differing between the FBI's definition, which does not include the perpetrator in the minimum of four fatalities needed to be considered mass murder, which other organizations include the perpetrator in the four deaths.

This assertion is not to undermine the social harm mass shootings cause among the general public. However, despite statistics showing that in addition to the immense emotional distress, the US is experiencing 31 percent of all the world's mass shootings with only 5 percent of the world's population (Christensen, 2017). Mass shootings are relatively infrequent when compared to everyday gun violence trends and comprise only a small percentage of overall deaths from guns.

There is a growing body of peer-reviewed criminological studies on mass shootings that have focused on several elements of the phenomenon, such as gun availability, mental health, and race. For example, Fox and DeLateur (2014) examined several misconceptions about mass shootings and how to prevent them. A few of the main misconceptions they focused on were: 1) mass shooters kill on a whim without much premeditation due to a mental illness, 2) more stringent background checks will aid in limiting those who are mentally unstable from acquiring a firearm, and 3) right to carry legislation will deter mass shooters from acting. Their research found that the majority of mass shooters have a calculated plan before going on their rampage, and that very few of these individuals set out to kill random individuals. More often than not, mass shootings are highly thought out and premeditated, and most commonly occur out of revenge, power, loyalty, terror, or profit (Fox and DeLateur, 2014).

Stricter or more prevalent background checks are unlikely to significantly prevent mass shootings, either due to the majority of mass shooters not having a

criminal history or a history of mental health issues. Research on ninety-three mass shootings by the Mayors Against Illegal Guns in 2013 concluded that none of the perpetrators had ever been arrested or hospitalized for a mental health disorder; only in 10 cases was the perpetrator in contact with a mental health professional or authority figure (Fox and DeLateur, 2014).

Fox and DeLateur (2014) examined the argument that gun-free zones are more vulnerable than areas of the country where right-to-carry legislation is in effect. They presented a study by Duwe, Kovandzic, and Moody (2002), which analyzed the efficacy of the right to carry legislation on mass murders between the years 1977 and 1999. Their results, based on a negative binomial statistical model, found that right-to-carry legislation has an insignificant impact on the rate of mass shooting incidents. The take-home points from the research presented above are that mass shootings are not as ubiquitous as many news outlets purport and that there is not a simple solution via gun reform to aid in reducing their occurrence significantly and reliably.

Also, although the characteristics and circumstances of a mass shooting point to a phenomenon that is different in some critical ways from the more typical gun violence and homicides associated with street crime, their rising numbers and the shocking nature of several recent incidents in Las Vegas, Nevada; Orlando, Florida and San Bernardino, California has arguably created a moral panic that is ratcheting up urgency in the debate. Nevertheless, relative to most other developed nations, the United States remains an outlier where mass

shootings are concerned. An outlier where such status seems to speak to the central issues in the gun crime/gun control debate, and of which, there are many opinions on how to combat gun violence properly. They are exemplified by the many legislative changes that have given rise to a plethora of interventions that can and have been tested. In this study, I propose to test only one.

The Great American Crime Decline

The United States has demonstrated an unprecedented and unexplained decline in crime rates since 1991 (Barker, 2010). Crime rates peaked nationally during the early 1990s and have since been on a steady decline ever since with the exception of 2004-2006, and 2016 when the U.S exhibited a slight increase in violent crime (Gramlich, 2019). This observation is backed by research efforts set forth by the FBI, such that the FBI assessed around 18,000 jurisdictions for crimes reported to a plethora of police agencies, primarily crimes that are categorized as severe offenses as per the FBI definition.

Furthermore, the Bureau of Justice Statistics has also played a significant role in documenting crime rates by gathering annual National Crime Victimization Surveys. Each year the BJS gathers self-report data on around 90,000 households in the United States, asking individuals directly if they have been a victim of a crime for that year. Given these two reliable sources of data regarding crime rates in the United States on a national level, reports have exhibited a decline in crime rates since 1993 (Gramlich, 2019). Specifically, a 49% decrease in violent crime from the years 1993 and 2017 according to the numbers

calculated by the annual reports conducted by the FBI for that period. According to the self-report measures taken by the Bureau of Justice Statistics, the crime rate declined by 74% relative to the peak in 1993, for the same period of 1993-2017. The NCVS survey also supports this decline.

Despite the perception of the public not aligning with the data reported by the FBI or BJS; such that the public perceives crime to be at about the same if not a higher rate than the early 1990s, crime is objectively at a lower rate in 2017 than any year prior, dating back to 1993 (Gramlich, 2019). Many researchers have attempted to explain this phenomenon, of them, the most notable names are Alfred Blumstein, Joel Wallman, Arthur Goldberger, Richard Rosenfeld, Jeremy Travis, and Frank Zimring. Each of these individuals has examined a plethora of potential causal factors as to why crime went down so steadily beginning in the early 1990s.

In his 2006 book *The Great American Crime Decline,* Zimring outlined criminal justice efficacy, demographics, and economic factors as being the most likely reasons as to explain the crime drop (Barker, 2010, p. 491). Criminal justice efficacy refers to the implementation of various policing tactics and higher incarceration rates. Demographics in this context is denoting the declining prevalence of younger people in society, such that younger people more frequently commit crimes. Finally, economic factors that Zimring identifies predominantly as job availability, which was higher in the mid-1990s, might also have played a role in the crime decline. Travis and Waul (2002) claim that

advances in law enforcement tactics and crime data technology have contributed to the crime decline since the mid-1990s. Blumstein and Rosenfeld (2008) author a book on the subject and explain one of the potential causes of the crime decline is the average age of U.S. citizens increasing, leading to less young people who are the demographic which commits the most crime. Blumstein and Wallman (2005) attribute the crime decline to the decrease of crack cocaine usage relative to the 1980s.

One significant gap that Barker (2010) identifies in her review of studies on the great American crime drop is that social dynamics and social changes are rarely considered when analyzing this decline in overall crime (p. 492). Barker notes that revisiting the conundrum that is the great American crime drop, might best be done by urban sociological researchers, primarily, reverting to the roots of criminal justice in order to gain an understanding of this phenomenon. The few key factors that have been brought to light by urban sociology regarding the crime drop are minority youth rejecting crack cocaine in the mid-1990s, rebuilding urban structures, and the introduction of immigrants with collectivist cultures into neighborhoods which were once individualistic (Barker, 2010).

Considering the many theories as to why crime has declined over the last 25 years is relevant to the gun crime debate as well as this study because it highlights the difficulty of pinpointing specific reasons as to why crime rates fluctuate. Therefore, making claims about gun legislation and how it impacts

crime based on a single research question can be exceptionally challenging, considering that crime and delinquency are complex issues.

Effects of Gun Control Policies

It has been nearly eleven years since the Heller decision; therefore, there are ten years worth of crime data post-Heller that can be examined to determine if there was any effect of the Supreme Court's decision on gun-related crime in D.C. and another commensurate city compared to gun-related and other violent crime in the decade before. Analyzing monthly crime data should provide some insight as to whether the FCRA might have been effective in reducing gun violence by testing what happened after crucial provisions in the FCRA were found to be unconstitutional. The two significant provisions contained by the act are discussed below.

First, the FCRA barred D.C. residents from legally owning a handgun unless they met the requirements to attain a one-year permit from the D.C. Metropolitan Police Department (D.C. Metro) Chief of Police. Second, all other legal firearms (separate from a permitted handgun) had strict control requirements that had to be met for a resident to own a firearm other than a handgun for personal use. For example, there were requirements for storage, firearm operation, and restrictions on place of operation. By examining data from the D.C. Metro Police to study the ban, as well as the gun control requirements of the FCRA, two separate explanations from an effort to limit gun crime can be

tested. One, because the handgun ban is a form of prohibition, an analysis of the effectiveness of preventing people from easily obtaining handguns in a society that has long had an influential culture of gun ownership is discernable. Two, whether the ruling that made handguns constitutional and thus legal to own nationwide had any subsequent effects on violent crime and gun crime in D.C. and the select commensurate city.

According to Pahn et al. (2017), the United States is responsible for 82 percent of all firearm homicides in the world. Research by Grinshteyn and Hemenway (2016) found similar results, determining that the US exhibits homicide at a rate of 7 times that of comparable high-income countries. They note that in the U.S., firearm-related homicide is particularly devastating for individuals aged 15- 24 years, such that this population dies by firearm at a rate of 49 times that of other comparable developed nations analyzed in their study. The frequency of homicides in the United States is still exceptionally higher than in other countries such as England, even without considering guns in the comparison equation. That is, the United States has more non-gun related homicides per capita than almost every other developed nation. This fact takes away the focus on gun availability being the primary reason for the United States experiencing more gun-related homicides than other countries by a rate of 25.2 times and shifts the attention to other variables that might be unique to the United States when it comes to violent crime (Grinshteyn and Hemenway (2016).

Therefore, though guns may be contributing to the relatively excessive rates of violent crime in the US, if they were not anywhere in the picture, the United States would still be the leader in violent crime among other developed nations. Messner & Rosenfeld (1997) postulate that the availability of guns alone might not be a sufficient reason for high gun violence rates in the United States. They discuss institutional-anomie theory, which emphasizes the importance of culture when it comes to a society's level of criminal activity. Based on this theory, they claim a society that emphasizes economic dominance, such as the United States, will exhibit unusually high rates of serious crime (Messner and Rosenfeld, 1997 p. 1410). They elaborate on this point by providing insight into the role of culture in shaping crime. They discuss how social status plays a role in how people are perceived and treated throughout different cultures prevalent in other developed nations. The degree to which a culture emphasizes the significance of perceived social status, such as age or profession, has an impact on how the members of society conduct themselves considering the laws which they are subjected to. Messner and Rosenfeld (1997) suggest that cultural differences might be able to explain the difference in serious violent crime trends between the United States and comparable developed countries with different cultural norms.

Consideration of different crime control policies is critical when it comes to assessing the impact the Heller decision had on crime rates in D.C. During the 1990s, policymakers were continuing their efforts to combat crime through

legislative measures. There is a large body of research that has sought to determine the effectiveness of various legislative efforts to control guns and reduce gun-related violent crime. Such research is relevant to this study as it aims to assess the impact or lack thereof; firearm legislation has on gun crime. Past gun control policies such as that One Gun a Month sanction (Rosengart, Cummings, Nathens, Heagerty, Maier, Rivara, 2005), Gun Buy-Backs (Sherman, 2001), and Operation Ceasefire (Rosenfeld, Fornango, and Baumer, 2005) has concluded little to no effect on gun-related crime. Limiting firearm purchases to once a month does not reduce gun violence significantly because traffickers who sell firearms in bulk are exceptionally uncommon and do not significantly facilitate the accessibility of guns to criminals (Kleck, 2011).

Research on Gun Buybacks determines this legislation not have a deterrent effect on crime as there were several instances where most of the guns being repurchased were unusable or destroyed (Mullin, 2000). Operation Ceasefire focused on directing police officers to crack down on criminals trafficking firearms to juveniles, and gang violence. Therefore, operation Ceasefire was only significantly effective in reducing general crime, not specifically gun crime, as it was initially intended. Moreover, law enforcement tactics, such as random searches, primarily occurred in impoverished communities, which led to friction between community members and the police (Braga et al. 2001). The cause of friction was because the individuals who were meant to be aided by this provision were also subject to random police stops and

frisks, which led to disputes about civil rights (Barker, 2010). Therefore, even though some factors might have reduced crime in the short term, such as higher incarceration rates and confiscating firearms, in the long term, these provisions generated breeding grounds for more crime.

A 2005 study by Rosenfeld, Fornango, and Baumer, assessed the effectiveness of three major policing interventions which sought to reduce firearms violence. Two of the interventions they studied were New York's COMPSTAT and Richmond Virginia's Project Exile. Before discussing these efforts to reduce crime individually, it is essential to note that it is arduous to determine which of these attempts had the most significant impact on crime reduction because they were mostly all tried in tandem. New York's COMPSTAT, was a computer mapping system capable of identifying crime hotspots. It was utilized by law enforcement to increased patrol in high crime areas. Rosenfeld et al. (2005) found COMPSTAT to reduce general crime, not necessarily gun crime, and also determined targeted police presence does not always reduce crime.

Eck and Maguire (2006) concluded that there is no significant evidence available to claim targeted policing reduces crime. They studied cities where there was no increase in police presence and found that these cities still exhibited a reduction in crime rates, no different than those cities where police presence was increased. One example of this had occurred in Seattle when the city experienced an 18% reduction in crime when police presence was also reduced by 6% (Eck and Maguire, 2006, 209). Taking a look at firearm specific

legislation such as Project Exile further demonstrates the difficulty of isolating the effects of firearm specific legislation. Project Exile was a federal program executed in Richmond, Virginia, which mandated sentence enhancements for specific crimes involving firearms., Rosenfeld et al. (2005) determined it did reduce the homicide rate in the areas where it was implemented, however, this reduction in homicide rates was small and not because of gun control, but because of the penalties the program imposed for firearm misuse. This type of policy implication demonstrates how sanctions for firearms misuse were enough of a deterrent to reduce homicide, but it does not explain much about trends of gun crime. Such that many other factors like police size and incarceration rates could have effected gun crime rates (Rosenfeld et al., 2005).

Furthermore, research by Blumstein (1997) and his colleagues found that higher incarceration rates lead to more ex-convicts who have a hard time reintegrating into society and therefore resort to crime. Thus the reasoning behind Project Exile, based on the idea that increasing the prison population will negatively correlate with lower crime rates, is spurious. Higher incarceration rates do not always correlate with lower crime rates.

Lambert and Silva (1997) came to a similar conclusion regarding legislation that penalizes the misuse of firearms according to the laws in place. They found that when governments set forth legislation that effectively compromises the accessibility its citizens have to their firearms, the result is a reduction in suicide (Lambert & Silva, 1997). When presenting their research,

Lambert and Silva point out that despite the immediate inaccessibility to their firearms, individuals did not seek out alternate methods of suicide, a claim many opponents of gun control measures used in an effort to give weight to the argument that firearms are not a contributing factor to high suicide rates (Lambert and Silva, 1997). On a similar subject of the effects of penalizing legislation, Makarios and Pratt (2008) conducted a study of the effectiveness of policies and programs that attempt to reduce firearm violence and found that enhanced prison terms do not have a strong deterrent effect on gun violence. According to their study, policies that base their foundation with fear tactics are not scientifically backed by research concerning their efficacy (Makarios & Pratt, 2008).

Prohibition

At the other end of the gun control debate are arguments for the prohibition and stringent regulations of firearms, such as what the FCRA required in Washington D.C. This idea can be useful in making sense of the effects of firearms in society. That is, gun prohibition, when it is intended to reduce crime, might not always do so and may facilitate the increase of that which officials are trying to control, and it may have many unintended consequences where the demand for that which is prohibited leads to increased value and effort on the part of others to satisfy it.

Consider one of the most critical widespread stints of prohibition in the United States, the prohibition of alcohol from 1920-1933. In a paper by Blocker in 2006, he found that the reason alcohol prohibition failed in the US was due to a

disregard for the law and the continuation of widespread alcohol consumption by the people. Subsequently, alcohol prohibition facilitated an underground market run by emerging organized crime syndicates. Prohibition thus primarily generated more crime than it ended (Blocker, 2006). So, given this demonstration of counterintuitive effects, on the surface, it would seem that the removal of a restrictive law might lower gun crime rates. Depending on what the data will yield, new knowledge about the full effects of prohibition should be obtainable by focusing on how D.C.'s violence rates might have been affected by the FCRA after over four decades of the prohibition on handguns.

Bagley (1988) discussed the effects of drug prohibition and supply and demand. He found that in order for the war on drugs to work effectively, the economy of the drug market, such as the potential to earn a substantial profit, must also be impinged for there to be a significant effect on the illegal drug trade. For instance, if gun prohibition set forth by the government, makes it difficult for citizens to obtain a firearm legally, individuals may resort to a black market for their guns, thus creating a demand. Citizens resorting to the black market compromises the effectiveness of the prohibition regarding reducing gun crime. Therefore, analyzing instances where gun prohibition is the bureaucratic approach to gun crime reduction, might provide valuable information when investigating how the firearms control regulations act affected D.C.'s gun crime rates. Studies on prohibition in general, not only on firearms, can be useful for

determining how well society responds to the removal of a stimulus from a psychological perspective.

In focusing on prohibition at the international level, Kates and Mauser, for example, examined the effects of outright firearms prohibition on murder and suicide rates (Kates & Mauser, 2006). They found other variables to be more significant in regards to influencing murder and suicide rates than firearm bans. Necessarily, the researchers conclude that social, economic, and cultural variables are more valid predictors of murder and suicide rates when compared to the actual apparatus; in this case, a firearm.

Similar to Kates and Mauser, such that the instrument is not the critical issue regarding violent crime, Stolzenberg and D'Alessio's (2000) research on gun availability and violent crime also shows that firearm availability as a standalone variable is not enough to predict gun crime. They found that the distribution of firearms in society is a more accurate predictor of gun violence than is availability). Stolzenberg and D'Alesslo (2000) further concluded that the concentration of firearms in high-risk areas at high-risk times by individuals who have illegally obtained their firearms is a more significant predictor of violent crime than only the gun prevalence in society. Mainly, they found that it is the individual operating the firearm that is more significant than the availability of guns. Moreover, they found that firearms that are legally owned do not affect gun crime in any direction. That is, citizens who own firearms in accordance with the law are not significantly contributing to a gun crime problem in the United States

(Stolzenberg & D'Alessio, 2000). Although they did not find significant support for gun prevalence, increasing violent crime rates in the area where legal guns are ubiquitous, they did, however, find support for the prevalence of illegal firearms as a significant predictor of violent crime. The researchers also found that stolen guns facilitate crime committed by juveniles.

In a similar vein, Kwon et al. (1997) had, prior to both Kates and Mauser and D'Alessio & Stoltzenberg, assessed the effectiveness of gun control laws. They concluded that variables such as socioeconomic factors, alcohol consumption, and a society's racial mix, all have more influence on gun-related deaths than gun control laws. Their conclusion suggests that if the United States focused more on improving the poor socioeconomic statuses of its citizens and less on implementing more gun control legislation, then there is a more significant potential for gun violence and gun-related deaths to decline.

Effects of Liberalized Gun Laws

It is also necessary to consider the instances where governments have demonstrated more lenient attitudes toward firearms by deregulating their control. For example, as of 2017, there are ten states which have moved toward exceptionally lenient gun legislation (Brown, 2019). However, the data on the gun death rates for these states are mixed, such that among these states: Vermont, Kentucky, Louisiana, Alaska, Wyoming, Idaho, Arizona, Missouri, Kansas, and Mississippi, some on the list have a considerably low gun death rate. For example, Vermont has the 36th lowest gun death rate in the US at 11 deaths per

100,000, and Kansas has the 23rd highest gun death rate in the country at 13.3 deaths per 100,000. By analyzing areas of the country with relaxed gun legislation, the crime rates in these areas provide a point of view, which contrasts with the desired outcome of the FCRA. Therefore, studying an alternate method to firearms harm reduction such as liberal gun legislation has the potential to unveil limitations with the approach of strict gun control or prohibition, especially if the studies on areas with lax gun laws demonstrate crime rates to be just as low or lower than areas with strict gun laws.

A prime example of permissive gun legislation is when a state or country allows its residents to carry a concealed weapon. Kovandzic and Marvell conducted a study in 2001 which analyzed Florida's 1987 right to carry a concealed handgun law. Essentially, the law allowed for Florida residents to apply for a permit, which, if granted, would permit them to carry a concealed firearm. Utilizing homicide victimization data from the CDC, they concluded that Florida's right to carry laws do not reduce homicide rates. They found evidence which demonstrates Florida's right to carry law increases robbery rates as well as auto theft. Kovandzic and Marvell (2001) also provide several reasons for Florida's right to carry laws being ineffective, offering that many residents already carried firearms illegally before the law even went into effect. Therefore, when the right to carry laws went into effect, instead of attracting new residents to obtain a concealed carry permit, the law merely legitimized those who were already carrying illegally and rendered no real effect on the rate of crime because

most of these people did not commit a violent crime in the first place. Furthermore, when criminals obtain a legal permit, the effects on overall violent crime rates are insignificant (Kovandzic & Marvell, 2001). The second reason is that the majority of Florida's residents demonstrated a lack of interest in the right to carry in the first place.

The Legality of Guns in Relation to Crime Rates

The research on the legality of gun ownership relative to gun-related crime is limited. There is a lack of information regarding the ratio of crime committed by a law-abiding citizen with a legally registered firearm vs. an illegally obtained gun by an individual who failed to abide by the sanctions in place in order to purchase a firearm in their specific state.

For instance, individual states such as California require a universal background check before one purchases a gun from an authorized dealer. However, if an individual chooses to purchase a gun from the black market, they are in possession of an illegal firearm and are breaking the law. One of the questions researchers strive to answer is, which gun is more prevalent in violent crime, the legally purchased gun, or the illegally purchased one? The reason data on whether legally or illegally purchased guns are involved in more gun crime is limited in the United States is due to a provision known as the Dickey Amendment. This amendment is outlined in 1996 by the United States Congress to prohibit federal taxpayer money from facilitating research on gun crime in the U.S. (Clark, 2018).

However, researchers at Johns Hopkins University gathered through surveying individuals incarcerated in federal and state-level penitentiaries in 2004. Included in the survey were questions pertaining to the legality and origin of the firearm the inmate utilized to commit their crime. According to an article drafted by Dan Clark for the media news outlet PolitiFact, this was the last time the United States government expended the effort on researching gun use by inmates (Clark, 2018). The Johns Hopkins team effort led to a few conclusions. First, about 40% of the inmates from the states with the least restrictive gun laws, defined as states with laws no more stringent than what is imposed federally in regard to firearm regulations, purchased an illegal firearm which they utilized in their crime (Vittes et al., 2012).

Furthermore, Vittes et al. (2012) noted only about 13% of the inmates surveyed utilized a legally obtained firearm for their crime (p. 29). In states where gun laws are less stringent, about 37 states, Vittes and his team found that about 55.6% of the offenders they surveyed, illegally obtained a gun and used it for their crime (Vittes et al., 2012). Therefore, according to the minimal research available on the involvement of illegal vs. legal gun use in violent criminal activity, it appears illegal guns obtained by delinquent individuals contribute to the majority of gun-related violent crime.

Guns as Crime Deterrents

Wright and Rossi (1994) surveyed nearly 2,000 incarcerated felons and concluded that criminals are more worried about running into armed victims than law enforcement. According to the Wright-Rossi survey, 34% of the felons responding from state prisons said that they had been “scared off, shot at, wounded or captured” by a victim armed with a firearm (p.13). The same percentage said they worried about being fired upon by armed victims, while 50% said they were more concerned with encountering an armed victim than encountering law enforcement officers (Wright and Rossi, 1994).

A study by Kleck, Kovandzic, and Gertz (1998) assessed whether individuals who use firearms for self-defense hold the notion that criminals should be punished harshly, more so than individuals who do not use firearms for self-defense. Their findings are such that individuals who use firearms for self-defense do hold slightly more punitive attitudes towards criminals, but that this effect is not related to the use of guns for self-defense; it is related to gun ownership in general. Therefore, merely using a firearm for self-defense is not a valid explanation for believing that criminals should be punished more severely. The evidence is such that, simply because one defends themselves with a firearm does not mean that these individuals have a stronger than usual desire for criminals to be prosecuted (Kleck et al.,1998).

According to Lott and Mustard's research in 1997, shall-issue laws allowing for concealed handgun carrying are more effective with respect to

reducing crime than increasing police presence, making more arrests, other personal security apparatuses, and social intervention programs. Lott and Mustard (1997) use cross-sectional county-level data on citizens allowed to carry concealed firearms in counties which permitted individuals to concealed carry between the years 1977 and 1992. Their goal was to determine if allowing citizens to carry a concealed weapon deters violent crime. They utilized an interrupted time series analysis model in order to study the effects of allowing individuals to carry a concealed handgun. By using this model, they were able to compare data on violent crime before and after the law went into effect. They found that allowing law-abiding citizens without mental illness to carry a concealed handgun worked to deter violent crime.

In 1998, Jens Ludwig was inspired to study shall-issue legislation because of the study carried out by John Lott and David Mustard in 1997. Similar to Kovandzic and Marvell (2001), Ludwig's findings revealed that shall-issue laws in multiple states, including but not limited to, Florida, Oregon, Mississippi, and Montana, do not reduce homicide rates. Ludwig (1998) incorporated controls for age and state factors not considered in Lott and Mustard's (1997) study. He claimed that with the controls mentioned above accounted for, shall-issue laws, increase adult homicide rates. Ludwig counters these findings by arguing that Lott and Mustard neglected certain variables while executing their analysis, such as failing to control for gang activity, average socioeconomic status of the areas they reviewed, and drug prevalence (Ludwig, 1998).

Public Perception of Gun Control and Crime

The US seems to have become quite polarized regarding the role of guns in crime or about their benefits to individuals and society with respect to self-defense, and over the meaning and expanse of the Second Amendment. While perceptions of gun policy or gun-related crime are not the primary focus of this proposed study, the findings from it can inform perceptions by shedding light on the effects of hand-gun liberalization on crime rates. Toward this end, it is valuable to explore the contours of the American public's perceptions briefly.

PEW Research Center surveyed attitudes about guns and gun control. According to the survey, Americans, regardless of whether or not they intend to, are exposed to firearms and the culture that comes with them merely due to the prevalence of firearms in the US (Parker, Horowitz, Igielnok, Oliphant, and Brown, 2017). Nowadays, 3 out of 10 US citizens own a firearm. Forty-four percent of American adults say that they know of someone involved in their life to have been shot. Twenty-three percent of Americans have felt threatened by a firearm at some point in their life. About 50 percent of the US population views firearms to be a problem plaguing the country (Parker et al. 2017).

According to the survey mentioned above, more than half of the country is in agreement about prohibiting those with mental illness from owning a firearm, as well as those on federal watch lists. Out of the individuals that own a gun, most feel that owning a firearm gives them a sense of personal freedom. The demographics behind firearm ownership in the US is broken down as such: 48

percent of white males claim to own a firearm, 24 percent of women and 24 percent of nonwhite men own a gun, 46 percent of gun owners live in rural areas, and the primary reason reported for owning a firearm is personal protection (Parker et al. 2017). When it comes to gun violence, and the perception of it, 59 percent of non-gun owners view gun violence to be a significant problem, whereas only about 33 percent of individuals who own a gun view gun violence as a severe problem. As far a political ideology, Democrats perceive gun violence to be a bigger problem than Republicans. The country overwhelmingly believes (86 percent) that individuals who carry illegal guns significantly contribute to the gun violence problem. When it comes to combating gun violence, non-gun owners are more in favor of tighter regulation on firearms sales than gun owners, precisely 56 percent, as opposed to 29 percent. More than half of gun owners (54 percent) feel that owning a gun deters crime. The results of the PEW report provide a comprehensive breakdown of the country's perception regarding gun crime and how much owning a firearm contributes to gun crime.

In an effort to alleviate gun crime, federal, state, and local governments have implemented what is now a substantial body of gun legislation since the country's beginning. Unfortunately, politics can get in the way of unveiling the truth about gun violence prevalence in society due to personal and special interest agendas. There have been numerous scientific research efforts to determine the best course of action concerning guns in America and toward uncovering the causal effects, correlative factors, and harm from gun-related

crime and violence. However, sometimes, opinion and personal notions seem to carry just as much weight as rigorous scientific studies. Additionally, personal bias tends to find its way into certain publications, which can skew the accuracy of the results.

CHAPTER THREE

DATA AND METHODS

The purpose of this proposed study is to obtain scientifically valid insight into the removal of a formerly restrictive gun control law as a result of the Supreme Court ruling. Specifically, the goal is to assess the impact of the Heller decision on gun crime in Washington D.C. and to use Detroit Michigan as a comparison state, as well as to evaluate the effect of the handgun legislation which the Heller decision eventually overturned. This section discusses the data and statistical methods for the creation and analysis of the statistical models, but first, these are the research questions driving this study:

1. Does an intervention marking the Heller Supreme Court reversal of Washington D.C.'s handgun ban affect violent gun crime trends in the city?
2. Using Detroit, Michigan as a comparison city, how does a change in policy regarding a handgun ban affects a city with a commensurate history of violent gun crime and population size, relative to the city in which the legislation was nullified?

The above questions address one of the central issues regarding gun control, whether looser control (otherwise referred to as gun "decontrol") will have an increasing effect on violent gun crimes. The converse, that control of guns can

lead to a decrease in crime, has not been shown to occur in any profoundly impactful way, yet this does not mean that loosening regulations will not have an effect. I will address this is idea in more detail below in posing hypotheses.

Data

There are two separate data sets I propose using in this study. The first was obtained directly from the Washington D.C. Metropolitan Police Department and covered violent criminal incidents spanning 1998 to 2018. Included in the data set is detailed information on homicide, robbery, and aggravated assault incidences, time and date of the incident, type of weapon, and locational data. These data were obtained for analyzing crime trends in monthly intervals for homicide, gun-related homicide, and total violent gun-related crime prior to and after the Heller decision. The isolation of these variables is necessary because firearms are involved in many types of violent criminal offenses, and the focus of this study is on the effects of a policy change on violent gun-related crime and homicide.

The second set of data comes from the FBI's Uniform Crime Report. The UCR is an annual report collected and presented by the FBI, from law enforcement agencies throughout the United States. The UCR is a reliable and official source of crime statistics on a variety of crime types. The FBI neatly breaks down crime into two categories: Part I and Part II offenses. Part I offenses, otherwise known as "Index Crimes," are the eight most serious violent and property crimes and are often used as the primary indicators of national and

subnational crime trends. Part II offenses are considered less serious, according to the FBI, encompassing all other offenses for which the FBI collects data. The UCR data containing monthly information on violent crimes for cities and other jurisdictions were obtained from the National Archive of Criminal Justice Data (NACJD) housed at the Inter-University Consortium for Political and Social Research at the University of Michigan in Ann Arbor, Michigan. These data will be used to analyze monthly violent crime trends with guns based on a composite violent crime index of murder and non-negligent manslaughter, gun-related robberies and gun-related aggravated assaults, and gun homicide. These variables will be measured in Washington D.C. and Detroit, Michigan, from 1980 to 2015, encompassing the years before and after the Heller decision. The purpose if Detroit, Michigan, is to compare D.C. to a city similar in population size and gun legislation and determine if the differences are attributable to the prohibition legislation specifically in D.C.

It should be mentioned that there are several limitations to the UCR data. One is that the monthly data are available only through the end of 2015, providing a shorter five-year time period post-Heller incorporation. Second, the data do not have information on offenders or other characteristics of the offense to perform more specific analysis that might provide insight on any effects.

Measures

The primary dependent variables for this study will be gathered from the above sources. For the Washington D.C. model, the Dependent Variables are as follows:

1. **Total Violent Crime with Guns**: This dependent variable will be comprised of Murder and Non-Negligent Manslaughter, Robbery, Aggravated Assault, and Sexual Assault involving guns and will be measured as an observed monthly rate per 1,000 people over nearly a twenty-year period beginning with January 1998 and ending with December 2015.
2. **Gun-Related Homicides**: This dependent variable will be comprised of Murder and Non-Negligent Manslaughter involving guns. This variable will be measured as an observed monthly rate per 1,000 over nearly a twenty-year period people beginning with January 1998 and ending with December 2015.
3. **Total Homicides:** This dependent variable will be comprised of Murder and Non-Negligent Manslaughter. This variable will be measured as an observed monthly rate per 1,000 over nearly a twenty-year period people beginning with January 1998 and ending with December 2015.

Specifically, I will attempt to uncover any possible changes to the violent crime trends involving guns in Washington, D.C., that might be a result of the Heller decision. In other words, the goal is to determine whether the Heller decision, which abolished the FCRA, had a significant impact on violent gun crime trends in Washington, D.C.

Detroit, Michigan, was chosen as a comparison city because It is comparable in size to Washington D.C., and its crime trends are also comparable to D.C. as denoted in the descriptive statistics portion of this paper.

The proposed Independent Variable for this study is derived from the Heller decision. As explained a bit more below, in an Interrupted Time Series quasi-experimental design, the Independent Variable testing a policy change is an “intervention.” In this case, a fixed point in time. The intervention is as follows:

1. An intervention in the Washington, D.C. monthly gun crime rate trend. In this case, the date, June 26, 2008, is the day Heller overturned D.C.’s handgun ban. This will allow for making a statistical determination about whether Heller had any significant effects on violent crime rates involving handguns in Washington D.C.

The intervention date for Detroit, Michigan, is the same as it is for D.C., as this was when the Heller Decision took effect. The same independent variables are used for both D.C. and the comparison city.

Methodological Design: Interrupted Time Series Analysis

Interrupted time series analysis (ITS), a quasi-experimental research design, capable of analyzing the effect of an intervention utilizing longitudinal data (Kontopantelis, Doran, Springate, Buchan, and Reeves, 2015). There are many examples of ITS used in criminology and policy studies. For instance, Loftin et al. (1991) used an ITS design for their study to measure the effects of the D.C. handgun ban on homicides and suicides. Their goal was similar to the current study; however, they sought to determine if restrictive licensing and prohibition of handguns in D.C. had an effect on the rates of homicides and suicides in the D.C. area. That is, before and after the FCRA, whereas my study seeks to determine if the decontrol of handguns in D.C. had an effect on violent gun crime trends. Loftin et al. (1991) assessed monthly data on homicides and suicides in D.C. before and after the handgun ban went into effect, which is why the interrupted time series design is adequate. Loftin et al. (1991) compared D.C. to surrounding areas and controlled for a variety of causes of death in order to ensure that the differences are attributable to the prohibition legislation, specifically in D.C. They measured the years 1968 through 1987, concluding that a significant reduction in suicides and homicides occurred for the D.C. area, and observed no difference in the nearby control areas where there was no ban.

In order to analyze the data effectively, ITS is employed in a similar fashion to the Loftin et al. (1991) investigation of Washington D.C.'s Firearms Control Regulations Act of 1976 and Humphreys, Gasparini, and Wiebe's (2016)

study of Florida's "Stand Your Ground" law. Both studies measure the effects of policy intervention and utilized trend data from before and after an intervention to gauge its impact. Moreover, an ITS design is suitable to answer this study's research question and has several appealing strengths, especially when analyzing large populations confined to a specific jurisdiction. The attributes of ITS which make it suitable for this study are listed below.

First, ITS is an accepted method in criminology and the social sciences that provides a partial experimental design for assessing the effects of an intervention on a trend. Second, ITS provides for longitudinal data analysis, which is necessary for contextual purposes due to the possible effects of the firearms ban and removal decision being long-lasting. Third, ITS requires no monetary investment as there is no experiment to coordinate and conduct, and the measured data is publicly available and ethically collected; it is a quasi-experiment using secondary data analysis. Fourth, ITS accounts for data trends before and after an intervention, therefore, it is possible to detect a change in a trend as a result of a policy change, which might not be intentional but occurs nonetheless. Last, ITS is relatively quick to accomplish compared to a full-fledged experiment, such as a randomized control trial, because again, there is no need to construct a controlled test in order to gain data (Penfold and Zhang, 2013).

Although a randomized control trial might be optimal for analyzing observational data, it is not possible to randomly assign the incidence of

homicide and general crime in order to study the impact of the handgun ban and the Heller decision. Therefore, this method is ideal for this study.

As with all methodological designs, ITS is not without limitations. Kleck, Britt, and Bordua (2000) co-authored a paper assessing the validity of a univariate interrupted time series design (ITSD) analyzing crime data after the 1976 handgun ban in Washington, D.C. Their goal was to determine if the identified flaws regarding ITSD are significant enough to cause problems when analyzing the data pertaining to the legislation. The main flaw noted by Kleck and colleagues (2000) was the inability of ITSD to identify the causality of a shift in the target variable. Furthermore, another one of ITSD's drawbacks occurs when assessing an intervention, in this case, a policy implication. The authors contend that the ITS model is not capable of explaining why an intervention either had an effect or did not. However, given the context of the D.C. handgun ban and the Heller decision that repealed it, the scope of this analysis is toward determining if there was any significant effect based on the policy change, based on the available UCR and D.C. Metro Police crime data.

In order to portray an accurate representation of the population being assessed and to determine the effect of the policy, it is beneficial to include more than eight measurements before and after the intervention. Given the amount of data at our disposal, it is desirable to add as many measures as possible to have a stronger assessment and representation of the jurisdiction. One limitation of interrupted time series is the inability to explain why an intervention worked or did

not work. Moreover, ITS cannot make inferences on the individual-level (Penfold and Zhang, 2013).

Expected Findings

This study is not testing a scientific theory, but rather the effects of a significant event that had a major impact on a criminal justice gun policy, first for the District of Columbia, and then two years later, nationwide. This study is a departure from the Loftin et al. (1991) study, which measured the impact of the implementation of the FCRA on homicides and suicides in Washington, D.C. Therefore, Loftin et al.'s research focused on the effects of gun control, whereas my study focuses on gun *decontrol.* More specifically, this study focuses on the effects of the removal of the FCRA rather than the implementation.

Given that Loftin et al. (1991) found the restrictive licensing requirements imposed on firearms in D.C. to reduce homicide and suicide significantly, I expect the removal of the FCRA to increase homicide, gun-related homicide, and total violent gun-related crime in D.C. The Heller decision liberalized individual gun ownership, and therefore, could lead to an increase in illegal gun usage as people motivated to use guns perceive D.C.'s gun restrictions and punishments as less threatening or less of a deterrent. As such, the primary hypothesis based on this study, which applies to all ITS models for D.C. is this:

H_1: There will be a statistically significant increase in the monthly violent gun crime rate trend in Washington D.C. in the five years after the Heller

Supreme Court decision compared to the monthly violent gun crime rate trend in the ten years prior to Heller.

Considering this hypothesis, I should note that it is possible no effect will be detected, not due to a Type I Error, in which the Null would be incorrectly rejected, but because many gun policies have not been shown to have any effects and this seems to be in large part because the people who legally own guns generally abide by gun laws so as not to lose this right and those that own illegal guns are not necessarily deterred or moved in any significant way by restricting or loosening of gun laws. Nevertheless, if there is an effect, then the findings from this study will provide valid evidence and knowledge relevant to the public and policy debate over guns.

CHAPTER FOUR

ANALYSIS

Descriptive Statistics

The UCR data obtained from the National Archive of Criminal Justice Data (NACJD) housed at the Inter-University Consortium for Political and Social Research at the University of Michigan in Ann Arbor, Michigan, initially presented several issues. The most significant hurdle with the NACJD data sets is that between 1980 and 2015, the variables were categorized differently for specific years. Therefore, there are a few preliminary steps necessary to get the data ready for modeling. The most significant task was isolating and organizing the particular data I needed from the entire data set to prepare it for ITS modeling using SPSS statistical software.

The second significant alteration was mean imputation. In six years (1993, 1996, 1997, 1999, 2007, 2015), a small number of cell data were missing for each variable in the original data set. To resolve this problem, I utilized the mean imputation function to generate an average based on the monthly cell data directly before and after the cells with the missing information. Although there was the potential for mean imputation to bias the standard error, this was not the case for this data set since the missing data were random, comprising less than one-half of one percent of all cells, and mean imputation did not have any detectable effects on the ITS results.

Lastly, I merged two crime variables, “Murder and non-negligent manslaughter” and “Negligent manslaughter in both the Washington D.C> and Detroit The reason for this was to ensure inclusion of all variables representing intentional killing to be under the “homicide” variable. Moreover, there were less than ten negligent homicides from 1998 to 2015, so it made sense to add the two together and rid the distinction between negligent manslaughter and murder, being that there were so few negligent manslaughter data.

Although the UCR raw data came with a plethora of crime variables, only a select few were necessary for the goals of this study. In the end, I isolated three key variables to represent the relevant subcategories for this study. The variables constructed and measured for each city in the analysis are “gun homicide” coded as “dcmurg” and “detmurg,” “Total violent gun crimes” coded as “dcgun” and “detgun,” and “Total homicides” coded as “dcmur” and “detmur.” These are the variables that best represent different constructions of violent crime, specifically gun-related crime. Given that this study analyzed the effects of an alteration in handgun legislation that would possibly affect gun and other violent crime rates, the measures above were appropriate for evaluating any impact in this regard.

In this section, I present descriptive statistics utilizing data dating going back to 1980 in order to provide a broad picture of gun crime trends in Washington, D.C., and Detroit, Michigan. It is essential to note that for the interrupted time series analysis, the assessment was limited to 1998-2015 due to

better model fit. The reason for limiting the period of the evaluation is because ITS modeling works better with fewer data. If I had incorporated data dating back to 1980, it would not have strengthened the analysis any further.

First, taking a look at Washington D.C., the monthly average for total violent gun crime is 294 violent gun crimes per month from the years 1980-2015. This measure comprises monthly gun robbery, gun homicides, and gun assaults in Washington, D.C., from 1980-2015. Therefore, relative to the total violent crime rate in Washington D.C. from 1980 to 2015, which is 1,419 crimes a month on average, 13% of all violent crimes in Washington D.C. between the years 1980-2015 are gun-related robberies, 1.06% are gun-related homicides, and 6% of all violent crime in Washington D.C. between the years 1980-2015 are gun-related assaults.

Figure 1 depicts a trend graph representing the monthly average of all violent gun-related crimes in Washington, D.C., revealing two peaks for gun-related crime between the years 1980-2015. Specifically, in 1981 and 1995, Washington D.C. experienced sharp peaks in gun-related robberies and assaults. Conversely, around the years 1986, 1998, and 2011, D.C. exhibited relatively low rates of the same crimes likely due to the same cause for variation. This is a notable trend in every measure in this analysis because it is consistent for each variable measured. One potential reason for these peaks and valleys is likely due to the introduction of crack cocaine in the United States beginning in early 1980, which contributed to considerable variance in urban crime rates

nationally throughout the 1980s and into the mid-1990s (Grogger and Willis, 2000).

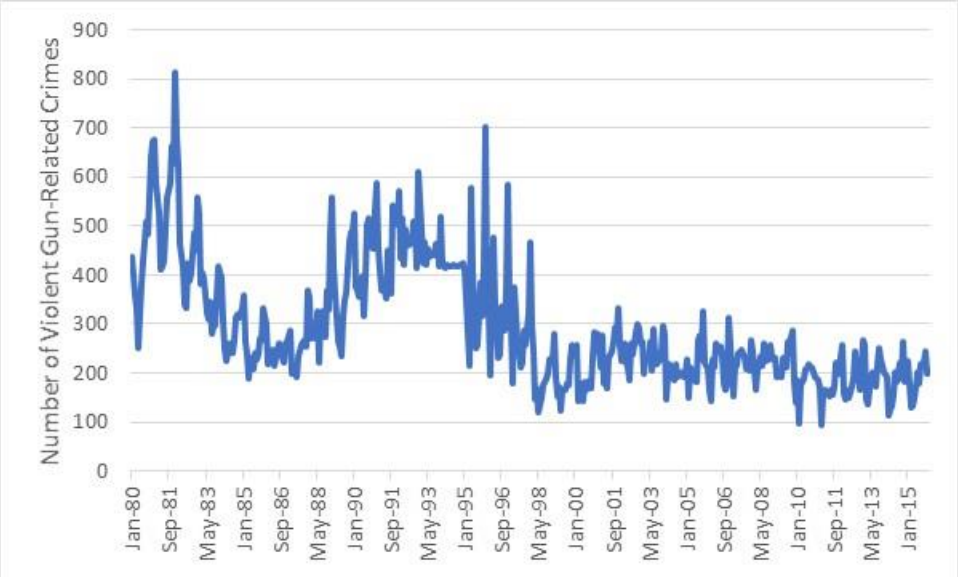

Figure 1. Total Violent Gun-Related Crimes by Month from 1980-2015 in Washington D.C.

In addition to analyzing the years 1980-2015 as a whole, breaking up the statistics further aids analysis. Refer to Table 1 for a visual representation of the before and after measures. A comparison of gun crime rates before and after the Heller decision revealed that the average monthly gun-related robbery rate is 202 gun-related robberies per month during the pre-intervention period in Washington, D.C. This period in time, reflects an era where the FCRA was in effect.

Moreover, isolating the years 2009-2015, a time period when the Firearms Control Regulations Act was no longer in effect, yields an average monthly gun-related robbery rate in Washington D.C. of 124 gun-related robberies per month. Given the difference, one can observe there to be a 39% difference in gun-related robberies in Washington, D.C., when comparing the means of two periods. Comparing the pre and post-intervention periods for gun-related assaults; the statistics are as follows: The average monthly rate for gun-related assaults from 1980-2008 in Washington, D.C., is 99 gun-related assaults per month and the average monthly rate for gun-related assaults from 2009-2015 in Washington, D.C., is 60 gun-related assaults per month. Therefore, there is an observable difference of 39% between the two timeframes. Gun-related homicide will be discussed separately as it is isolated as a measure further down.

The comparison city in this analysis is Detroit, Michigan. Therefore, the same crime variables employed for Washington, D.C., are also utilized for Detroit. The average total monthly violent gun-related crime rate in Detroit from 1980 to 2015, which encompasses monthly gun robbery and gun assaults, was 786 violent gun-related crimes per month. Upon isolating gun-related robbery and gun-related assault, the statistics are as follows: the average monthly gun-related robbery rate in Detroit from 1980 to 2015 is 416 gun-related robberies per month, the average monthly gun-related assault rate in Detroit from 1980 to 2015 is 340 gun-related assaults per month. Relative to all violent crime in Detroit from 1980-2015 (at an average of 2,616 incidents per month), gun-related robberies

account for 16% of all the violent crimes committed during this time. Gun-related assaults, when compared to all violent crime in Detroit from 1980-2015, account for 13% of all violent crimes.

Figure 2 depicts the trend for the monthly average of all violent gun-related crimes in Detroit, Michigan, from 1980-2015. Notably, Detroit experienced a sharp spike in gun-related robberies and assaults in 1983. Conversely, around the years 1981, 1989, 2001, and 2015, the city exhibited relatively low rates of the same crimes. One similarity between the Washington, D.C., and Detroit, Michigan data sets is that they both show a downward trend in the same gun-related crimes upon the turn of the century. This observation is accurate except for 2005 when Detroit, Michigan, exhibited a rapid increase in gun-related crimes for that year, whereas Washington, D.C., remained relatively stable into the late 2000s. Furthermore, both cities demonstrate a significant jump in gun-related crime rates in the mid-1990s, and both cities experience a drop in the same violent crimes in the mid to late 1980s.

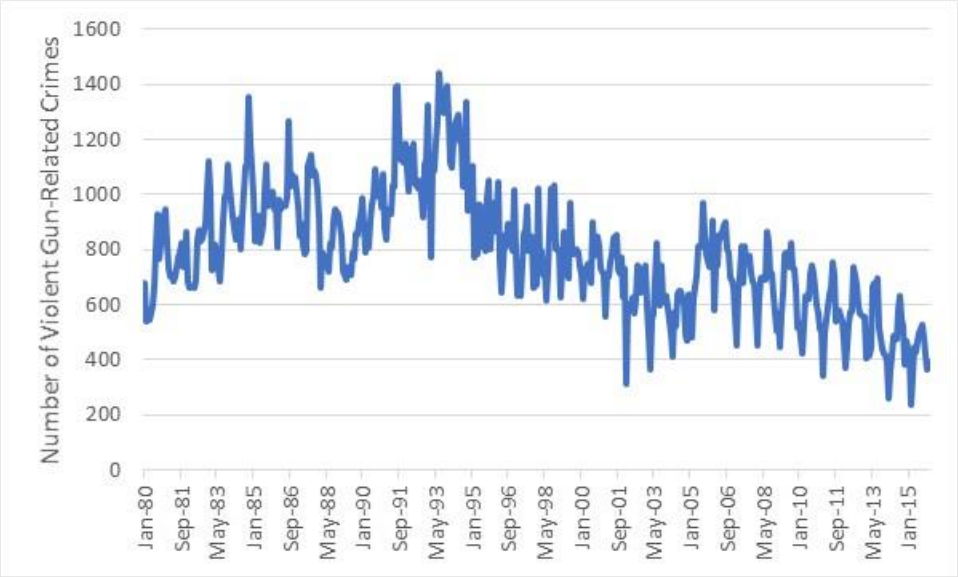

Figure 2. Total Violent Gun-Related Crimes by Month from 1980-2015 in Detroit, Michigan.

In addition to analyzing the 1980-2015 data as a whole, I analyzed crime rates before and after the Heller decision. Refer to Table 1 for a visual representation of the before and after measures. By isolating the years 1980-2008, during the pre-Heller period, the average rate was 902 gun-related robberies per month before the Heller decision. This period in time reflects an era when the FCRA was in effect. During the post-Heller period, an era of time when the FCRA was no longer in effect, yields the average monthly gun-related robbery rate in Detroit of 395 gun-related robberies per month, or a 35% decline in average monthly gun-related robberies after Heller. This is a similar decrease to Washington D.C. For gun-related assaults, the average rate pre-Heller was

351 per month. After Heller, it dropped to 288 per month, a decline of 18% between the two time frames.

The next dependent variable I analyzed for both cities is the monthly average for homicide rate. First, taking a look at Washington D.C., the monthly average homicide rate is 20 homicides per month from the years 1980-2015. This measure comprises “murder” and “non-negligent manslaughter” in Washington D.C from 1980-2015. Therefore, relative to the total violent crime rate in Washington D.C. from 1980 to 2015, which is 1,419 crimes a month on average, 1.41 % of all violent crimes in Washington D.C. between the years 1980-2015 are homicides.

Figure 3 depicts a trend graph representing the monthly average of all homicides in Washington, D.C., revealing one dominant peak of crime between the years 1980-2015. Specifically, around 1989, Washington D.C. experienced a spike in homicide. Conversely, around the years 1985 and 2001, D.C. exhibited relatively low rates of the same crimes likely due to the same cause for variation.

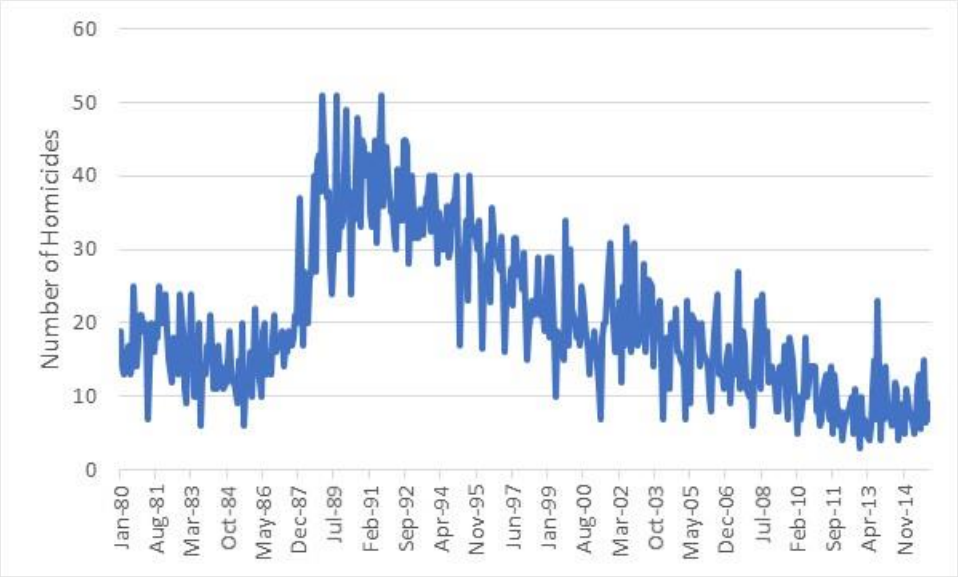

Figure 3. Homicide by Month from 1980-2015 in Washington D.C.

In addition to analyzing the years 1980-2015 as a whole, I analyzed crime rates before and after the Heller decision. Refer to Table 1 for a visual representation of the before and after measures. By isolating the years 1980-2008, during the pre-Heller period, the average rate was 23 homicides per month before the Heller decision. This period in time, reflects an era where the FCRA was in effect. During the post-Heller period, an era of time when the FCRA was no longer in effect, yields an average monthly homicide rate in Washington D.C. of 10 homicides per month, or a 56% decline in average monthly homicides after Heller.

The average monthly homicide rate in the comparison city, Detroit, Michigan, from 1980 to 2015, is 39 homicides per month. Relative to the total

violent crime rate in Detroit from 1980 to 2015 (at an average of 2,616 incidents per month), homicides account for 1.49 % of all the violent crimes committed during this time.

Figure 4 depicts the trend for the monthly average of all homicides in Detroit, Michigan, from 1980-2015. Notably, Detroit experienced one major peak of homicides in 1987. Since that year, Detroit's homicide rate has been on a steady decline overall.

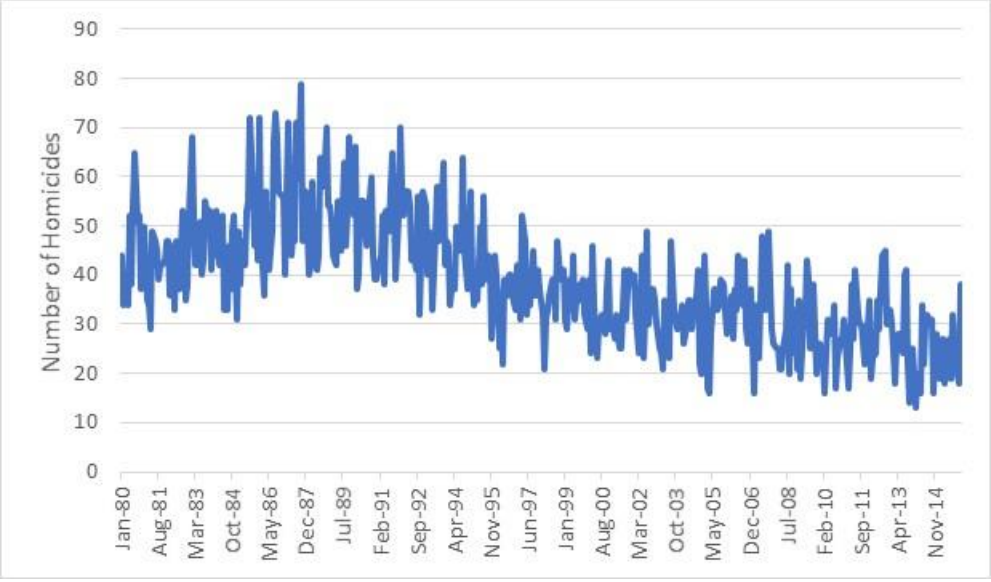

Figure 4. Homicide by Month from 1980-2015 in Detroit, Michigan.

In addition to analyzing the 1980-2015 data as a whole, I analyzed crime rates before and after the Heller decision. Refer to Table 1 for a visual

representation of the before and after measures. By isolating the years 1980-2008, during the pre-Heller period, the average rate was 42 homicides per month before the Heller decision. This period of time reflects an era of time when the FCRA was in effect. During the post-Heller period, an era of time when the FCRA is no longer in effect yields the average monthly homicide rate in Detroit of 27 homicides per month or a 36% decline in average monthly homicides after Heller.

The last variable measured for both cities is gun-related homicide. This measure accounts for all murders in which a firearm was involved. From 1980 to 2015, the average monthly gun-related homicide rate in Washington D.C. was 15 gun-related homicides per month. Relative to the total violent crime rate in Washington D.C. from 1980 to 2015, which is 1419 crimes a month on average, 1.06 % of all violent crimes in Washington D.C. between the years 1980-2015 are gun-related homicides.

Figure 5 depicts a trend graph representing the monthly average of all gun-related homicides in Washington, D.C., revealing a significant peak of gun-related homicides between the years 1980-2015. Specifically, around 1991, Washington D.C. experienced a spike in gun-related homicide. However, beginning in 1991, the average monthly rate for gun-related homicide began to decline steadily through 2015.

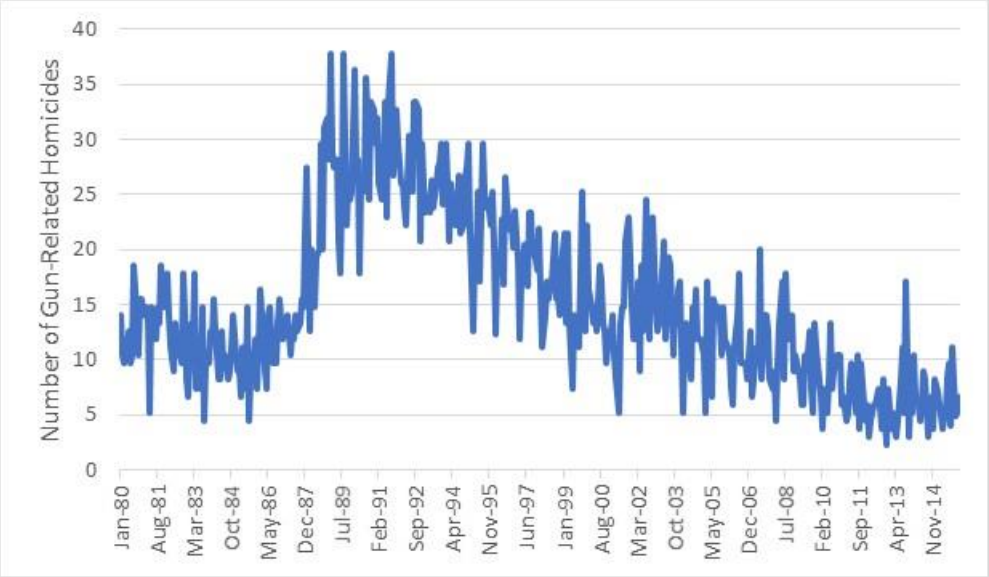

Figure 5. Gun-related Homicide by Month from 1980-2015 in Washington D.C.

In addition to analyzing the 1980-2015 data as a whole, I analyzed crime rates before and after the Heller decision. Refer to Table 1 for a visual representation of the before and after measures. By isolating the years 1980-2008, during the pre-Heller period, the average rate was 17 gun-related homicides per month before the Heller decision. This period in time reflects an era when the FCRA was in effect. During the post-Heller period, an era of time when the FCRA was no longer in effect, yields the average monthly gun-related homicide rate in Washington D.C. of 7 gun-related homicides per month, or a 59% decline in average gun-related homicides after Heller.

Finally, the last measure in the analysis is gun-related homicide for Detroit, Michigan. The average monthly gun-related homicide rate in Detroit from

1980 to 2015, was 28 gun-related homicides per month. Relative to all violent crime in Detroit from 1980-2015 (at an average of 2,616 incidents per month), gun-related homicide account for 1.07 % of all violent crimes committed during this time

Figure 6 depicts a trend graph representing the monthly average of all gun-related homicides in Detroit, Michigan, from 1980-2015. Although Detroit's gun-related homicide rate peaked in the late 1980s as most of the previous crime measures have in this analysis so far, in Detroit, Michigan, the peak is not as profound as it has been for the prior measures. Indicating that the average monthly gun-related homicide rate in Detroit has been slightly less contrasting than it was for D.C. However, similar to the many other crime measures in this analysis, Detroit's gun-related homicide has decreased considerably since the high in 1987.

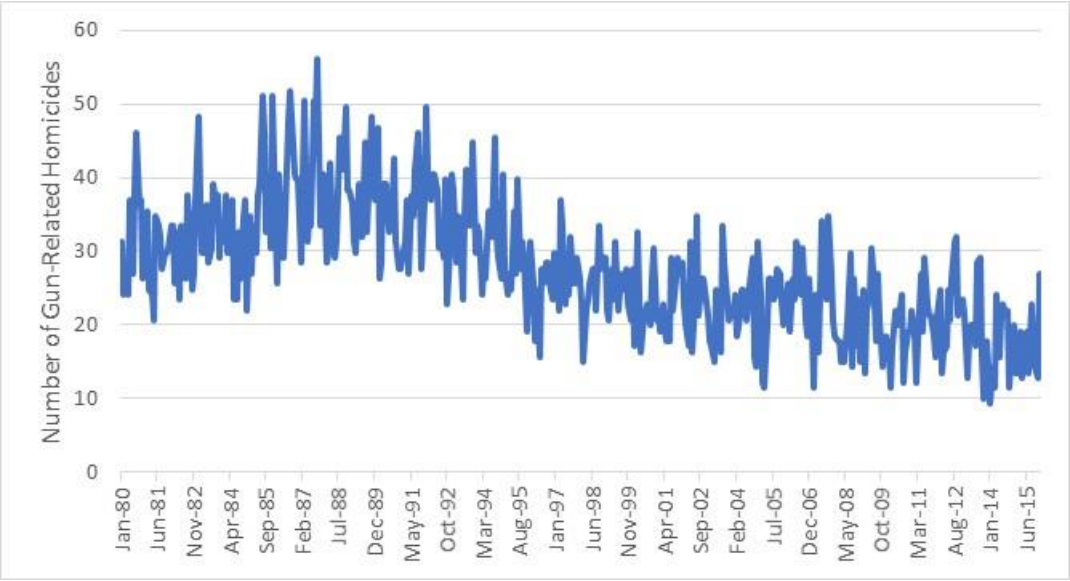

Figure 6. Gun-related Homicide by Month from 1980-2015 in Detroit, Michigan.

In addition to analyzing the 1980-2015 data as a whole, I analyzed crime rates before and after the Heller decision. Refer to Table 1 for a visual representation of the before and after measures by isolating the years 1980-2008, during the pre-Heller period; the average was rate 30 gun-related homicides per month before the Heller decision. This period in time, reflects an era where the FCRA was in effect. During the post-Heller period, an era of time when the Firearms Control Regulations Act was no longer in effect, yields the average monthly gun-related homicide rate in Detroit of 19 gun-related homicides per month, or a 37% decline in average gun-related homicides after Heller.

Table 1. Monthly Crime Counts Pre and Post Supreme Court Heller Decision 1980-2015

City	Gun Assault	Gun Robbery	Gun Homicide	Total Homicide
Pre-Heller Washington D.C.	99	202	17	23
Post-Heller Washington D.C.	60	124	7	10
Pre-Heller Detroit	351	902	30	42
Post-Heller Detroit	288	395	19	27

*Monthly data for Table 1 were obtained from the FBI's Uniform Crime Reports 1980-2015

All tables and figures in this section have been fabricated by the author of this paper, Naveen Raj Madahar.

Analysis

I evaluated the difference between post-intervention trends and the trends exhibited prior to the intervention, where the intervention is the Heller decision on June 26, 2008, repealing the handgun ban in the Firearms Control Regulations Act of 1976. In order to analyze the two trend periods, one from 1998-2008 and the other from 2008-2015, I use an interrupted time series analysis design similar to that of Loftin et al. (1991). Loftin and his colleagues studied the impact of restrictive licensing on handguns in Washington, D.C.

Based on the nature of the intervention, a court decision that changed the law at one point in time, it is hypothesized that the impact striking down the handgun ban in the FCRA would ensure a gradual negative change in the post-intervention crime trends. The same test is also conducted for Detroit, Michigan,

as a comparison city for the same years, which was unaffected by repeal of the handgun ban—comparing any observed effects in Washington, D.C., with Detroit, Michigan, because Detroit shares a similar population size as well as elevated gun crime rates. The comparison of Detroit, Michigan, and Washington D.C. was done to observe how crime in a similarly populated city evolved over time, relative to a city where the gun policy was significantly altered.

During the pre-intervention period from 1998 to 2008 in Washington, D.C., the mean monthly homicide count was 18.31 per month or a rate of .35 homicides per 1,000 populations per month. The reason for measuring the rate per 1,000 is because Washington, D.C.'s population averages about 585,124 from 1998-2008. During the pre-intervention period, the mean monthly gun-related homicide count in D.C. was 13.6 per month or a rate of .26 gun-related homicides per 1,000 populations per month. Therefore, 74.3% of all homicides during the pre-intervention period involved a firearm in some way.

During the post-intervention period from 2008-2015, in Washington, D.C., the mean monthly homicide count was 9.89 per month or .17 homicides per 1,000 populations per month. The mean monthly gun-related homicide count in D.C. was 7.28, or a rate of 0.13 gun-related homicides per 1,000 populations per month. Therefore, 73.81% of all homicides during the post-intervention period involved a firearm in some way. During the post-intervention period, Washington, D.C., exhibited a monthly minimum of 3 homicides for one month and a monthly maximum of 24 homicides for one month. Throughout the pre-intervention period,

Washington, D.C., experienced a minimum count of 6 murders for over one month and a maximum of 34 murders over one month. During the post-intervention period, Washington, D.C., exhibited a monthly minimum of 2 gun-related homicides for one month and a monthly maximum of 18 gun-related homicides for one month. Throughout the pre-intervention period, Washington, D.C., experienced a minimum count of 4 gun-related homicides for over one month and a maximum of 25 gun-related homicides over one month.

During the pre-intervention period from 1998 and 2008 in Detroit, Michigan, the mean monthly homicide count was 32.71 per month or a rate of .44 homicides per 1000 population. The reason for measuring the rate per 1,000 is to stay consistent with how Washington, D.C., was measured. The mean monthly gun-related homicide count in Detroit was 23.21 or a rate of .29 gun-related homicides per 1000 population. Therefore, 70.8% of all homicides during the pre-intervention period involved a firearm in some way. During the post-intervention period, in Detroit, the mean monthly homicide count was 27.57 per month or a rate of .44 homicides per 1000 population, where the average population in Detroit from 2008-2015 was 709,059. The mean monthly gun-related homicide count in Detroit was 19.5, or a rate of .31 gun-related homicides per 1000 population. Therefore, 70.5% of all homicides during the pre-intervention period involved a firearm in some way.

During the post-intervention period, Detroit exhibited a monthly minimum of 13 homicides for one month and a monthly maximum of 45 homicides for one

month. Throughout the pre-intervention period, Detroit experienced a minimum count of 16 murders over one month and a maximum of 49 murders over one month. During the post-intervention period, Detroit exhibited a monthly minimum of 9 gun-related homicides for one month and a monthly maximum of 32 gun-related homicides for one month. Throughout the pre-intervention period, Detroit experienced a minimum count of 11 gun-related homicides over one month and a maximum of 35 gun-related homicides over one month.

Interrupted Time Series Models

Within the three interrupted times series models, the independent variable or interruption is the day the U.S. Supreme court ruling in Washington D.C. v. Heller in 2008 struck down parts of the FCRA, including the restrictive licensing requirements on owning a handgun. Each model tests a different dependent variable. The dependent variables include the number of total homicides in Washington, D.C. per month, the number of gun homicides in Washington, D.C. per month, the monthly rate of total gun-related crime in Washington, D.C. (excluding rape). These same crime variables were used in measuring Detroit gun crimes for comparative purposes. Each ITS model produced an R-squared statistic, which is the measure of how much variance in the dependent variable is explained by the independent variable; in this case, how much of the change in gun crime in Washington D.C. can be explained by the Heller decision.

The Ljung-Box test examines autocorrelation of the difference between predicted and observed values, also known as the residuals. The purpose of this

test is to determine if the residuals are different from zero. Effectively, this test measures whether the correlations of signals within themselves (autocorrelations) for the residuals are non-zero. Based on the p-value of the Ljung-Box, which determines whether or not autocorrelation is too high in the model, one can determine how well the time series model fits the data. If the p-value is above .05, then the null hypothesis cannot be rejected, and one would have to say there was too much residual autocorrelation. If the p-value is less than .05, one can say the model fit is good and can reject the null.

This test was applied to the residuals of the interrupted time series analysis, subsequent to fitting an autoregressive integrated moving average (ARIMA) statistic to the data. ARIMA is a method by which time-series data can be modeled for predicting future data characteristics such as growth and decline patterns, the rate of the growth and decline, and the statistical noise or how much the data points are fluctuating. Essentially, the ARIMA statistic tracks moving averages as they change and determines if the interruption is significant or not. One key note about the ARIMA statistic is that it does not predict future trends; instead, it is useful for assessing past trends.

Results

Gun Homicide Model

For the ITS model measuring gun homicides in Washington D.C.[1], the R-squared for D.C. was .47, meaning that the independent variable explains 47 % of the variance in the dependent variable. The ARIMA statistic, which represents the calculation of moving averages and determines if the interruption has an effect, for the D.C. gun homicide model is .003. However, in the D.C. gun homicide model, the interruption does not significantly explain the trend for the dependent variables in the test. The reason for the lack of statistical significance is because the Box-Ljung test's p-value for the D.C. gun homicide model is .051. Consequently, the D.C. gun homicide model was not a good fit for the data, and as a result, the interruption did not significantly affect gun homicides in Washington, D.C.

The ARIMA statistic for the Detroit gun homicide model is .000. For Detroit, it was.159, meaning that the independent variable explains 15.9 % of the variance in the dependent variable. Though the Detroit model was significant at 000., I could not be confident in rejecting the null hypothesis given that the interruption took place in D.C., and Detroit was only a comparison City. Furthermore, there were no controls in this analysis; therefore, I could not rule out that unobserved changes in Detroit might be responsible for the changes to gun homicide trends in the city. One noteworthy fact about the D.C. analysis is that the Ljung-Box statistic was only slightly above .05, which is extremely close

to being statistically significant. However, concerning the gun homicide model, the interruption did not have a statistically significant impact on the crime trends in either city. Therefore, the results of the gun homicide model do not support either of my hypotheses.

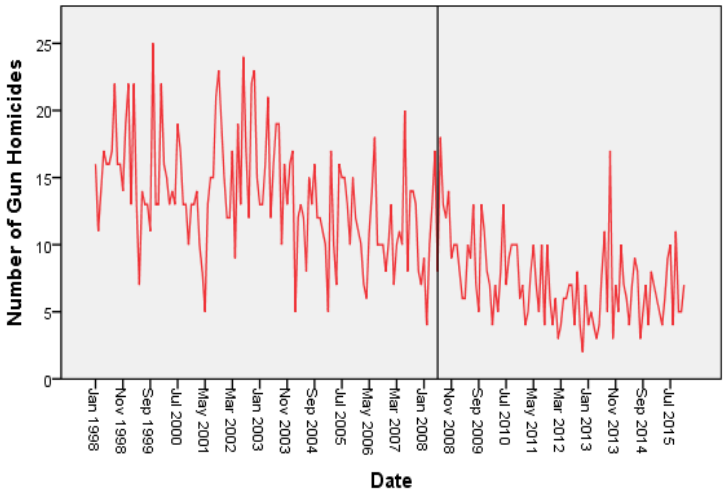

Figure 7. Number of Homicides by Firearms per Month in Washington, D.C.

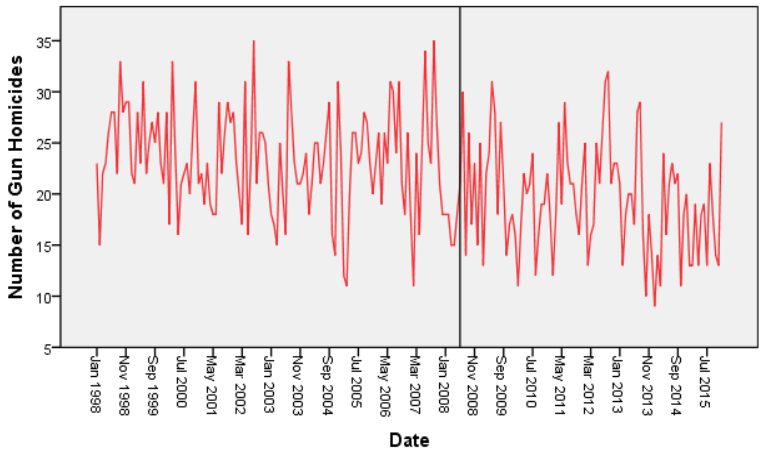

Figure 8. Number of Homicides by Firearms per Month in Detroit, Michigan.

Total Gun-Related Crime Model

For the ITS model measuring gun homicides, the R-squared for D.C was .493, meaning that the independent variable explains 49.3 % of the variance in the dependent variable. For Detroit, it was .706, meaning that 70.6% of the variance in the dependent variable is explained by the independent variable. The ARIMA statistic, which represents the calculation of moving averages and determines if the interruption has an effect, for the D.C. gun homicide model is .000. The ARIMA statistic for the Detroit gun homicide model is .000. However, in the D.C. total gun-related crime model, the interruption does not significantly explain the trend for the dependent variables in the test. The reason for the lack of statistical significance is because the Box-Ljung test's p-value for the D.C. total gun-related homicide model is .341.

Consequently, the D.C. total gun-related crime model was not a good fit for the data, and as a result, the interruption did not significantly affect the total gun-related crime trends in Washington, D.C. Though the Detroit model was significant at .002., I could not be confident in rejecting the null hypothesis given that the interruption took place in D.C., and Detroit was only a comparison City. Furthermore, there were no controls in this analysis, and therefore, I could not rule out that unobserved changes in either city might be responsible for the changes to total gun-related crime trends. Therefore, concerning the total gun-related crime model, the interruption did not have a statistically significant impact

on the crime trends in either city. In turn, the results of the total gun-related crime model do not support either of my hypotheses.

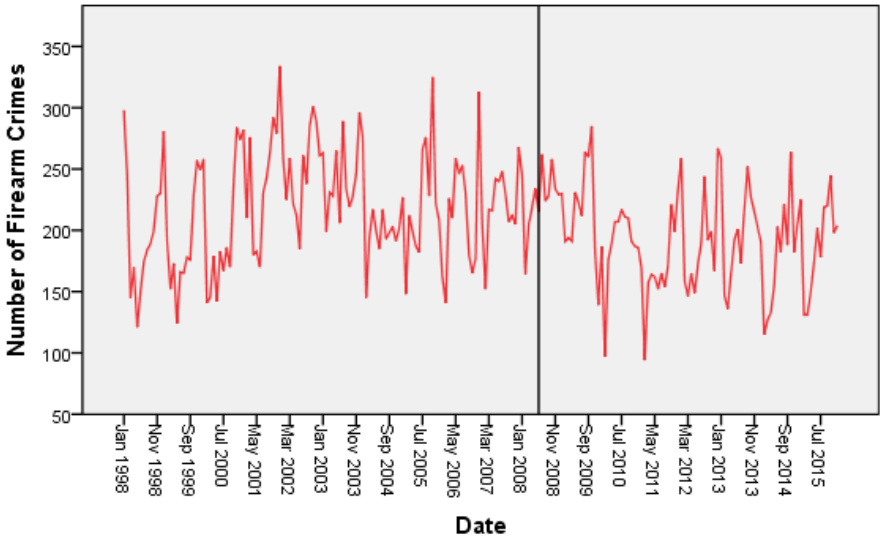

Figure 9. Total Gun-Related Crime per Month in Washington, D.C.

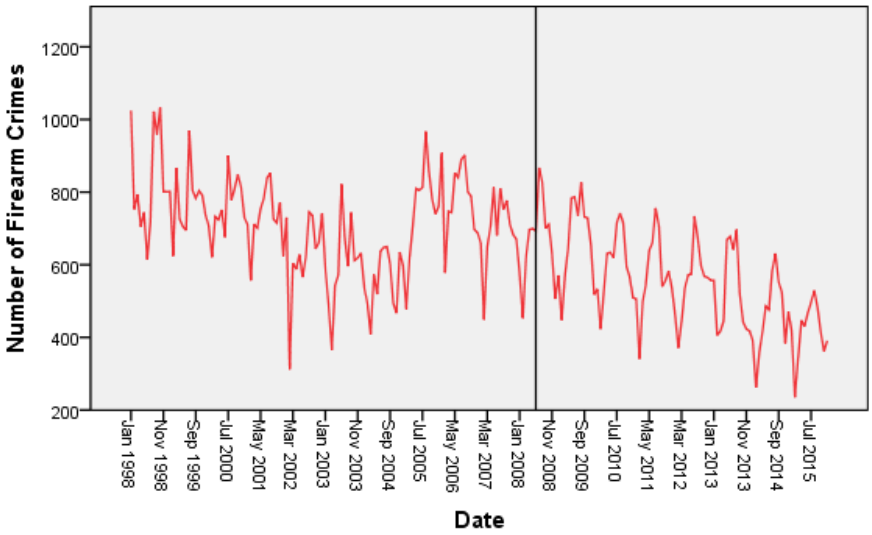

Figure 10. Total Gun-Related Crime per Month in Detroit, Michigan.

Homicide Model

For the ITS model measuring gun homicides, the R-squared for D.C. was.464, meaning that the independent variable explains 46.4 % of the variance in the dependent variable. For Detroit, it was .157, meaning that 15.7% of the variance in the dependent variable is explained by the independent variable. The ARIMA statistic, which represents the calculation of moving averages and determines if the interruption has an effect, for the D.C. homicide model is .002. The ARIMA statistic for the Detroit homicide model is .000. However, in the D.C. homicide model, the interruption does not significantly explain the trend for the dependent variables in the test. The reason for the lack of statistical significance is because the Box-Ljung test's p-value for the D.C. homicide model is .051.

Consequently, the D.C. homicide model was not a good fit for the data, and as a result, the interruption did not significantly affect gun homicides in Washington, D.C. Though the Detroit model was significant at 000., I could not be confident in rejecting the null hypothesis given that the interruption took place in D.C., and Detroit was only a comparison city. Furthermore, there were no controls in this analysis. Therefore I could not rule out that unobserved changes in Detroit might be responsible for the changes to homicide trends in the city. One noteworthy fact about the D.C. analysis is that the Ljung-Box statistic was only slightly above .05, which is extremely close to being statistically significant. However, concerning the homicide model, the interruption did not have a

statistically significant impact on the crime trends in either city. Therefore, the results of the gun homicide model do not support either of my hypotheses.

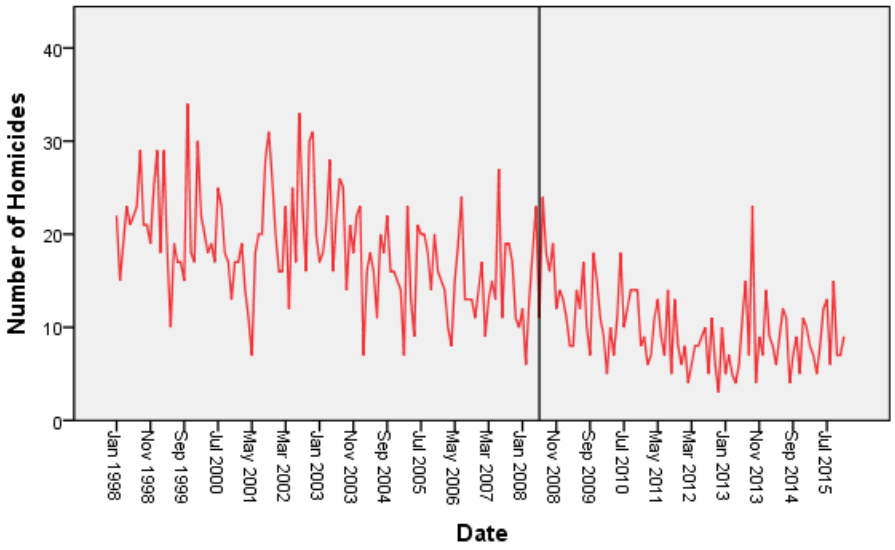

Figure 11. Number of Homicides per Month in Washington, D.C.

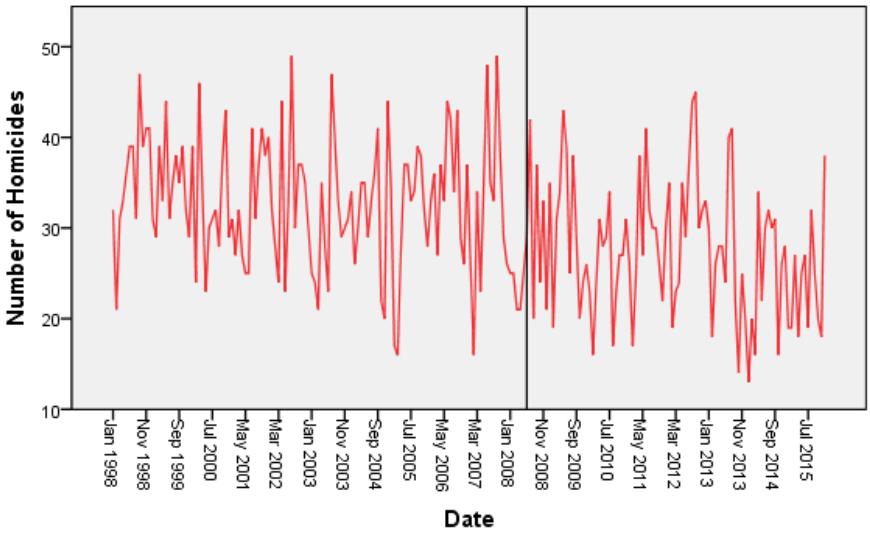

Figure 12. Number of Homicides per Month in Detroit, Michigan.

Each statistic mentioned in this section is presented in table two. The interruption is presented in figures 6-12. All tables and figures in this section have been fabricated by the author of this paper, Naveen Madahar.

Table 2. Impact of Heller Decision on Homicides by Firearm, Total Gun-Related Crime, and Total Homicides.

	Mean Monthly Count		Mean Monthly Rate (per 1,000 opulation)		T	R-Squared	Model Fit p-value
Variable	Pre Heller	Post Heller	Pre Heller	Post Heller	Mean Difference	Trend	Interruption
Homicide							
Washington, DC	209.91	111	0.36	0.18	6.66	0.46	0.051
Detroit, Michigan	375.36	311	0.42	0.44	0.32	0.15	0
Gun Homicide							
Washington, DC	155.73	81.9	0.27	0.13	7.59	0.46	0.051
Detroit, Michigan	265.82	219	0.3	0.31	0.51	0.15	0
Total Gun-Related Crime							
Washington, DC	2497.09	2185	4.27	3.46	2.08	0.49	0.34
Detroit, Michigan	8098.91	6230	9.11	8.8	0.39	0.7	0.002

CHAPTER FIVE

DISCUSSION AND CONCLUSION

Discussion

The purpose of this study is to analyze the impact of a change in gun legislation on gun crime rates in Washington, D.C., and Detroit, Michigan. In order to accurately assess gun crime trends, data from the National Archive of Criminal Justice Data (NACJD) at the University of Michigan were used. Additionally, data from the FBI's Uniform Crime Report were also used in the analysis. I narrowed down my research to two cities, Washington, D.C., and Detroit, Michigan. Washington, D.C., was paramount for the analysis because the change in legislation initiated in Washington, D.C., and primarily affected this city. Detroit, Michigan, was solely implemented in the analysis as a comparison city, leaving the focal point of this study on Washington, D.C. The legislative change, in other words, the intervention, analyzed in this study was the Firearms Control Regulations Act (FCRA). The FCRA was enacted in Washington D.C. in 1976 and nullified in 2008 by the Supreme Court ruling in Washington D.C. v. Heller (2008). Detroit, Michigan, was used as a comparison city due to its characteristic similarities to Washington, D.C., such as population size and average crime rates. Both cities were analyzed using an interrupted time series model, where variables such as firearm homicide, homicide, and total violent

firearm crime were assessed for their rates before and after the Heller decision (in other words, the interruption), which changed the fabric of the FCRA.

The interrupted time series analysis yielded insignificant results in each of the three Washington D.C. models yet statistically significant results for the Detroit, Michigan crime measures. However, I determined that the effects of Heller were insignificant in explaining the change in gun crime trends based across both cities, despite the Detroit models having produced significant results. The Detroit models were deemed insignificant, primarily due to the lack of control variables, which might have helped rule out other factors that could explain the decline in crime trends observed in Detroit. If my analysis controlled for influences outside of the Heller decision, the decline in gun-related crime trends could have been narrowed down to the interruption.

Moreover, had Washington D.C. reached significance across all three models, coupled with Detroit, this may have provided secure enough evidence to reject the null hypothesis, despite a lack of controls. In short, the standard I set for rejecting the null hypothesis and having high confidence in accepting my stated (alternative) hypothesis was conditioned firstly on the evidence for Washington D.C. to be compelling; by this, I mean, consistently significant across all three models. Moreover, secondly, that Detroit would also look similarly since despite not having the same FCRA statutes in the city, it is reasonable to speculate that the Supreme Court declaring handgun bans in violation of the

constitution would influence views about the rights of people to have handguns in a way that removes some of the taboo against owning gun illegally.

Given that this study is primarily a departure from the Loftin et al. (1991) study—in a sense it's diametric opposite--considering they measured the implementation of the same policy for which I measured the nullification, some 32 years later, one might wonder why their results contrast to mine such that they found the FCRA to reduce homicide and suicide rates subsequent to its implementation significantly, and I find that its removal did not contribute to a significant rise in gun-related crime in the same city. Notably, my analyses of total homicide, as well as gun homicide in D.C., was only slightly above the significance threshold at .051 and .051, respectively, while Washington D.C. exhibited a 56% decline in average monthly homicide rates and a 59% decline in average monthly gun-related homicides rates post-Heller (considering the full 1980-2015 trends). However, using a p-value threshold of p=.05 or lower, I could not reject the null given that the models were insignificant and, furthermore, because I did not include control variables. Given the lack of controls and the overall national decline of crime in the United States, there is no way to determine if the observed decrease in homicide and gun-related homicide in D.C. is not attributable to unobserved macro-level forces.

In addition, the contrast in conclusions between my study and Loftin et al.'s (1991), could also be because they accounted for alternate means of execution aside from a firearm in their analysis regarding their measures. They

also measured suicide, two factors that are significantly different between our study designs.

Conclusion

This study sought to contribute to the literature on the effects of gun legislation by employing a quasi-experimental ITS design to test the impact of gun decontrol. Similar to many other studies, this study failed to uncover any significant statistical effects of gun decontrol as a result of the Heller decision. Gun crime in the United States is a complicated matter where policy measures geared toward gun control and gun decontrol have across many studies produced mixed results in the empirical literature, frequently leaving researchers with inconsistent explanations. Gun culture plays a big part in effectively addressing issues with gun laws. Given the political controversies and special interest influences regarding gun rights and gun regulation policy in the U.S., researchers will need to seriously consider the association between gun policy and gun crime to provide better empirical evidence that informs policy decisions.

The current study design is not without limitations. First, the timeframe of data analyzed after the intervention was five years. The determination of an effect due to the intervention is the most valid with ten years of data before or after the interruption. Any more data points than that do not contribute to the validity of an interrupted time series analysis. Second, neither of the data sets include demographic information. The raw data sets acquired from the D.C.

Metropolitan police department and the FBI's Uniform Crime Report did not include any measures on demographics. Third, the statistical analysis lacked control variables such as seasonality and economy. Future research on the impact of the Heller decision would benefit from incorporating controls because any conclusions regarding the Supreme Court decision would be more valid. Fourth, no determination of causality of a shift in the target variable is identifiable because interrupted time series is only capable of explaining if an intervention has either a positive or negative effect. Future researchers seeking to study this topic might benefit from utilizing an analysis which determines causality to strengthen their assertions with contextual reasoning. Considering these limitations, based on the analysis, I find the intervention did not significantly increase crime rates for any of the variables measured in Washington, D.C.

REFERENCES

Bagley, B. M. (1988). US foreign policy and the war on drugs: Analysis of a policy failure. *Journal of Interamerican Studies and World Affairs*, *30*(2-3), 189-212.

Barker, V. (2010). Explaining the great American crime decline: A review of Blumstein and Wallman, Goldberger and Rosenfeld, and Zimring. *Law & Social Inquiry*, *35*(2), 489-516.

Bellesiles, M. A. (1996). The origins of gun culture in the United States, 1760-1865. *The Journal of American History*, *83*(2), 425-455.

Blocker Jr, J. S. (2006). Did prohibition really work? Alcohol prohibition as a public health innovation. *American Journal of Public Health*, *96*(2), 233-243.

Blumstein, A. (1995). Youth violence, guns, and the illicit-drug industry. *Journal of Criminal law & Criminology*, *86*, 10.

Blumstein, A. (2003). The notorious 100:1 crack: powder disparity--the data tell us that it is time to restore the balance. *Federal Sentencing Reporter, 16*(1), 87-92. doi:10.1525/fsr.2003.16.1.87

Blumstein, A., & Rosenfeld, R. (2008). Factors contributing to US crime trends. In understanding crime trends: Workshop report*. National Academies Press, 2*,13-44.

Boyum, D. A., Caulkins, J. P., & Kleiman, M. A. (2011). Drugs, crime, and public policy. *Crime and public policy*, 368-379.

Brown, D. (2018). These are the 10 US states with the weakest gun laws in 2017. Retrieved March 3, 2019, from www.businessinsider.com

Carter, G. L. (2006). *Gun control in the United States: A reference handbook*. Santa Barbara, CA: ABC-CLIO.

Centers for Disease Control and Prevention. (1998). Rates of homicide, suicide, and firearm-related death among children -- 26 industrialized countries. *Morbidity and mortality weekly report.* Retrieved March 03, 2019 from www.cdc.gov

Christensen, J. (2017). Why the US has the most mass shootings. Retrieved March 02, 2019, from www.cnn.com

Clark, D. (2018, March 12). Is most gun crime committed by those who illegally possess guns? *PolitiFact*. Retrieved from www.politifact.com

Cooper, A., & Smith, E. L. (2012). *Homicide trends in the United States, 1980-2008.* Washington, DC: Bureau of Justice Statistics.

District of Columbia v. Heller, 554 U.S. 570, 128 S. Ct. 2783, 171 L. Ed. 2d 637 (2008).

Duwe, G., Kovandzic, T., & Moody, C. E. (2002). The impact of right-to-carry concealed firearms laws on mass public shootings. *Homicide Studies*, 6, 271-296.

Eck, J. E., & Maguire, E. R. (2006). Have changes in policing reduced violent crime? *The Crime Drop in America. New York: Cambridge University Press*, 207–65.

Firearms and Crime Statistics. (2019). Retrieved January 08, 2019, from www.bjs.gov

Fox, J. A., & DeLateur, M. J. (2014). Mass shootings in America: moving beyond Newtown. *Homicide Studies*, *18*(1), 125-145.

Funk, T. M. (1994). Gun control and economic discrimination: The melting-point case-in-point. *Journal of Criminal Law & Criminology*, *85*, 764.

Gramlich, J. (2019). 5 facts about crime in the U.S. Retrieved February 18, 2020, from www.pewresearch.org

Grinshteyn, E., & Hemenway, D. (2016). Violent death rates: the US compared with other high-income OECD countries, 2010. *The American Journal of Medicine*, *129*(3), 266-273.

Grogger, J., & Willis, M. (2000). The emergence of crack cocaine and the rise in urban crime rates. *Review of Economics and Statistics*, *82*(4), 519-529.

Humphreys, D.K., Gasparini, A., & Wiebe, D. J. (2016). Evaluating the impact of Florida's "Stand Your Ground" self-defense law on homicide and suicide by firearm: An interrupted time series study. *JAMA Internal Medicine*. 2017;177(1): 44-50. doi:10.1001/jamainternmed.2016.6811.

Jacobs, J. B., & Potter, K. A. (1995). Keeping guns out of the wrong hands: The Brady law and the limits of regulation. *Journal of Criminal Law & Criminology*, *86*, 93.

Kates, D. B., & Mauser, G. (2006). Would banning firearms reduce murder and suicide-a review of international and some domestic evidence. *Harvard Journal of Law & Public Policy*, *30*, 649.

Kleck, G., Britt, C. L., & Bordua, D. J. (2000). The emperor has no clothes: using interrupted time series designs to evaluate social policy impact. *Journal on Firearms & Public Policy*, *12*, 197.

Klukowski, K. A. (2009). Citizen gun rights: incorporating the Second Amendment through the privileges or immunities clause. *New Mexico Law Review.*, *39*, 195.

Knopov, A., Siegel, M., & Pahn, M. (2018). Gun violence in the US kills more black people and urban dwellers. Retrieved March 02, 2019, from www.theconversation.com

Kontopantelis, E., Doran, T., Springate, D. A., Buchan, I., & Reeves, D. (2015). Regression based quasi-experimental approach when randomisation is not an option: Interrupted time series analysis. *bmj*, *350*, h2750.

Kovandzic, T. V., & Marvell, T. B. (2003). Right-to-carry concealed handguns and violent crime: Crime control through gun decontrol? *Criminology & Public Policy*, *2*(3), 363-396.

Kwon, I. W. G., Scott, B., Safranski, S. R., & Bae, M. (1997). The effectiveness of gun control laws: Multivariate statistical analysis. *American Journal of Economics and Sociology*, *56*(1), 41-50.

Lambert, M. T., & Silva, P. S. (1998). An update on the impact of gun control legislation on suicide. *Psychiatric Quarterly*, *69*(2), 127-134.

Loftin, C., McDowall, D., Wiersema, B., & Cottey, T. J. (1991). Effects of restrictive licensing of handguns on homicide and suicide in the District of Columbia. *New England Journal of Medicine*, *325*(23), 1615-1620.

Lott, Jr, J. R., & Mustard, D. B. (1997). Crime, deterrence, and right-to-carry concealed handguns. *The Journal of Legal Studies*, *26*(1), 1-68.

Ludwig, J., & Cook, P. J. (2000). Homicide and suicide rates associated with implementation of the Brady Handgun Violence Prevention Act. *The Journal of the American Medical Association*, *284*(5), 585-591.

Ludwig, J. (1998). Concealed-gun-carrying laws and violent crime: Evidence from state panel data. *International Review of Law and Economics*, *18*(3), 239-254.

Makarios, M. D., & Pratt, T. C. (2008). The effectiveness of policies and programs that attempt to reduce firearm violence: A meta-analysis. *Crime & Delinquency*, *58*(2), 222-244.

Martin, S. E., Maxwell, C. D., White, H., & Zhang, Y. (2004). Trends in alcohol use, cocaine use, and crime: 1989-1998. *Journal of Drug Issues*, *34*(2), 333-359.

Matthews, D. (2018). Mass shootings represent a tiny share of all shooting deaths. Retrieved February 23, 2019, from www.vox.com

Messner, S. F., & Rosenfeld, R. (1997). Political restraint of the market and levels of criminal homicide: A cross-national application of institutional-anomie theory. *Social Forces*, *75*(4), 1393-1416.

Miller v. Texas, 153 U.S. 535, 14 S. Ct. 874, 38 L. Ed. 812 (1894).

Mullin, W. P. (2001). Will gun buyback programs increase the quantity of guns? *International Review of Law and Economics*, *21*(1), 87-102.

National Archive of Criminal Justice Data. (2019) Resource guide: Uniform Crime Reporting Program. (n.d.). Retrieved January 06, 2019, from www.icpsr.umich.edu

Pan, D., Follman, M., & Aronsen, G. (2019). US mass shootings, 1982-2019: Data from *Mother Jones*' investigation. Retrieved October 03, 2018, from www.motherjones.com

Penfold, R. B., & Zhang, F. (2013). Use of interrupted time series analysis in evaluating health care quality improvements. *Academic Pediatrics*, *13*(6), S38-S44.

Pifer, H., & Minino, A. M. (2018). Morbidity and mortality weekly report (MMWR) *Centers for Disease Control and Prevention*. retrieved march 01, 2019, from www.cdc.gov

Raphael, S., & Ludwig, J. (2003). Prison sentence enhancements: The case of Project Exile. *Evaluating gun policy: Effects on crime and violence*, *251*, 274-77.

Rosenfeld, R., Fornango, R., & Baumer, E. (2005). Did ceasefire, compstat, and exile reduce homicide? *Criminology & Public Policy*, *4*(3), 419-449.

Rosenfeld, R., Wallman, J., & Fornango, R. (2005). The contribution of ex-prisoners to crime rates. *Prisoner reentry and crime in America*, *80*, 102-03.

Rosengart, M., Cummings, P., Nathens, A., Heagerty, P., Maier, R., & Rivara, F. (2005). An evaluation of state firearm regulations and homicide and suicide death rates. *Injury Prevention*, *11*(2), 77-83.

Sampson, R., & Lauritsen, J. (1997). Racial and ethnic disparities in crime and criminal justice in the United States. *Crime and Justice*, 21, 311-374.

Schaeffer, K. (2019). Share of Americans who favor stricter gun laws has increased since 2017. Retrieved February 16, 2020, from www.pewresearch.org

Scutti, S. (2018). Gun homicides on the rise, CDC says. Retrieved January 08, 2019, from www.cnn.com

Sherman, L. W. (2001). Reducing gun violence: What works, what doesn't, what's promising. *Criminal Justice*, *1*(1), 11-25.

Singh, G. K., Kochanek, K. D., & MacDorman, M. F. (1994). Report of final mortality statistics. *Monthly vital statistics*, *45*, 19.

Singh, G. K., & Yu, S. M. (1996). US childhood mortality, 1950 through 1993: Trends and socioeconomic differentials. *American Journal of Public Health*, *86*(4), 505-512.

Starr, S. B., & Rehavi, M. M. (2013). Mandatory sentencing and racial disparity: Assessing the role of prosecutors and the effects of Booker. *Yale Law Journal*, *123*(1), 2-80

Stolzenberg, L., & D'alessio, S. J. (2000). Gun availability and violent crime: New evidence from the national incident-based reporting system. *Social Forces*, *78*(4), 1461-1482.

Travis, J., & Waul, M. (2002, August). Reflections on the crime decline: Lessons for the future. In *Proceedings from the Urban Institute Crime Decline Forum: Urban Institute Justice Policy Center, Washington, DC* (pp. 1-45).

Vittes, K. A., Vernick, J. S., & Webster, D. W. (2013). Legal status and source of offenders' firearms in states with the least stringent criteria for gun ownership. *Injury Prevention*, *19*(1), 26-31.

Wintemute, G. J. (2015). The epidemiology of firearm violence in the twenty-first century United States. *Annual Review of Public Health*, *36*, 5-19.

Wright, J. D., & Rossi, P. H. (1994). *Armed and considered dangerous: A survey of felons and their firearms.* Hawthorne, NY: Aldine de Gruyter Publishing Co.

Xu, J., Murphy, S. L., Kochanek, K. D., Bastian, B., & Arias, E. (2018). Deaths: final data for 2016. *National vital statistics reports: from the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System*, *67*(5), 1-76.