Measuring the Impact of Gun Theft on City-Level Gun Crime Rates

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Measuring the Impact of Gun Theft on City-Level Gun Crime Rates

A Thesis Presented

By

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Bridgewater State University

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In partial fulfillment of the requirements for the degree of

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In Criminal Justice

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Abstract

The history of gun culture in the United States is complicated. Guns are an integral part of American history and attempts to control them through policy are often contentious. However, research suggests that gun crime occurs in areas where there are more guns (Braga, 2017; Braga & Pierce, 2005; Cook, Harris, Ludwig, & Pollack, 2015; Kennedy, 2011; Koper, 2013; Pierce, Braga, Hyatt, & Koper, 2004). Consequently, as gun accessibility increases within cities, the likelihood of gun crime also increases. When researching gun accessibility, it is important to note how guns are accessed. Often, guns are accessible in three ways: (1) legal transactions, (2) straw purchases, or (3) theft (Braga, 2017; Cook et al, 2015; Koper, 2013). Most contemporary gun accessibility research measures the impact of legal gun ownership and straw market transactions on gun crime rates within cities (Braga, 2017, Cook et al., 2015; Koper, 2013). Breaking from conventional research, this study will explore the relationship between city-level gun theft and gun crime to determine if cities experiencing higher rates of gun theft also experience higher rates of gun crime. Environmental criminology suggests that opportunities to acquire guns vary depending on physical and social features of places (Bratingham & Bratingham, 1984; Cohen & Felson, 1979; Meier & Miethe, 1993). Therefore, using environmental criminology as a framework, it is likely that if a stolen gun is used in a crime, it will be used close to where it was stolen. As follows, if gun theft increases in a city – increasing illicit gun availability – so too will gun crime.

Key Words: Gun Crime, Gun Availability, Illicit Gun Markets, Gun Theft, Gang Crime, Environmental Criminology
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Chapter 1

Introduction

Gun culture in the United States is unique compared to other countries. Cultural, racial, and gendered roles in Americans have been shown to correlate with gun ownership (Cretacci & Hendrix, 2017). American history is fraught with violence and the use of guns to accomplish political and revolutionary goals. Examples such as the Revolutionary War, the Civil War, and the “Wild West” illustrate the gun infused history America is marred in (Lemieux, 2014). These historical events were integral in the development of American culture and politics and were largely solved by violence where guns acted as the tools of that violence. American history is infused with gun violence and current policies struggle to cope with the importance of firearms in American history and their deadly applications in crime.

Guns and violence are also deeply entrenched in various Americanized codes of honor (Brown & Imura, 2014). Often, violent honor codes are driven by an expectation to retaliate against signs of disrespect (Leung & Cohen, 2011). Largely driven by a masculine appeal to strength and toughness, failure to retaliate when threatened makes a person appear weak and a target for victimization (Nisbett & Cohen, 1996).

The United States’ contemporary gun policies are a reflection of this struggle to balance its history, Constitutional Rights, and civil rights. For example, Stand Your Ground laws allow an armed person to shoot and kill another person when they believe their life is in danger (Lemieux, 2014). Stand your ground laws do not require a duty to retreat from their assailant, allowing for lawful killing based on the perception of a threat. Notably, states which enact these laws tend to have loose firearm purchasing laws (Lemieux, 2014). Gun cultures encourage a
culture of honor and defensive reputational violence, encouraging laws similar to stand your ground.

This culture of violence and honor contributes to the ownership of firearms in the United States. Gun ownership is often driven by the need to carry concealed weapons in the chance of being assaulted or encountering a life-threatening situation. Americans own the largest number of guns compared to any other civilian population in any other country in the world (Cretacci & Hendrix, 2017; Karp, 2018). With the large prevalence of guns in American culture, studies have linked gun availability in the United States to increased use of guns in criminal incidents such as homicide, suicide, robbery, and gang crimes (Braga, 2017; Cretacci & Hendrix, 2017; Kposowa, Hamilton, & Wang, 2016; Wintemute, 2000).

The United States also has a history of controlling and regulating the use of firearms. In 1934, the National Firearms Act was put in place which prevented the selling and distribution of automatic weapons. In 1994, Congress passed the Violent Crime Control Act which included a ban on assault weapons. However, Congress failed to define exactly what an assault weapon is. Any semi-automatic rifle with a pistol grip and a bayoneted mount was considered an assault weapon (Plumer, 2012). Further, magazines which held more than ten rounds were no longer legal to sell.

The 1994 assault weapons ban contained many loopholes and was largely ineffective. Many loopholes allowed for manufacturers to bypass the technical definition of what constituted an assault weapon, and any assault weapon which was created or owned prior to the ban – including high capacity magazines – were still legal to sell (Plumer, 2012). Further, it is not conclusive if the ban had any impact on reducing gun related crime. The majority of gun crimes are committed by handguns (Kennedy, 2011) so the initial effectiveness of this ban is very
limited. Further, there were more than 1.5 million assault weapons and 24 million high capacity magazines already in circulation before the ban (Plumer, 2012). Therefore, it was still relatively easy to obtain an assault weapon.

Moreover, although there was a decline in gun crime following the mid-1990s, it is unlikely the 1994 ban contributed much (Plumer, 2012). The ban only lasted ten years as Congress failed to renew it in 2004. Thus, the ban is no longer in effect federally. Gun control policies in the United States are very complex and enter the political forefront often in the name of safety, but research is unclear how effective these policies actually are at preventing crime (Braga, 2017; Cook & Laub, 1998; Kennedy, 2011; Kleck, 1997; Hoskin, 2011; Karp, 2018).

For decades, researchers have tried to determine if there is a relationship between gun availability and gun violence. Some studies suggest that gun availability will increase levels of gun violence (Cook & Laub, 1998; Kleck, 1997; Hoskin, 2011; Karp, 2018), others found that gun availability should decrease gun violence (Archer & Erlich-Erfer, 1991; Maggaddino & Medoff 1984; McDowall & Loftin, 1983), and others still found that there is no relationship at all (Wolfgang, 1958). This study will attempt to contribute to existing literature by examining illicit gun availability, as measured by gun theft rates, and its impact on gun crime.

Chapter 2

Gun Violence

Research on Gun Violence

Gun violence in the United States increased drastically between the 1970s-1990s (Braga, Papachristos, & Hureau, 2010; Kleck, 1997). Between 1970 and 1980, gun related homicide rates increased 19% and another 3% between 1980 and 1993 (Kleck, 1997). 1993 marked the highest number of gun related murder incidents in the United States with a total of 17,075 across
the country compared to years before (Blumstein, 1995; Braga, Papachristos, & Hureau, 2010; Cook & Laub, 1998). Figure 1\textsuperscript{1} illustrates the number of firearm crime events from 1993-2011.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Number of Firearm incidents (1993-2011)}
\end{figure}

As seen in Figure 1, following 1993, gun related homicide rates have declined in the United States, however, compared to its neighbors, the United States retains uniquely high rates of gun related homicide (Hoskin, 2011). Further, homicide incidents are more likely to involve firearms in the United States compared to its neighbor, Canada. In 2009, 67\% of murders in the United States were committed with a gun, where only a third of homicides involved a gun in Canada (Hoskin, 2011). Recently, in 2015, two thirds of homicide in the United States involved a firearm (Cook, Harris, Ludwig, & Pollack, 2015).

The high rates of gun related homicide within the United States may be connected to the number of guns available within the country in addition to the gun culture discussed above. Although research is unclear about the exact relationship between gun availability and gun

\textsuperscript{1} Data collected from (National Crime Victimization Survey, 2011)
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violence, it is noteworthy that the United States not only has higher rates of violent gun crime compared to other Western countries, but also has some of the highest ownership rates of guns across the world. In a 2018 global survey, researches estimated that over 857 million private civilians – not military or law enforcement personnel – owned firearms – with 393 million of these firearms are owned in the United States (Karp, 2018). Nearly half of the world’s privately-owned firearms are owned in America. The same survey reported firearm ownership rates in the United States are as high as 120.5 firearms per 100 people (Karp, 2018). There are more guns than people in the United States. Consequently, gun violence and gun availability are topics of public policy. With so many guns available in the country, there must be adequate policies in place to control the use of guns considering how fatal guns are compared to other weapons (Koper, 2013).

Chapter 3
Gun Availability

One reason the United States has more gun crime is because of the ease of obtaining a gun. Gun availability refers to multiple ways in which a person acquires a firearm (Braga, 2017, Cook et al., 2015; Koper, 2013). Guns can be acquired through either legal or illegal means. Legal gun availability is often measured through legal gun ownership and sales (Cook et al., 2015). Illicit gun availability is often measured by the number of accessible guns within a city which are not legally owned.

Researchers have attempted to establish a relationship between gun availability and gun crime. Generally, there are three competing views on the impact of gun availability on gun crime: (1) increased gun availability and accessibility does not impact gun crime, (2) increased
gun availability and accessibility increases the likelihood of gun crime, and (3) increased gun availability and accessibility reduces the likelihood of gun crime (Hoskin, 2011).

**1) Gun Availability and Accessibility Does Not Impact Gun Crime.** There is no clear consensus in gun crime research as to which viewpoint is empirically stronger. Various studies have shown that cities with more guns have higher rates of gun crime (Braga, 2017; Dierenfeldt, Brown, & Roles, 2016; Stolzenberg & D’Alessio, 2000). Underlying this thought is that if guns are accessible, offenders are more likely to use them because of the ease firearms have to inflict serious harm from a distance compared to other weapons (Hoskin, 2011).

However, researchers have argued that the availability of guns does not increase gun crime because criminals will find the tools necessary to commit whatever crime they are aiming to commit, despite the presence of firearms (Wolfgang, 1958). This perspective is largely considered outdated because it predates many current criminological theories. Further, most research sets out to either prove a positive or a negative relationship between gun availability and gun crime.

**2) Gun Availability and Accessibility Increases the Likelihood of Gun Crime.** At first glance, it would appear that gun ownership and gun violence are positively correlated. As the United States has the highest rate of gun ownership in the world and is one of the leading countries in gun crime rates (Cook & Laub, 1998; Kleck, 1997; Hoskin, 2011; Karp, 2018). However, ownership is not the only measure for gun availability. There are several proxy measures for gun availability in the literature. Using firearm vendors as a proxy for both legal gun availability, Steidley, Ramey, & Shrider (2017) measured if Federal Firearm Licensees (FFLs) acted as social institutions conducive to violent crime. Steidley et al., (2017) found that as
the number of federal firearm vendors in a city increased, so too did homicide and robbery rates, suggesting a positive relationship between gun availability and gun crime.

Another proxy used to measure gun availability is gun related suicide rates (Karp, 2018; Kposowa, Hamilton, & Wang, 2016). This measure is imperfect and is intrinsically linked to national cultures around firearms and suicide, therefore the effectiveness of the proxy changes depending on the geographic subject of the study (Karp, 2018). However, Anestis & Houtsma (2017) found support that suicide rates within states are higher in those which have higher rates of gun ownership.

Finally, guns are powerful tools in competing criminal organizations such as youth gangs. In Boston in the late 1980s and 1990s, youth homicide was often connected to gang crime and commonly involved the use of a firearm (Kennedy, 2011). The Boston Gun Project was a joint response from youth workers, the Boston Police Department, and a group of Harvard Law researchers. The operation attempted to reduce youth homicide in Boston by targeting specific gangs which were disproportionately involved in youth homicide, and by removing gang access to firearms. Widely considered a success, the Boston Gun Project reduced youth homicide in Boston by over 66% (Braga, Hureau, & Papchristos, 2014). However, the results put into question the effect that gun availability has on other violent crimes. As proposed by Wolfgang (1958), reducing the number of available firearms will not prevent violent crime as offenders will resort to different weapons or means of violence.

(3) Gun Availability and Accessibility Deters Gun Crime. As mentioned above, some research suggest that gun availability and accessibility may decrease gun crime (Maggaddino & Medoff 1984; McDowall & Loftin, 1983). Other studies found that gun ownership increases following increased media coverage of local violent crime (Archer & Erlich-Erfer, 1991). This
suggests people will purchase guns in the name of self-defense if they believe they live in violent areas (Cook & Ludwig, 1997). Where researchers who found support for gun availability increasing gun crime suggest that guns come before gun crime, those who posit the opposite suggest that people will arm themselves following a spike or increase in gun crime.

It is important to note, crime is not the only driving force behind gun ownership. In 1997, the Department of Justice (DOJ) noted that 35% of gun owners purchased firearms for recreation, which included hunting and sport shooting (Travis, 1997, p. 3). A further 18% of gun owners purchased guns for hunting only (Travis, 1997, p. 3). Although these numbers are dated, it is clear that gun ownership does not always follow crime, yet their prevalence may still deter gun crime.

Researchers have suggested that the increase of legal firearm purchases and availability of legal firearms will deter violent crime (Lott, 2000). Using Cohen and Felson (1979)’s Routine Activities Theory, Lott (2000) implies that if more law-abiding citizens possess a firearm, there will be less available suitable targets and more capable guardians to prevent criminal incidents.

This argument is closely related to the National Rifle Association’s response to the Sandy Hook Elementary school shooting claiming that the only thing that can stop a bad guy with a gun is a good guy with a gun (Stroud, 2016). As a result, following the Sandy Hook shooting, concealed weapon permits among men have increased driven by a masculine sense of duty to protect family and fear of being dominated by others (Stroud, 2016). However, this increase in firearm ownership has followed a marked decrease in violent crime across the country.

The good guy argument makes a few assumptions about potential legal gun owners. First, this argument assumes that when a good guy purchases a gun, that gun will remain in the hands of that person. As will be discussed in a later section, many legal purchases of firearm lead to
straw transactions, theft, and other forms of illegal commerce of guns. Second, the good guy argument assumes that when someone purchases a firearm, the buyer will remain good and not suffer from an emotional or irrational which may prompt them to use their firearm illegally, will not be influenced by drugs or alcohol, or suffer from a future mental defect. Moreover, there is not enough available research to determine how many legal purchasers of firearms use their firearms legally.

**Crime Guns and Opportunity**

Not all guns are desirable for criminals. Often, crime guns are classified as Saturday Night Specials (SNSs) which are inexpensive handguns – revolvers costing under $150 – are old, and shoot smaller and slower caliber rounds (Koper, 2013). The use of SNSs by criminals, opposed to newer, more expensive guns, is due to the convenience and availability of SNSs. SNSs are three to four times more likely to be used in a crime than new firearms because of their availability to criminals (Koper, 2013). Further, SNSs are often smaller handguns which are easier to carry around compared to large rifles (Koper, 2013). The size of SNSs makes it easier for criminals to conceal, especially within cities.

Studies indicate that criminals would prefer to use newer firearms in the commission of a crime – such as semiautomatic pistols – opposed to SNSs because newer firearms are less likely to already be involved in a crime, may shoot larger and faster rounds, and will likely function better than older, cheaper guns (Cook et al., 2015; Koper, 2013). Semiautomatic weapons are able to hold more bullets in a magazine increasing their potential damage output.

Offenders use firearms which are available to them. For an offender to use a newer, more expensive firearm, the opportunity to obtain it must be present. Just like all crime, gun crime is only committed in places where there is the opportunity for it to occur (Felson & Clarke, 1998). Opportunities are highly specific to each crime committed, in the case of a gun crime, one such
opportunity which is necessary is the presence of a gun, and the ability to obtain the gun quickly. Without a gun, a gun crime cannot occur.

However, there are other factors present in a gun crime. As a form of violent crime, gun crimes share some of the same opportunities as other forms of violent crime. For example, fights can break out because offenders feel a perceived threat to their honor or self-esteem after an insult (Brown & Imura, 2014; Felson & Clarke, 1998; Leung & Cohen, 2011). This is especially true in violent masculine subcultures like violent gangs (Kennedy, 2011; Leung & Cohen, 2011). Additionally, substance abuse social situations to violence among young males who believe they have been wronged by someone (Felson & Clarke, 1998). Violence can also occur preemptively in order to prevent becoming a victim, or it can be retaliatory as the consequence of being victimized (Glass, 2013).

Reducing gun crime, may not have an effect on reducing violent crime (Felson & Clarke, 1998). For example, during the Boston Gun Project, Kennedy (2011) noted that youth gangs were unable to acquire and use firearms to the extent they were before the operation started. As a result, when gang members resorted to violence, instead of shooting each other, they began to fight each other with their hands or blunt objects.

Reducing gun violence may not be able to reduce violence in communities, but it can reduce the lethality of violent incidents as guns are thirteen times deadlier than knives and blunt instruments (Koper, 2013). As guns are a necessary prerequisite for gun crime, understanding how criminals obtain firearms is paramount in preventing guns from being used by offenders. Guns used in crimes are called crime guns (Braga, 2017, Cook et al., 2015, Koper, 2013). Crime gun acquisition research attempts to identify the opportunities in which criminals obtain firearms and measure which avenues are most commonly used to prevent criminal access to guns.
Crime Gun Acquisition

As previously mentioned, gun availability alone does not determine how much gun there may be in a city. Additionally, not all guns will be used to commit a crime. How some guns are obtained and used in a crime is called gun acquisition (Braga, 2017, Braga et al., 2014, Cook et al. 2015, Koper, 2013). Crime gun acquisition research has identified three ways which most criminals obtain firearms: (1) through legal primary and secondary markets, (2) via straw transactions, and (3) by theft (Braga et al., 2010; Braga, 2017; Braga & Pierce, 2005; Cook & Ludwig, 1997; Cook et al., 2011; Koper, 2013; Pierce et al., 2004; Steidley et al., 2017; Stolzenberg & D’Alessio, 2000). These three avenues will be discussed further bellow. Most commonly, crime guns are acquired through straw transactions and secondary markets or buyers (Koper, 2013; Wintemute et al., 2010), however each avenue is unique.

When researching gun crime acquisition, most scholars have attempted to locate where criminals obtained their firearms by attempting to trace firearms which were confiscated by law enforcement following a crime through one of the above mentioned avenues (Blumstein, 1995; Braga, 2017; Braga & Pierce, 2005; Cook & Ludwig, 1997; Cook et al., 2015; Cook et al., 1995; Dierenfeldt et al., 2016; Wintemute et al., 2010). However, due to the lack of documentation and available data, constructing pathways of crime gun acquisition is difficult and inadequate. Figure (2) illustrates the various pathways a legal firearm can take to becoming an illegal firearm.

Legal Purchases: The Primary and Secondary Markets. The primary and secondary markets refer to legal or pseudo-legal gun markets available to consumers (Braga, 2017; Cook et al., 2015; Wintemute et al., 2010). The difference between the two markets largely derives from federal and state regulations regarding legal purchases of firearms. In the primary market, firearms are manufactured by legitimate bussinesses who employ appropriate legal channels to import or export their products to federally liscenced gun dealers (Wintemute et al, 2010).
For example, for a firearm to be imported to the United States, it must comply with the Gun Control Act of 1968. The act prohibits the import of guns in the United States unless: (1) it is being used for research purposes or competition, (2) it is unserviceable and meant to be displayed in a museum, (3) it was previously taken by an American citizen out of the country and is being returned by that citizen, and (4) it is a firearm which is generally considered to be used for sport (Bureau of Alcohol, Tabaco, Firearms, and Explosives, 2011). Manufacturers must follow these guidelines if they intend to import and sell firearms.

Transactions occur by Federal Firearm Licencers (FFLs) (Cook, Molliconi, & Cole, 1995). These dealers must follow federal and state regulations as to whom they can sell, how many firearms of which category can be sold in a single purchase, and what types of firearms can be sold at the dealership. Following every transaction, a licensed gun dealer must complete a Federal 4473 Form\(^2\) to document the sale. However, there is no licence required to manufacture one’s own firearm so long as it is not intended to be sold, can be detected by metal detectors and x-rays, and it requires to be taxed and approved by the ATF (18 U.S.C. 922).

Other than the above mentioned restrictions and documentation needed to complete a transaction, there are other regulations for specific guns which must be followed to complete a lawful sale. All handgun purchases must comply with the 1994 Brady Bill, which regulates the sales of handguns in the United States. During the 1981 attempted assassination of Ronal Reagan, his assistant, James Brady was shot. Brady quickly became an advocate for stricter gun regulations surrounding the distribution of handguns in America as it was a handgun which was used during the assassination attempt. Handguns are defined by the Brady Bill to be any firearm

\(^2\) This form must be completed by both the dealer and the purchaser. It records documentation of the sale, provides background information on the purchaser, and asks confirmation information of the dealer. Upon completion of this form, the sale can legally be made.
which was made with the capability to be fired with one hand and has a short stock (Brady Handgun Control Act, 1994).

For a firearm transaction to be legal, the intended purchaser of the firearm must present legal documentation, such as a lawful licence or permit, that they are allowed to purchase a firearm within the state of purchase. For someone to legally allowed to purchase a handgun, they must comply with all of the following: (1) they cannot be indicted or convicted of a felony, (2) must not be an unlawful user of controlled substances, (3) cannot be adjudicated of a mental disorder, (4) cannot be an illegal immigrant, (5) has not been dishonorably discharged from the armed services, (5) must not have revoked United States citizenship (Brady Handgun Control Act, 1994). The documentation of proof of purchasing ability must be renewed every five years.

Upon presenting state identification proof of purchasing ability, the transferor – or seller – must submit the request of sale to local law enforcement who verify the identification of the buyer. The chief local law enforcement official has five days to revoke or approve the sale (Brady Handgun Control Act, 1994). If there is no word from the chief enforcement officer, the sale is approved. It is unlawful for the transferor to sell the handgun to anyone who violates the list of five limitations mentioned above. However, if the seller is informed after the sale that the buyer violates one of the aforementioned limitations, the seller must notify law enforcement within one business day. Failure to comply with any of these regulations may result in the six month or permanent ban of firearm selling licence and up to $5,000 fine (Brady Handgun Control Act, 1994).

Due to the documentation necessary to produce a legal transaction in the primary market, of all the avenues to obtain a firearm, this is the easiest to trace. If a firearm is purchased from an FFL and used in the commission of a crime, researchers or law enforcement can trace the serial
number of the firearm back to its original purchase and understand the lifespan of the firearm. Only 10-15% of guns confiscated in the commission of a crime can be directly traced to the primary legal market (Braga, 2017; Koper, 2013). Nearly 80% of all confiscated firearms were at some point sold, or passed through private parties outside of the primary legal market (Wintemute et al., 2010).

The secondary market is difficult to define given that each state regulates the purchasing of firearms differently, so what constitutes legal transactions varies greatly by state. Commonly, the secondary market consists of flea markets, individual private dealers, pawn shops, swap meets, and gun shows (Wintemute et al., 2010). Further, firearms can be bought and sold online. Studies have just recently begun research on how crime guns are acquired through the Dark Web (Weimann, 2016). Unlike the primary market, secondary market transactions frequently do not involve documentation of the sale (Cook, Molliconi, & Cole, 1995).

A common analogy used to explain the differences between the primary and secondary gun markets is to compare them to the primary and secondary markets for motor vehicles (Cook, Harris, Ludwig, & Pollack, 2015; Cook, Molliconi, & Cole, 1995). In the primary market, buyers are able to easily locate the model they are interested in, quickly able to find dealerships, and there is a certain level of quality which the buyer can count on because of all the necessary regulations. In the secondary market, buyers must locate dealers, often through word of mouth, the internet, or newspaper advertisements (Cook et al., 2015; Wintemute, 2016). There is not nearly the same amount of paperwork in the secondary market – some sales between private hands do not require documentation at all – nor is there any guarantee that the seller is the legal owner of the firearm.
To provide an example, gun shows are often discussed when debating the efficacy of secondary firearms sales. Gun shows are temporary markets where guns and ammunition are sold by both licensed dealers – FFLs – and private owners who – depending on the state where the gun show is – are not required to be licensed. Private sellers are able to bypass licenses because of a clause in the Gun Control Act of 1968 which mandates that those who are engaged in the business of selling firearms must be licensed (Garrett, 2019). Simply put, private sellers are not supposed to make a profit on the sales of firearms and are therefore not invested in the business of selling firearms.

Currently, 32 states allow for private sellers to sell guns at gun shows without requiring the seller to have a license or for the seller to conduct a background check. Nine, which include California, Colorado, Connecticut, Delaware, New York, Oregon, Rhode Island, and Washington, states require a background check for every sale of a firearm (Garrett, 2019). States such as Maryland and Pennsylvania require background checks only for handgun purchases, where states such as Hawaii, Illinois, Massachusetts, and New Jersey require private sellers to obtain a state permit (Garret, 2019). Finally, Michigan, Nebraska, and North Carolina require state permits only to sell handguns (Garret, 2019). Although states vary in their regulation of private party sales, it is important to note that those who live in states such as New York and Oregon can bypass their state’s regulations by traveling to one of the 32 states which do not have as strict regulations.

**Straw Transactions.** Straw transactions are most common when a firearm is purchased through either the primary or secondary market and given or sold to a person legally prohibited from owning a firearm (Koper, 2013). This will be discussed shortly. Firearm ownership prohibitions exist for specific groups of people including convicted felons, minors, domestic
violence offenders, individuals legally determined to have a mental illness, and controlled substance abusers (Wintemute et al., 2010). These restrictions exist federally, but states also have their own varying restrictions.

Typically, a straw transaction occurs when someone known to the offender purchases a firearm and gives it to the prohibited owner (Braga, 2017). The term “straw transaction” refers to the redirection of a gun away from the legal market into an illegal transaction. Thus, even if the original purchase was through an FFL, there may not be a paper trail linking the firearm from the buyer to the offender. As a result, the initial purchase of a straw transaction from either an FFL or a secondary market is not illegal if the dealer sold the gun to an eligible buyer. This is different from the gun show loophole because anyone could purchase a firearm from an FFL and lend it to someone else. The gun show loophole allows private sellers to sell guns without a license, whereas a straw transaction occurs after the original point of sale.

As previously mentioned, obtaining firearms illegally through straw transactions is common. Koper (2013) suggests that as many as 40% of guns recovered by law enforcement in the commission of a crime were obtained through straw transactions. Coupled with Wintemute et al. (2010) assertion that as many as 80% of crime guns at some point transferred through private parties independent of the primary market, it is clear that straw markets represent a major source of crime guns. Regardless of legal restrictions, once a firearm is purchased through a straw dealer, it is largely untraceable by federal and state governments. This is especially true if the firearm was physically altered, such as the serial number being damaged. Researchers can still observe larger trends when measuring the lifespan of a firearm by noting where a firearm was used in a crime and where it was originally purchased, but without a paper trail, the full lifespan of a firearm cannot be accounted.
Most crime gun acquisition research attempts to construct straw markets by tracing the lifespan of confiscated firearms (Braga, 2017; Braga & Pierce, 2005; Cooke et al., 2015; Koper, 2013; Pierce et al., 2004). Researchers use trends found in trace data to determine if crime guns were originally purchased within the city it was seized by law enforcement, within the state, or from somewhere else in the country. If a firearm was altered, such as the serial number being damaged or removed, or if there is no documentation of a sale, the lifespan of the firearm is incomplete.

When analyzing straw markets and tracing firearms, researchers rely heavily on ATF tracing practices. These practices begin when a firearm is confiscated by a law enforcement agency and submitted to the ATF for tracing. It is important to note that law enforcement agencies are not mandated to submit firearms to the ATF for tracing, in fact, few do (Braga, 2017). The ATF uses FFL forms, any documentation used by a secondary transaction, and Federal 4473 forms to trace the lifespan of the firearm from the time of the crime to the original purchase. Due to the heavy reliance on a paper trail, this tracing method has many shortcomings.

Offenders often find other illegal opportunities to acquire firearms. For instance, some offenders acquire firearms from illegal drug markets (Cook et al., 1995). Braga (2017) suggests that illegal secondary markets can consist of large interstate structures which mirror interstate drug markets. Specifically, Braga (2017) notes the Iron Pipeline which traverses states on the East Coast connected by the I-95 highway.

Because of ATF tracing method restrictions, and the lack of mandated reporting/tracing policies, the data on straw market transactions is very limited. In cases where a firearm retains its serial number, it can be traced to its initial sale, but there are often gaps in its lifespan. These gaps can be caused by the lack of documentation of a sale or the theft of a firearm.
**Gun Theft.** Stealing a gun represents one of the most difficult pathways of a firearm to trace. When a gun is stolen, there is no legal or illegal transaction of the gun, no paper trail with the exception of a police report. However, the police report will only note that a gun was stolen, not who currently is in possession of the gun. As a result, gun theft provides an opportunity for criminals to bypass federal and state regulations, and bypass straw market pricing points to obtain a firearm. This means that there is no direct monetary cost to the offender. As previously stated, offenders tend to use SNSs in the commission of a crime partially because they are cheaper. However, stealing a firearm allows an offender to acquire a more expensive firearm with more destructive capabilities without having to worry about a pay barrier to the access of the firearm.

Although offenders are able to acquire newer firearms by stealing them, they are also limited to the opportunities around them. An offender can only steal guns which they have access to. As a result, handguns account for 63% of all guns stolen (Langton, 2012). This is likely because handguns account for between 50% to 60% of guns owned (Azreal, Hepburn, Hemenway, & Miller, 2017; Travis, 1997). Further, handguns account for the majority of guns used in crimes because of their ability to be concealed easily (Koper, 2013). Therefore, handguns are more likely to be targeted by burglars and theives.

Of crime guns confiscated by law enforcement, a significant portion were found to be stolen at some point in their lifespan (Koper, 2013). During a survey of prison inmates, Wright & Rossi (1986) recorded that 47% of felons had stolen a firearm in their lifetime and 32% of felons who possessed handguns had personally stolen the firearm.

Firearm theft can also aid in the construction of illicit firearm markets (Cook, Molliconi, & Cole, 1995; Sutton, 2010). Specifically, stolen firearm markets exist where offenders target
firearms for theft and sell them to potential buyers. Thieves in these markets will target firearms
for theft only when they believe there is a demand for a specific form of firearm (Sutton, 2010).
Therefore, these theives tend to have close ties and relationships to illicit markets. These markets
can be physical, such as the Iron Pipeline (Braga, 2017), or virtual over the Dark Web
(Wintemute, 2016). Typically, illicit firearm markets are run by violent gangs. This will be
discussed in a future section.

There is limited understanding of how illicit gun availability by theft impacts gun crime. As
traditional tracing methods cannot adequately track stolen firearms – because traditional
methods are only useful for tracing legally owned firearms – researchers have instead tried to
learn the pathway a gun takes from a legally owned firearm to a stolen firearm, and the
relationship between gun theft and gun crime within cities (Dierenfeldt, Brown, & Roles, 2016;
Stolzenberg & D’Alessio, 2000). These research designs posit that as illicit gun availability
within a city increases, so too does gun crime.

It is important to note that these studies focus on gun theft and gun crime within cities
and not at smaller levels of analysis. Using smaller units of analysis can provide more detail on
specific offender motivations (Felson, 2008). Further, gun crime is not evenly distributed across
cities, often concentrating in specific neighborhoods or streets (Braga, Papachristos, & Hureau,
2010; Kennedy, 2011). By aggregating data at city levels, contemporary studies are unable to
provide specific factors which may correlate with gun theft incidents. Further, using smaller
levels of analysis would provide more insight in determining how secondary and illicit markets
influence gun crime patterns.

Using city level data however is often the only available data which researchers have
access to. Obtaining accurate data of gun theft incidents within cities or neighborhoods is
difficult as there does not exist a comprehensive law enforcement database which tracks the location of where firearms were stolen. The only law enforcement database which records the serial numbers of stolen firearms is the National Crime Information Center (NCIC). This database is not publicly accessible and requires law enforcement credentials to use. Therefore, cities are often the smallest level of aggregation researchers can use when analyzing gun theft.

*Figure 2* illustrates one example of the various pathways that a gun can take before it is recovered by law enforcement after the commission of a crime. The figure illustrates that a firearm can be stolen at any point in its lifespan either from an FFL, a secondary market hub, or from an owner. After a firearm is stolen, it can be used in a crime and can be illegally sold multiple times. These pathways can create a cycle in which a single firearm is transported via secondary markets, straw transactions and theft until it is somehow confiscated by law enforcement.

*Figure 2*

*The Paths of a Crime Gun*
Gangs and Crime Guns

Gangs play a vital role in the distribution of illicit guns, and disproportionately account for many counts of gun crime (Bjerregaard & Lizotte, 1995; Pyrooz, Moule, & Decker, 2014; Roberto, Braga, & Papachristos, 2018). During the Boston Gun Project, youth gangs accounted for less than one percent of the city’s youth population, but were responsible for more than sixty percent of youth homicide within the city (Braga, 2014). Newer gang research suggests that gangs often use guns to protect themselves from violence, not to cause violence (Glass, 2013; Peterson, Taylor, & Esbensen, 2004). Consequently, gangs arm themselves with weapons, including firearms, to protect themselves from rivals (Cook, Ludwig, Venkatesh, & Braga, 2007).

Violent gangs in the United States emerged primarily in response to shifting socio-economic structures during the late 1970s and early 1980s (Braga, 2003). These socio-economic shifts were caused employment opportunities moving away from city centers destabilizing urban centers (Moore & Tonry, 1998). As socio-economic structures in inner cities deteriorated, urban reliance on formal social controls, such as law enforcement, to prevent victimization became less effective causing for youth gangs to form (Braga, 2003; Clear 2007; Moore & Tonry, 1998). Further, police organizations were not equipped to deal with the mass social changes during the Civil Rights Movement, the Vietnam War, and the Women’s movement effectively during the professional era of policing (Katzenbach, et al., 1967). As cities changed structurally and socially, there were not adequate methods in place to control the social backlash, helping to lead to an increase in violent and gun crime.

During the 1980s, the country was also hit with additional economic turmoil along with the crack-cocaine and AIDS epidemic. Existing gangs became participants in illicit drug markets managing the distribution of crack cocaine (Moore & Tonry, 1998). As gangs rivaled for
territory over the crack market, they began arming themselves (Braga, 2003; Moore & Tonry, 1998). These gangs became younger as older gang members were incarcerated during the War on Drugs or killed in gang-on-gang violence (Kotlowitz & James, 2012; Rittler, 2009).

During the early 1990s, as gang violence peaked across the country (Hoskin, 2011; Kleck, 1997), gangs had already established a complicated network for procuring firearms and were well armed (Bjerregaard & Lizotte, 1995). During a report published by the U.S. Department of Justice in 1975, twenty years before gang violence spiked, Miller (1975) found that typically half of any gang’s members have access to or own a gun. Alarmingly, despite gang membership largely being driven by a desire to be protected, gang membership increases the likelihood of victimization (Papachristos, Braga, Piza, & Grossman, 2015; Pyrooz, 2015; Roberto, Braga, & Papachristos, 2018). As these gangs are likely to be armed, the victimization faced by gang members is acutely fatal.

Gangs provide means for criminals, or legally barred owners to obtain firearms. As straw markets are difficult to get involved in, and can be scarce (Cook et al., 2015) gangs are able to circumvent legal limitations (Roberto et al., 2018). One such way is through large straw market networks. National gangs may use highways to transport guns and create straw markets. For example, Braga (2017) uncovered evidence of the Iron Pipeline. Represented by the I-95 corridor stretching up the East Coast, Braga (2017) noted that as many as a third of all crime guns confiscated by the Boston Police Department were originally purchased somewhere out of state where most came from states along I-95. Braga (2017) suggests that gang members will hire people to buy guns in bulk from states with looser gun laws than Massachusetts and then sell these firearms illegally in state.
Gangs often reserve their guns for other members of their gang (Roberto et al., 2018). However, gangs do loan their guns to non-members, often with attached financial obligations (Cook et al., 2015). Most importantly, gangs act as large social networks able to procure and distribute illegal goods – such as firearms (Adamic & Adar, 2005). Gangs thus act as one of several key gatekeepers to illicit gun access.

**Theoretical Framework**

**Routine Activities Theory, Gangs, and Crime Guns.** In past studies, when researching the origin of crime guns, researchers often use environmental criminology to inform their research (Huebner, Martin, Moule Jr., Pyrooz, & Decker, 2016; Spano, Freliech, & Bolland, 2008). Environmental criminology puts forth three assertions to inform criminal understanding: (1) criminal behavior is significantly influenced by the immediate environment, (2) crime is not randomized in space and time, and (3) understanding how the environment influences criminal behavior is vital in preventing and stopping crime (Wortley & Mazerolle, 2008).

It is important to note that routine activities theory is an environmental criminology theory, and not a crime theory. Crime theories study the event of a crime, such as a robbery, where criminology theories study on the motivations and behaviors of the offenders to understand how and why a crime occurs (Bratingham & Bratingham, 1984).

Specifically, researchers apply routine activities theory to determine how environmental factors impact the likelihood of gun victimization (Huebner et al., 2016; Spano et al., 2008). Traditional routine actives theory suggests that crime concentrates in space and time based on the convergence of three elements: (1) a motivated offender, (2) a suitable target, and (3) the lack of capable guardianship (Cohen & Felson, 1979; Felson, 2008). Huebner et al (2016) also use Cohen, Klugel, and Land’s (1979) lifestyle-routine activities theory to predict gang victimization citing gang membership and gun carrying as risky lifestyle behaviors.
Expanding on routine activities theory, Brantingham & Brantingham (1984) suggest there are six vectors of a crime event, as shown in Figure 3. Brantingham & Brantingham suggest crime is a rare event and occurs when six factors converge (1984). The six factors: (1) law, (2) target/victim, (3) site, (4) crime as situational, (5) mechanics, and (6) offender, all create the opportunity for crime to occur. Of opportunity, there are two kinds, one where opportunity is made, and another where an opportunity presents itself (Brantingham & Brantingham, 1984). The former refers to a level of planning and premeditation on the side of the offender, whereas the latter occurs when an opportunity is formed in the moment and then capitalized on by an offender.

Figure 3

Crime Opportunity

Law

Offender

Mechanics

Situational

Target “Victim

Site

Structural Backcloth: Values and Norms of Society

Brantingham & Brantingham (2001)

Meier & Miethe (1993) further add to routine activities theory by added three more elements – (1) proximity to crime, (2) exposure to crime, and (3) target attractiveness –and
expanding on capable guardianship. Proximity to crime refers to the distance between areas which have a concentration of suitable crime targets and motivated offenders. Victimization is more likely to occur when a person lives close to these areas and when their lifestyle may expose them to crime (Meier & Miethe, 1993). Examples of lifestyles which are more prone to victimization include the amount of time spent in public places, such as bars, pubs, night clubs, and other social spaces where there may be alcohol or drugs present (Felson & Clarke, 1998). Target attractiveness refers to an individual’s level of ownership or expensive portable goods including money, jewelry, or even guns (Meier & Miethe, 1993). Finally, Meier and Miethe (1993) expand on capable guardianship by suggesting there are two facets of guardianship, social and physical. Social guardianship refers to friends, family, or other social networks a person can rely on, where physical guardianship applies to target hardening techniques such as physical barriers, cameras, lights, etc.

When measuring gun crime victimization, Wintemute (2000) noted that gangs represent a particularly vulnerable group because of the close relationship between victimization and offending (Thornberry, Krohn, Lizotte, & Wierschem, 1993). Gangs are often gatekeepers in the facilitation of illicit firearms and are therefore heavily armed (Wintemute et al., 2010). Both offending rates and victimization rates of gang members were found to be higher during a member’s tenure in a gang than before or after (Spano, et al. 2008). As a result, gangs represent motivated offenders and suitable targets of various forms of crime.

To provide an example of the close relationship between offending and victimization, gangs may arm themselves with firearms to prevent being targeting by other gangs. However, guns also act as a measure of target attractiveness where other offenders may target a gang with firearms to steal their firearms (Meier & Miethe, 1993). Thus, high crime areas may suffer from
robberies and burglaries because people who carry illicit objects, such as firearms or drugs, are often targeted for the illicit objects they carry (Braga, Hureau, & Papchristos, 2011; Meier & Miethe, 1993).

Other studies have illustrated that crime concentrates around nodal points of interest (Kubrin & Hipp, 2014; Ronceck & Maier, 1991). Research suggests that high traffic areas attract crime. When measuring gun crime specifically, Steidley, Ramey, & Shrider (2017) examined places such as gun shops as a centralized location for gun crime. Steidley et al. (2017) noted that gun store locations are targets for potential thefts and therefore a source of illicit guns. Therefore, it can be assumed that more gun shops within a city may increase the opportunity a criminal has to acquire a firearm illegally. Based on the discussion above, this study will measure the impact of illicit gun availability on gun crime. Where previous studies suggest that legal ownership creates opportunities for gun crime by measuring FFL gun stores, this study will measure gun availability through theft incidents to determine if illicit availability provides a better opportunity for gun crime.

Chapter 4

Methods

Research Question: Do cities with high rates of gun theft experience high rates of gun crime?

Considering FFLs and other locations that sell guns would be the best way to measure legal gun availability and its impact on gun crime, research must be able to systematically examine places with a concentration of primary and secondary markets. Normally, these facilities are concentrated in specific locations within cities and metropolitan areas, and understanding this concentration is important for effective crime prevention strategies and
effective gun policies. However, it is just as important to understand the relationship between
gun theft and gun crime rates within cities.

A number of previous studies used cities as a unit of analysis (Braga, 2017; Braga, et al.,
2014; Cook & Ludwig, 1997’ Cook, Molliconi, & Cole, 1995; Cook et al., 2015; Cook et al.,
2007; Koper, 2013). Given the available data on gun theft and gun crime rates, cities were used
as a unit of analysis. Previous studies suggest this level of aggregation is useful in estimating the
net effects of community gun availability on gun crime rates (Kleck, 2004). Studies which have
determined relationships between individual’s use of guns and their own victimization
(Kellermann, et al., 1993) do not account for how other people’s ownership can impact
community victimization (Kleck, 2004). Additionally, studies which focus on gun crime
incidents can inform about the causes of gun crime (Kleck & DeLone, 1993) but address how
gun ownership and availability increases the chances of gun crime (Kleck, 2004). Therefore,
when analyzing gun availability as an independent variable, it is appropriate to use cities as a
level of analysis.

In social science research, there are various definitions of cities. Often, the most defining
characteristic of a city is the level of urbanization (Frey & Zimmer, 2000). Other definitions are
based on geo-political boundaries defined by government entities like the United States Census
Bureau and local government planners (Ratcliffe, 2012). In this project, a city was defined by
population size. Any geographic place as reported by the U.S. Census with a population of
10,000 or more is considered a city. Based on the research question above, here are the research
hypotheses:
H₀: Cities experiencing greater rates of gun theft do not experience greater rates of gun crime.

H₁: Cities experiencing greater rates of gun theft do experience greater rates of gun crime.

**Data Collection, Unit of Analysis, and Sampling**

This study compares city-level data from across the United States to investigate whether cities with more gun theft have more gun crime. Data was collected from four secondary data sources including the 2016 publications of the Uniform Crime Report (UCR), the National Incident Based Reporting System (NIBRS), the ATF Federal Firearms Licensees Listings (FFL), and the United States Census. The year 2016 was selected because this was the most current year with comprehensive data from across all datasets.

For a city to be included, it had to be a geographic location recognized by the United States Census and must have also reported to the 2016 NIBRS. NIBRS does not have as many police departments which report as the UCR. Thus, some cities – and some entire states – are omitted from this project. After meeting both requirements, the final total sample size was 960 cities.

Next, cities were stratified by population into three strata: (1) large cities, (2) medium cities, and (3) small cities. Gun crime has been shown to concentrate in large cities more heavily and differently than in small cities (Block & Martin, 1997; Braga, 2017; Wintemute, 2000). Therefore, it was important to separate cities by population to see if gun theft affected gun crime differently in larger or smaller cities. Large cities (1) had a population of 100,000 or more, medium cities (2) had a population of 50,000-99,999, and small cities (3) had a population of 10,000-59,999. Table 1 displays descriptive statistics of each city bracket.

Illustrated in Table 1, the number of cities represented in this study is disproportionately small cities. However, it is important to note that the majority of gun theft and gun crime
incidents (*Tables 3, and 4*), occur in large cities, supporting Block & Martin (1997), Braga (2017), and Wintemute (2000)’s assertion that gun crime concentrates in large cities.
<table>
<thead>
<tr>
<th></th>
<th>All Cities</th>
<th>Large Cities</th>
<th>Medium Cities</th>
<th>Small Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>960</td>
<td>83</td>
<td>136</td>
<td>741</td>
</tr>
<tr>
<td>Min</td>
<td>6,175</td>
<td>100,377</td>
<td>50,137</td>
<td>6,175</td>
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<tr>
<td>Max</td>
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<td>787,033</td>
<td>99,685</td>
<td>49,138</td>
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<td>Mean</td>
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<td>226,756.61</td>
<td>70,562.05</td>
<td>22,070.49</td>
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<td>172,103.881</td>
<td>14,700.884</td>
<td>10,905.172</td>
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<tr>
<td><strong>Gun Crime Incidents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>960</td>
<td>83</td>
<td>136</td>
<td>741</td>
</tr>
<tr>
<td>Min</td>
<td>0</td>
<td>12</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>10,365</td>
<td>10,365</td>
<td>1,018</td>
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<tr>
<td>Mean</td>
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<td>149.57</td>
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<td></td>
<td></td>
</tr>
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<td>960</td>
<td>83</td>
<td>136</td>
<td>741</td>
</tr>
<tr>
<td>Min</td>
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<td>Max</td>
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<td><strong>Gang Crime Incidents</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>n</td>
<td>960</td>
<td>83</td>
<td>136</td>
<td>741</td>
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<tr>
<td>Min</td>
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</tr>
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Dependent Variable
The purpose of this study is to determine the impact of gun theft on gun crime. To define gun crime, data was collected from the 2016 NIBRS report which collects national data from law enforcement departments. NIBRS is limited in its scope as not every department is mandated to report to NIBRS.

Each crime reported by NIBRS included three variables which coded for weapon use in the commission of the crime. NIBRS further coded for different categories of weapons used, one of which is firearms. As there were three variables coded for each crime, a total of three weapons could be reported for a crime incident.

To obtain the number of gun crimes in 2016, each crime incident which reported the use of at least one firearm in the commission of the crime was counted as a gun crime incident. Gun crime rates per 1,000 where then calculated for each city. Previous studies have used rates per 100,000 (Stolzenburg & D’Alessio, 2000; Dierenfeldt et al., 2016), but those studies focused on large cities. As this project includes smaller cities, a smaller number was used to divide the rates.

Independent Variable
Crime gun availability is operationalized as gun theft, which is any firearm which was stolen from its legal owner. There are few data sets which provide gun theft data. To obtain the number of gun thefts in each city, data was collected from the 2016 NIBRS report. Both NIBRS and the UCR collect data on stolen or lost property separated by categories including firearms. However, NIBRS codes each stolen item as a separate incident where the UCR compiles stolen property into one measure based on the value of the stolen property. Thus, it was possible to obtain a total number of stolen firearms from NIBRS per city where the UCR could only report the total value of stolen firearms per city.
When NIBRS coded for a crime, it included three variables which accounted for a stolen item. As gun theft in this study acts as a proxy for illicit gun availability, each firearm that was stolen was tallied as a separate event even if NIBRS grouped them in the same incident. A frequency table was generated to determine the number of guns stolen per city (see figure #). This was then calculated into a rate per 1,000.

**Control Variables**

Crime concentrates in small geographic locations, and this is no different for gun crime (Block & Martin, 1997; Wintemute, 2000). Typically, gun crime concentrates in large cities, and within those cities, gun crime is disproportionately represented in a few neighborhoods (Wintemute G., 2000). As data for this study uses cities as the unit of analysis, it was not possible to obtain variables which could control for these smaller pockets of gun crime. Despite this, understanding gun availability through gun theft on city-wide levels throughout the country can still provide important insight on the nature of gun crime.

Considering the unit of analysis for this study consists of cities, to determine whether cities acted as a greater target for gun crime, city-wide statistics were gathered from the United States Census. These statistics included information on the number of houses and apartments owned and rented throughout each city. The number of people employed, or unemployed, and the per capita income of each person living in the city.

Crime concentrates in vacant areas. Each city was thus coded with a percent vacancy variable. To calculate percent vacancy, the total number of houses and apartments in each city were added together. Each house and apartment which was not being owned or rented was considered vacant. A total number of vacant residences was added and divided into the total number of houses and apartments. This number was multiplied by 100 to obtain the percent vacancy variable.
Within cities, gangs represent illicit firearm gatekeepers and control much of their distribution (Roberto, Braga, & Papachristos, 2018; Wintemute, Braga, & Kennedy, 2010). As a result, many gun crimes committed in cities often are related to gangs. It was not possible to control for the number of gang members in each city. Instead, the number of gang crime incidents as reported by NIBRS was counted, divided by the city population and multiplied by 1,000 to determine the gang crime rates in each city.

Gun crime offenders and victims are most commonly males between 15-24 years-old (Kennedy, 2011; Roberto, Braga, & Papachristos, 2018; Wintemute, 2000; Wintemute, Braga, & Kennedy, 2010). Accounting for this, the number of males within that age group was divided by the population of each city and multiplied by 100 to determine the percentage of male 15-24-year-olds in each city.

Data was collected on the occupancy of houses and apartments within each city. Specifically, the number of single parent households and the number of people who live alone without family or roommates was collected. Of single parent households, past studies suggest that the number of single female-headed households is strongly correlated with crime rates (Agnew, 1999). This measure was also controlled for in previous research regarding gun crime (Dierenfeldt et al, 2016). Therefore, the percentage of single female-headed households was calculated as a control for lack of capable guardianship.

Routine Activities Theory persists that offenders are rational and calculating (Cohen & Felson, 1979). Offenders locate suitable targets while conducting their daily routines. As a result, areas where there is a lot of foot traffic often act as a mitigating factor for criminal activity because offenders are less likely to target a spot where people congregate. Further, people who spend more time away from home are more likely to be victimized. To account for foot traffic
and time away from home, two controls were created. First being the percent of people who commute to work by foot, and the second was percent of people who experience a long commute to and from work. A long commute was considered to take ninety-minutes or more. These variables were gathered from the Census.

Previous studies suggest that gun crime occurs in impoverished areas where there is a lot of racial diversity (Dierenfeldt, Brown, & Roles, 2016; Steidley, Ramey, & Shrider, 2017; Stolzenberg & D’Alessio, 2000; Wintemute, 2000). To control for poverty, the number of households which were reported to be living below the poverty level by Census were divided by the total number of households in each city and then multiplied by 100. This created the variable, percent poverty. Another control for poverty including the percent of people unemployed in each city.

Finally, educational attainment and gun violence have been shown to have strong correlations in past studies due to its connection to institutionally isolated youth – a vulnerable population to gun violence (Dierenfeldt, Brown, & Roles, 2016; Thomas & Shihadeh, 2013). Populations which have larger percentages of people who did not graduate high school have been shown to have higher rates of gun violence (Dierenfeldt et al, 2016). Controlling for this, data was gathered from the Census on the percentage of each city’s population which did not graduate high school.

The last control variable used in this study is an accounting of each Federal Firearm Licenser located in each city as reported by the ATF. The number of FFLs act as a proxy to measure the activity of the legal firearm market in each city. Given the debate on the impact of gun availability has gun crime, it was important to control for the legal market when measuring the impact of gun theft on gun crime in each city. Further, this provides an important opportunity
to draw a distinction between legal gun availability and illicit gun availability and their impact on gun crime, allowing for a nuanced addition to the national discussion.

Chapter 5

Analysis

Following the data collection process, the results were calculated in four stages. The first stage consisted of using the complete sample of 960 cities and creating a correlation matrix (Table 2) to determine which variables appeared to be initially correlated. The alpha used in this study was .05 to determine significance. After creating a correlation matrix, a multiple linear ordinary least squares (OLS) regression was run predicting gun crime rates using the above-mentioned controls. Models 2-4 repeated this process using the city population brackets to separate the large, medium, and small cities.

Proceeding the correlation matrix, linear regression analyses were run predicting gun crime rates. An analysis was run which included all cities, and three more models were estimated which included only one of the city population categories.
Table 2: Correlation Matrix

<table>
<thead>
<tr>
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<td>.428**</td>
<td>.045</td>
<td>.462**</td>
<td>.429**</td>
<td>.422**</td>
<td>.171**</td>
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<td>.362**</td>
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<td>3. Gang Crime Rate</td>
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<td>.428**</td>
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<td>.362**</td>
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<td>5. Racial Diversity</td>
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<td>.313</td>
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<td>6. Number Of FFLs</td>
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<td>.273**</td>
<td>.252**</td>
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<td>7. Total Number Of Officers</td>
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<td>9. Long Commute</td>
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<tr>
<td>10. Percent Unemployed</td>
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<td>.274**</td>
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<tr>
<td>11. High School Drop Out</td>
<td>.242**</td>
<td>.463**</td>
<td>.362**</td>
<td>.130**</td>
<td>.319**</td>
<td>.003</td>
<td>.034</td>
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<td>12. Female Headed Households</td>
<td>.270**</td>
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<td>.376**</td>
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<td>.041</td>
<td>.100**</td>
<td></td>
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<td>.516**</td>
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<td>13. Live Alone</td>
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<td>.171**</td>
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<tr>
<td>14. Living Not With Family</td>
<td>.201**</td>
<td>.271**</td>
<td>.381**</td>
<td>.146**</td>
<td>.109**</td>
<td>.111**</td>
<td>.155**</td>
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<td>.739**</td>
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<td>16. Poverty</td>
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<td>.444**</td>
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<td>.118**</td>
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</table>

Note *p < .05, **p < .01, ***p < .001
Table 3

Multiple Linear Regression (OLS) Predicting City Gun Crime Rates

<table>
<thead>
<tr>
<th></th>
<th>All Cities Gun Crime Rates (β)</th>
<th>Large Cities Gun Crime Rates (β)</th>
<th>Medium Cities Gun Crime Rates (β)</th>
<th>Small Cities Gun Crime Rates (β)</th>
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</thead>
<tbody>
<tr>
<td>Gun Theft Rates</td>
<td>.229***</td>
<td>.313***</td>
<td>.155*</td>
<td>.273***</td>
</tr>
<tr>
<td>Gang Crime Rates</td>
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<td>.210*</td>
<td>.414***</td>
<td>.354***</td>
</tr>
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<td>Number of FFLs</td>
<td>-.093***</td>
<td>-.173*</td>
<td>-.115*</td>
<td>-.087***</td>
</tr>
<tr>
<td>Total Number of Officers</td>
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<td>.417***</td>
<td>.227***</td>
<td>.171***</td>
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<tr>
<td>Male 15-24</td>
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<td>.010</td>
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<td>Poverty</td>
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<td>Vacancy</td>
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<td>.109</td>
<td>.112***</td>
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<td>Racial Diversity</td>
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<td>.182*</td>
<td>.120</td>
<td>.218***</td>
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<td>Short Commute</td>
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<td>.047</td>
<td>-.161</td>
<td>-.031</td>
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<td>Long Commute</td>
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<td>.012</td>
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<td>Unemployment</td>
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<td>.175</td>
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<td>High School Drop Out</td>
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<td>-.102**</td>
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<td>Female Headed Households</td>
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<td>.151***</td>
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<td>Living Alone</td>
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<td>.034</td>
<td>-.034</td>
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<td>Living not with Family</td>
<td>-.033</td>
<td>.153</td>
<td>.085</td>
<td>-.039</td>
</tr>
</tbody>
</table>

Note: *p < .05, **p < .01, ***p < .001
Chapter 6
Results

Correlation Matrix
When pooling all city population brackets into the same correlation matrix, the data illustrated that gun theft rate, gang crime rate, percent of the population living in poverty, the diversity of the city, the percentage of vacant living quarters, unemployment, percentage of people who did not graduate high school, percentage of female-headed households, and percentage of people who live alone all had strong positive correlations with gun crime rate. This would appear to follow the literature as most of these variables were predicted to positively correlate with gun crime rates. It is important to note that gang crime rate had the strongest correlation with gun crime rate.

Interestingly, the total number of officers in each city positively correlated with gun crime rates. Routine Activities Theory would suggest that as the number of officers in a city increases, the likelihood of a violent crime – including gun crime – should decrease (Cohen & Felson, 1979). It is possible that cities with greater gun crime may have more officers to deal with the crime, thus explaining why the number of officers is positively correlated. Increasing the number of officers in a given city may also be a symptom of violence. Clear (2007) would suggest that as a community relies more on formal social controls, in this case police presence, the community becomes jaded and more prone to acting against those formal social controls. Therefore, it may be that police presence – at a certain point – could be having an adverse effect on gun violence.

Further, the percentage of the population which consists of males between the ages 15-24 was not found to be statistically significant. Likely, this is because of population centers which
attract this age group do not necessarily correlate with crime rates in general. For example, this age group includes many college students who may be living in concentrated areas within cities. Therefore, as the Census does not differentiate college males living in a city attending schools from young males who reside in the city and do not attend college, this variable is likely diluted throughout this study. In fact, this variable at no point – even when differentiating the cities by population bracket – proves to be statistically significant.

**Linear Regression Results**

Once these variables were placed into a regression predicting gun crime rates, the relationships appear to become clearer. The R Square for the model was 0.692 suggesting that the model was able to predict nearly 70% of all gun crime rates within the cities in the sample. The variable with the strongest positive relationship with gun crime rate was gang crime rate followed by percent of female-headed households, total number of officers, and gun theft rates. This would suggest that gun theft rates do have an impact on gun crime, but generally there are better predictors of gun crime rates.

Perhaps the most interesting result was found is the relationship between the number of FFLs and gun theft rates on gun crime rates. Across each city category, the number of FFLs shared a negative relationship with gun theft rates suggesting that a greater number of FFLs within a city correlated with less gun crime. Due to the lack of available firearm sales data, the number of FFLs acted as a proxy for legal firearm availability. These findings suggest that as legal firearm availability increases in a city, there is a decreased risk of gun crime occurring.

Yet, across each city level, gun theft rates shared a positive correlation with gun crime rates. Considering gun theft as a proxy for illicit firearm availability, this study supports that gun crime is more likely to occur in areas with an increase in illicit firearm availability. This finding posits a nuance in the national debate on gun availability and gun crime.
The three strongest predictors of gun crime rates were gun theft rates and gang crime rates and the total number of officers in each city. Of these three variables, the total number of officers in each city was the only one to retain a high level of significance of .001 when analyzed at each city level. Specifically, the greater number of officers in a city correlated with a higher rate of gun crime.

Unemployment, poverty, length of commute, and whether someone lived alone were all found to be not statistically significant in relation to gun crime rates across all city levels. This is a surprising find because violent crime often congregates in impoverished areas where people travel short distances. However, this finding could be a product of the level of aggregation used in this study. As it was not possible to measure how gun crime congregated within each city, it is likely that these variables were washed out when aggregated at the city level compared to neighborhood levels. Vacancy and racial diversity were only found significant in small cities. These findings suggest that a city’s demographic make-up may not play a large role in determining the likelihood of gun crime occurring.

Large cities were the only cities in which the percentage of high school dropouts and female headed households did not play a statistically significant role in predicting gun crime rates. Given the data presented in this study, it is not specifically clear why these variables did not correlate with gun crime.

Both the positive relationship between gun theft rates and gun crime rates, and the negative relationship between FFLs and gun crime rates is most strongly represented in large cities. Interestingly, although still significant, the relationship between gang crime rates and gun crime rates is weakest in large cities compared to medium and small cities.
Other Findings

After linear regressions were run predicting gun crime rates, they were also run against gun theft rates to determine if there were any shared patterns between gun crime and gun theft. Further, having variables which explain gun theft may provide insight into the relationship between gun theft rates and gun crime rates as found in this study. See Table 4.

Just as with gun crime, gang crime rates are a strong predictor of gun theft rates across all city levels. This supports Wintemute et al’s assertion that gangs play pivotal roles in acquiring illicit firearms. Further, gun crime rates also correlate significantly with gun theft rates across each city. As this project is cross sectional, there is additional research required to determine which predicts the other.

Although shown to have a negative relationship with gun crime rates, the number of FFLs in each city have a positive relationship with gun theft rates. FFLs may act as nodes or targets of gun theft or this relationship may be contributed to the number of targets available in each city as a result of increased FFL presence. There is not enough data to determine how many guns are bought and sold in each city from FFLs but using FFLs as a proxy measure for potential gun sales proposes that as the number of legally available guns within a city increases, there is a greater likelihood of gun theft.

Despite the previous finding that FFLs appear to be associated with a decreased likelihood of gun crime, but an increased likelihood of gun theft, legally owned firearm availability may still be indirectly contributing to gun crime. Gun theft is consistently correlated with gun crime. As more guns become legally available in a city through FFLs, there is a greater opportunity for guns to be stolen within the city.

Further, unemployment shared a negative correlation with gun theft rates, providing support for the above proposition. Guns were more likely to be stolen in cities which had more
employed residents who would be more likely to have the income to purchase firearms. It follows that gun theft is more likely to occur in cities where there is a greater opportunity for legal firearm ownership.
# Measuring the Impact of Gun Theft on City-Level Gun Crime Rates

### Table 4

**Linear Regression Against City Gun Theft Rates**

<table>
<thead>
<tr>
<th></th>
<th>All Cities (β) Gun Theft Rates</th>
<th>Large Cities (β) Gun Theft Rates</th>
<th>Medium Cities (β) Gun Theft Rates</th>
<th>Small Cities (β) Gun Theft Rates</th>
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<tbody>
<tr>
<td>Gun Crime Rates</td>
<td>.328***</td>
<td>.455***</td>
<td>.243*</td>
<td>.352***</td>
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<tr>
<td>Gang Crime Rates</td>
<td>.434***</td>
<td>.318**</td>
<td>.431***</td>
<td>.399***</td>
</tr>
<tr>
<td>Number of FFLs</td>
<td>.157***</td>
<td>.233**</td>
<td>.198**</td>
<td>.155***</td>
</tr>
<tr>
<td>Total Number of Officers</td>
<td>-.166***</td>
<td>-.195</td>
<td>-.051</td>
<td>-.079**</td>
</tr>
<tr>
<td>Male 15-24</td>
<td>.076*</td>
<td>.035</td>
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<td>Poverty</td>
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<td>.063</td>
<td>-.263</td>
<td>-.120*</td>
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</table>

*Note* *p < .05, **p <.01, ***p < .001
Chapter 7
Discussion

The purpose of this study was to determine if there exists a significant relationship between illicit gun availability and gun crime. Illicit gun availability was measured through gun theft rates as reported by the 2016 NIBRS publication. The dependent variable was measured through gun crime rates as reported by the same publication. This study rejects the null hypothesis providing evidence that there exists a positive relationship between illicit availability and gun crime.

Key Findings

One of the most important findings in this study was the nuanced relationship between gun availability and gun crime. While measuring illicit gun availability as gun theft rates, this study also controlled for legal gun availability through the form of FFLs. Noting that legal gun availability correlated with decreased gun crime, while illicit availability correlated with increased gun crime is an important contribution to the national debate revolving around gun availability and gun crime.

Secondly, this study identified possible predictors of gun theft. Although not the original intent of the study, running regressions against gun theft provided an opportunity to research initial avenues of exploration to better understand gun theft. Few studies have attempted to use gun theft as the center of their research, as a result, there is little known about the causes and motivations behind gun theft.

Interestingly, gun theft correlated with the number of FFLs in each city suggesting that as legal gun availability increased in a city, there was more opportunity for guns to be stolen. Coupled with the main finding of the study – that illicit gun availability correlated with gun
crime – legal gun availability may be indirectly correlated with gun crime. The greater number of
guns available in a city means that there are more chances for guns to be stolen and then used
within the city.

**Limitations**

**Data Collection.** This study was limited in its scope and access to relevant data.

Although this study contributes to existing literature by suggesting a nuance in the national
debate between gun availability and gun crime, there is still much more research required to
make a definitive statement about the relationship. Specifically, gun theft data is not something
easily tracked, as evident by the ATF’s paper trail tracing methods. Of law enforcement
databases, the only national one which accurately tracks gun theft is the National Crime
Information Center (NCIC) database. However, this database is not publicly accessible and
requires law enforcement credentials to use.

Originally, this study was designed to map gun crime events and gun theft reports within
the city of Boston to construct hot spots of both forms of crime. Then, the reported stolen
firearms were to be traced to gun crime incidents using serial numbers to determine how many
stolen firearms within Boston were used to commit a crime within Boston. However, after
multiple attempts to contact the Boston Police Department to acquire data on gun theft reports,
the BPD was unable to provide relevant data.

Following failed attempts to gain relevant data from the BPD, a local ATF office was
contacted to see if the ATF could provide relevant data on stolen firearms. The ATF office did
track stolen firearms and gun crimes including serial numbers of all weapons stolen and
confiscated by law enforcement. However, the office only tracked guns stolen from a medium
sized city in Massachusetts dating back to the beginning of 2017. The office had not recorded
enough stolen firearms within the city to construct a meaningful hot spots map. It became clear
that it was not going to be possible to map gun theft incidents and track them to gun crime events. The project then changed to a national study measuring gun theft rates against gun crime rates in cities to determine if there was a connection between illicit gun availability and gun crime. Constructing this relationship is vital to inform future research and establish a need to better track gun theft events to prevent gun crime.

**Data Availability.** Of the data which was available on gun theft, collecting data on gun theft incidents using national databases was difficult. The first database used was the UCR which collected data on gun theft value instead of incident numbers. The UCR reported the total value of every firearm reported stolen in each city. As the cost of an individual firearm can vary greatly, this measure was not appropriate for measuring gun theft rates.

Unlike the UCR, NIBRS did report the number of gun theft incidents opposed to the value of reported guns stolen. However, NIBRS is limited in its data collection. As all law enforcement agencies are mandated to report to the UCR, the data collected from the UCR is comprehensive. Police departments are not mandated to report to NIBRS resulting in some entire states being omitted from this study.

To control for legal gun availability this study used the number of FFLs in each city. Originally, attempts were made to find data on the number of gun sales in cities. The ATF produces yearly publications on gun sales but similar to the UCR only provides data on the total value of gun sales. Further, the lowest level of aggregation available for these reports was at the state level.

The availability of usable gun data is difficult to find. There does not currently exist a comprehensive publicly accessible database with actionable data on gun theft and gun crime.
Unit of Analysis. The unit of analysis in this study was cities. This level of aggregation is useful for determining large trends between gun theft and gun crime rates, but it is not useful in providing tangible policy suggestions. Crime concentrates in certain places within cities. While some cities may report higher or lower rates of gun crime, it was not possible to determine where gun crime concentrated within each city. This is just as true for gun theft within each city. There are few studies which have mapped where gun theft occurs and therefore there is not much known on how gun theft congregates. To better understand the relationship between gun theft and gun crime, mapping where these two events occur within cities is paramount.

Theory Conceptualization. Routine activity theory, as conceptualized by Cohen and Felson (1979) was developed to explain increased national crime trends after World War II. Since then, routine activity theory has developed to better understand how crime concentrates in smaller units of analysis such as cities, neighborhoods, streets, and crime hot spots (Felson, 1986; Felson, 1995). Defining place in research is important because crime concentrates in very small geographic locations – such as a street or street corner (Eck, 2018). It is important to study crime in the smallest geographic unit as possible to best apply resources as prudent as possible (Eck, 2018). Routine activities theory as adapted to this, however the data surrounding guns violence and theft has not. As a result, cities are the smallest unit available, yet routine activities still provides important insight to this level of analysis. Using nodes and crime events – in this case FFLs, gun theft, gun crime, and gang crime incidents – to determine correlations between the dependent and independent variable, routine activities provides the framework needed to understand how gun theft rates impact gun crime rates. Further, it also provides preliminary understandings of possible enviromental factors which influence the causes of gun theft.
Chapter 8

Conclusion

There currently does not exist an adequate database, or group of databases, needed to fully test the effect of gun availability on gun crime at any level of analysis. Databases such as the ones used in this study can only provide a partial picture how many guns are legally owned within a city and how many guns are stolen. However, this study supported previous research which suggested that as gun availability increases within a city, so does the opportunity to commit gun crime. However, illicit and legal gun availability have varying effects on gun crime rates suggesting that not all gun availability acts the same. This can be explained because the exact details of the pathways of guns are still largely unknown. Future research is required to determine how gun availability effects gun crime within cities to better understand the pattern of illicit gun markets and actions.
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18 U.S.C. 922(o), (p) and (r)


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