INTIMATE PARTNER HOMICIDE IN RURAL/URBAN AREAS WITH THE

PRESENCE OF GUNS

By

ERIN DOHERTY

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Written under the direction of

Dr. Richard Stansfield

And approved by

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Dr. Richard Stansfield

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Dr. Nathan Link

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Dr. Daniel Semenza

Camden, New Jersey

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THESIS ABSTRACT

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Thesis Director:

Dr. Richard Stansfield

Although homicide has been declining in the United States since the early 1990s, Intimate Partner Homicide (IPH) has remained more stable, representing a persistent public health problem. Females killed by their partners are more likely to be killed by a gun than any other method, making access to guns a critical piece of this problem. Yet community access to guns remains a sorely understudied area of intimate partner violence research. This study considers the relationship between the rate of federally licensed firearm dealers and intimate partner homicide incidents across counties in 16 states. Additionally, this thesis considers whether county type (rural versus urban) and county racial / ethnic composition moderate the relationship between licensed gun stores and partner homicides. Findings from a series of negative binomial regression models reveal that a higher rate of licensed firearm dealers is associated with a higher incidence of partner homicide in urban areas but rural counties. This relationship in urban areas is not moderated by a county's racial or ethnic composition. The relationship also held after accounting for state variation in DVRO gun laws aimed at dispossessing guns from the hands of domestic violence offenders.

Keywords: *Intimate Partner Homicide, Intimate Partner, Firearms, Rural, Urban*

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Introduction

Intimate partner homicide is the murder of an intimate partner, defined as a current or former spouse, girlfriend/boyfriend or partner. Intimate partner homicide rates have decreased in the United States since the 1990s, especially for male victims (Reckdenwald & Parker, 2010). Women, the principal victims of IPH (Roberts, 2009), have experienced a subtler decline in homicide victimization, however (DeJong, Pizarro & McGarrell, 2011; Websdale, 1999). Women are nine times more likely to be killed by an intimate partner than by a stranger (Bureau of Justice Statistics, 2004; Campbell et. al, 2007). Within the United States, approximately 40% to 50% of women are killed in intimate partner homicides each year (Glass, Koziol-McLain, Campbell, Block, 2014). Certain groups, including Hispanic women have actually seen an increase in their risk of homicide by a partner over the past 5 years (Sabine & Swatt, 2015).

Guns are also a central part of the story of intimate partner homicide in the United States. Estimates suggest that 60% of Intimate Partner Homicides are committed using a firearm (Puzone, et al., 2000). Female victims of Intimate Partner Homicide are more likely to be murdered from a gunshot wound (Roberts, 2009; Walsh & Hemenway, 2005). In 2013, 53% of females murdered by a partner were murdered by a firearm (Federal Bureau of Investigation, 2013). Sorenson & Wiebe (2004) further documented how abused women in domestic violence shelters have experienced being scared, threatened, or harmed by their abuser with a firearm. And Jacquelyn Campbell and colleagues (2003) documented that women were four times more likely to be murdered by their abusive partner if they had been previously threatened or assaulted with a firearm or another weapon (Campbell, et al 2003; Lynch & Logan, 2018). While these studies

highlight the central role of guns in understanding IPH, surprisingly little IPH research has assessed how the guns are accessed. Even measuring gun ownership and gun access has been difficult for researchers. Previous work on guns however has linked higher firearm ownership in states to a significantly higher likelihood of individuals dying from gunshot wounds (Miller, Azrael, Hepburn, Hemenway, & Lippmann, 2006; Miller, Lippmann, Azrael, & Hemenway, 2007). The goal of this thesis is to expand research into this issue and explore the relationship of gun access by measuring the legal stores selling guns. Using the rate of federally licensed firearm dealers, I aim to examine the relationship between gun stores and the incidence of intimate partner homicide. Specifically, I explore the following questions:

1) Does greater availability of firearms at the county-level influence county homicides perpetrated by an intimate partner?

2) Does urban versus rural location moderate the role of guns on homicides?

3) Are there differences depending on the racial and ethnic make-up of communities?

I hypothesize that a higher rate of gun stores (as a representation of access to a gun) within a county will be significantly associated with more IPH incidents. Gun ownership increases the risk of homicides for women in physically abusive relationships (Campbell et al., 2003). In fact, firearm ownership has been associated with the increase of the likelihood of IPH by a factor of 5.38 (Bullock & Cubert, 2002). Therefore, if a higher rate of gun stores is reflective of higher gun ownership I would expect a positive association between gun stores and IPH. Furthermore, a higher rate of federally licensed

gun stores may also indicate easier opportunity for the purchase of a firearm during or shortly after a domestic altercation, which is likely associated with an increased risk of IPH (Wintemute, Wright & Drake, 2003; Zeoli, Malinski, & Turchan, 2016).

In this thesis, I focus on all intimate partner homicides including homicides perpetrated by both males and females because the focus of this thesis is on gun stores and other features of the local county, which should affect perpetrators of either gender. That being said, there are several differences in the motivations and reasons for IPH across gender. Males typically commit IPH because of sexual jealously and male proprietariness (Daly & Wilson, 1988; DeJong, Pizarro, & McGarrell, 2011; Serran & Firestone, 2004; Websdale, 1999; Wilson & Daly, 1993). Some male perpetrators feel entitled to control and power of domination within the relationship (Kimmel, 1995). Female victims of IPH are likely to be younger than their male partners, which can create stress and tension with the male wanting to have control of the relationship (Breitman et. al, 2004; DeJong, Pizarro, & McGarrell, 2011; Websdale, 1999). Reckdenwald (2010) states, "among U.S. female homicide victims, roughly one in three is killed by an intimate partner, whereas among male homicide victims, only one in twenty are killed by an intimate partner" (p. 951). Female victims may try to leave relationships, but their intimate partner can create obstacles for the relationship to end. If a female does leave, this can increase a higher risk of intimate violence. This emphasizes how weapons and potential lethal acts of violence fit within processes of control and dominance.

By contrast, prior research examining female perpetration of IPH revealed high levels of retaliatory violence out of protection and fear of security from their former

intimate partner (Kruttschnitt et al., 2002; Websdale, 1999). Females feel trapped and helpless and seek a way to leave the abusive relationship by resorting to homicide (DeJong, Pizarro, & McGarrell, 2011). Females who commit Intimate Partner Homicide have higher rates of being married to their husband who suffered from years of abuse (Swatt & Ni He, 2006). Risk factors of IPH are a prior history of abuse, estrangement, possession of firearms, male partner's unemployment, and the presence of stepchildren (Bullock & Cubert, 2002; Roberts, 2009). Even while recognizing these different motivations for IPH by gender, the ability to purchase a gun, gun ownership, and related culturally acceptance of guns should increase the risk of both situations (retaliatory violence and ongoing control) turning lethal. Below, I discuss several other theories, which have been used to help explain higher rates of IPH in cities and counties in the United States.

Social Disorganization Theory/Concentrated Disadvantage

Social disorganization theory posits crime is more pronounced in areas characterized by persistent poverty, population heterogeneity, and residential turnover, which combine to undermine the social control capacity of neighborhoods (Shaw & McKay, 1942; Bursik & Grasmick, 1993). Social disorganization and concentrated disadvantage have a significant connection (Stansfield & Parker, 2013). Socially disorganized neighborhoods experience reduced collective efficacy, which is weakened by residential instability (Sampson, Raudenbush & Earls,1997; Browning, 2002). Due to economic disadvantage, individuals cannot rely on their friends or neighbors for social support. As a result, individuals experience stress within these areas.

Residents within these socially disadvantaged neighborhoods also face difficulties obtaining jobs to produce income, which creates strain within their lives (Bursik & Grasmick, 1993; Chamberlain & Hipp, 2015). Crime rates are higher within socially disadvantaged neighborhoods due to fewer resources (Bursik & Grasmick, 1993; Sampson, Raudenbush, & Earls, 1997; Chamberlain & Hipp, 2015). In addition, a lack of resources exist for women in need of domestic violence shelters and intimate violence may not be monitored (Browning, 2002). In the absence of adequate social control, which is lessened in disadvantaged communities, the increased presence of negative emotions among individuals in these communities creates combustible situations conducive to violent crime. The individuals are custom to living in an aggressive area that violence is the known answer to utilize in violent situations.

Women who can receive domestic violence resources and social support have several alternatives instead of killing their partner (Browne & Williams, 1989; Dugan,

Nagin, & Rosenfeld, 1999, 2003). Females have expressed through education the decreased capability of experiencing intimate partner homicide (Campbell, et al., 2007). A higher rate of female education may increase knowledge of resources and support available to leave abusive relationships, as well as greater potential financial independence.

The exposure reduction hypothesis suggests that limiting the exposure or contact between intimate partners that have a history of violence toward one another should decrease the probability of intimate partner homicide (Reckdenwald & Parker, 2012). Exposure can be altered via changes in marriage rates and divorce rates (Dugan, Nagin, & Rosenfeld, 1999, 2003; Rosenfeld, 1997). The exposure to domestic violence within the home has been a contributing risk factor to intimate partner homicide (Dugan, Nagin, & Rosenfeld, 1999). IPH roots from violence within the relationship or a prior history of violence (Sheehan, et al., 2015). Dugan, Nagin, & Rosenfeld (1999) study has documented how the use of domestic violence resources such as legal services and hotlines by wives has reduced rates of Intimate Partner Homicide. Female and male intimate partner victimization decreased from marriage rates declining (Dugan, Nagin, & Rosenfeld, 1999). Dugan, Nagin & Rosenfeld (2003) completed an additional study with the results of lower rates of IPH for communities with multiple resources to leave an abusive partner. All of these studies suggest that the exposure reduction hypothesis allows available resources for women seeking support to leave abusive relationships. If a women leaves, marriage rates will decline and result in lower rates of IPH.

While the exposure reduction hypothesis posits a protective effect of divorce, gender equality, and other avenues supportive of women leaving an abusive relationship,

the backlash perspective alternatively discusses how the loss of control or power experienced by men can increase the likelihood of violence toward an intimate partner (Browne, 1987; Vieraitis & Williams, 2002; Reckdenwald & Parker, 2010). With the backlash perspective, males may experience loss of control, when there is an imbalance in power or threat to male control, such as a partner may have a higher income. This explains how social gender inequality is associated with higher rates of gendered violence (Gillespie & Reckdenwald, 2017; Whaley & Messner, 2002). Reckenwald, Yohros & Szalewski (2018) study found higher rates of IPH in rural areas and less access to healthcare services while discovering how the backlash perspective was experienced for females gaining equality in the workforce. Whaley and Messner's (2002) study supported the backlash perspective of women in the South experiencing higher rates of homicides related to gender inequality. Gender inequality within relationships can ultimately lead to IPH because of males being threatened by their female intimate counterparts. Within the South, a southern man's masculinity can be damaged from a female obtaining a job (Cohen, Nisbett, Bowdle & Schwarz, 1996) because gender role attitudes are still prevalent (Rice & Coates, 1995). Whaley & Messner's study (2002) further revealed how gender equality influenced homicides of males killing females within the South. Males did not want to see a woman partake in political power, a working job, or obtaining higher power (Whaley & Messner, 2002). Male dominance and power is a reoccurring theme within the South.

Rural/Urban Areas

In addition to exploring the relation between gun stores, structural conditions, and IPH, this thesis also considers the moderating role of county type. Differences among rural and urban areas are rooted in the structure, community, geographic region, and the way crime is controlled among these areas (Jennings & Piquero, 2008). The difficulties facing rural areas especially in terms of intimate partner violence and sexual assault have received some attention in the past decade. While rural states such as Alaska and North Dakota have experienced high rates of partner violence and sexual assault, studies within states have similarly found that residing in a rural county is associated with a higher likelihood of victimization (Gillespie & Reckdenwald, 2017).

Several theories have been posited for this association, including reduced access to resources, greater distance from formal social control vehicles such as the police, and even less access to healthcare providers whom could aid in the early detection of abuse (Gillespie & Reckdenwald, 2017). As an example, medical staff in rural areas has revealed insufficient funding, training and staff to withstand Intimate Partner Violence (Eastman & Bunch, 2007). Due to geographic disadvantage, rural women have less access to public transportation, which manipulate being able to leave the relationship.

It's also possible that intimate partner homicide occurs at a higher rate in rural areas due to the higher levels of existing gun ownership (Wiebe et al., 2009). Some note that rural subculture prompts an acceptance to violence and guns (Websdale, 1995) with the isolation of counties and houses reducing the ability of formal interventions (Beyer, Wallis, & Hamberger, 2015). Within rural areas, the rate of handgun ownership is also higher compared to urban areas due to hunting and wildlife (DeKeseredy &

Donnermeyer, 2014). Weisheit, Falcone & Wells' (2006) study estimates gun ownership 8% higher in rural areas. The existing presence of guns embedded in rural areas may contribute to easy access for aggrieved partners to obtain firearms. Higher existing firearm ownership may also reduce the need for people to visit gun stores when motivated to commit a new gun crime. Gun stores are less prevalent and accessible in urban areas.

Although I expect differences in the effect of gun stores on IPH across county type, few existing studies (see Steidley et al., 2017 for an exception) have considered how legal gun store rates have differential effects. Some prior studies have nevertheless explored how other risk factors for IPH differ by county type. A study conducted in North Carolina found county disadvantage strongly influenced the risk for Intimate Partner Homicide of female victims, measured as a combination of female education, unemployment, female-headed households and public assistance payments (Madkour, Martin, Halpern, and Schoenback, 2010). The authors suggested that these disadvantages increased the risk for IPH given the consequences for domestic resources funding, access to services and limited law enforcement responses to IPV (Madkour, Martin, Halpern, and Schoenback, 2010). Police departments have been found to be less likely to record domestic incidents in rural areas (Jennings & Piquero, 2008). In most cases, the Sheriff will know the male who committed the crime. Confirming the isolation and difficulty in reporting crime, Websdale (1998) found that telephone subscription rates in rural areas were extremely low. Due to rural areas being isolated, achieving signal to report abuse has been more difficult. While urban areas, provide more coverage of achieving not only a signal, but obtaining various opportunities to report.

Gun Legislation

This thesis also explores the role of legislation pertaining to guns and domestic

violence offenders. Intimate partner homicide rates have declined nationally in part due

to states' development of legal responses to domestic violence, including the

development of risk assessment protocols, laws governing the arrest of a DV perpetrators,

laws limiting the gun purchasing options for all residents (universal background checks,

license requirements, background and license check requirements for gun show

purchases), and limiting gun ownership among people arrested for domestic violence.

policies (Buzawa, Buzawa, & Stark, 2017; Vidgor & Mercy, 2003). The presence of a

firearm dictates the power a man manipulates over his current or prior significant other.

Controlling behaviors are often utilized within the home by the abuser who possesses a

firearm (Zeoli & Webster, 2010). Women seek to defend themselves, while their abuser

may hide the gun and only be able hold onto it within the home (Lynch & Logan, 2018).

Women revealed fearing for their safety if they took their abuser's firearm, and finding

out (Lynch & Logan, 2018).

In the United States, only twelve states ban individuals with a prior domestic

violence conviction to purchase or attempt to possess a gun (Vidgor & Mercy, 2006).

Federal and state laws do differ in permission of gun possession. Domestic Violence

Restraining orders are sought after by female victims to achieve protection from their

abuser. Female victims who apply for DVRO's are more likely to be married, sexually

assaulted, have family and friends who were assaulted or threatened by the abuser, have a

full-time job and depressed (Vittes & Sorenson, 2008; Wolf, Holt & Kernic, 2000).

Moracco, Runyan & Butts (2003) research revealed 9.2% of IPH female victims had obtained a restraining order in one state in the year before being killed.

Jurisdictions within states and cities can vary in judicial decision-making. Studies conducted have shown women may receive a DVRO, but the abuser may only have to surrender one gun or none at all depending upon the judge (Webster, et al, 2010). Firearm restrictions with preventive orders can have negative issues of the abuser murdering the victim (Lynch & Logan, 2018; Vidgor & Mercy, 2003, 2006; Zeoli & Webster, 2010). In addition, Vittes & Sorenson (2008) states, "Although persons under a domestic violence restraining order are prohibited from purchasing or possessing a firearm, being killed with a firearm was not associated with whether the victim had a restraining order" (p. 195). Regardless of actions of the victim and courts, restraining orders may not influence the outcome of a murder. Zeoli, Malinski, & Turchan's (2016) study found DVRO firearm prohibitions of possession did not decrease the risks of IPH. The use of a preventative order may not even matter in a given situation regardless of assistance from the Criminal Justice System. Lynch & Logan (2018) provided further insight on the Criminal Justice System not handling gun attainment in proper procedures and needing a better response from law enforcement to prevent IPH.

Race/Ethnicity Differences

Finally, this thesis also considers whether the relationship between gun stores and IPH differs depending on race and ethnicity. Based upon prior studies conducted, Blacks are killed by intimate partners at higher rates than Whites (Greenfeld et al., 1998; Wells & DeLeon-Granados, 2004). Social Disorganization Theory and Concentrated Disadvantage may allow us to explain why Whites and Blacks experience these differences, given the higher likelihood that black families and intimate partners live in strained and stressful conditions (Peterson & Krivo, 2010), which increases the risk for both conflict and martial dissolution. Intimate partner violence is experienced in all racial groups based upon different responses and beliefs (Wells & DeLeon-Granados, 2004). Couples who have been separated or are inter-racial and have age differences are at a higher risk of IPH (Mercy & Saltzman, 1989; Wilson, Daly & Wright, 1993).

Fox and Zawitz (2002) discovered the homicide victimization rate for intimate partners in each racial and gender group declined since the 1990s except for white female victims. But females who were poor, young, and Black were linked to a higher risk of experiencing IPH at any point (Campbell, et al., 2003; Gauthier & Brankston, 2004; Lewandowski, et al., 2004). It follows that Black and Hispanic couples experience higher rates of IPV (Field & Caetano, 2003; Sorenson, Upchurch, & Shen, 1996).

IPH is a growing problem among racial groups. A study conducted on IPV deaths revealed the geographic locations of Southern and Western states have higher rates and race is a determining factor of Black females having higher rates of IPV deaths (Paulozzi, Saltzman, Thopson, & Holmgreen, 2001). White male perpetrators are committing the violence against their current or former intimate partner (Sabri, Campbell, Messing,

2018). Azziz-Baumgartner and colleagues study further indicated how Hispanic, Black, and foreign-born women were highest for IPV deaths (Azziz-Baumgartner, McKeown, Melvin, Dang, & Reed, 2011). Foreign-born women are at higher risks of IPH because of precarious immigration statuses, reduced access to social services (including language barriers to access), and fearing retaliation and legal risks of leaving an abusive relationship (Amanor-Boadu, Messing, Stith, Anderson, O'Sullivan & Campbell, 2012; Messing, Ward-Lasher, Thaller, & Bagwell-Gray, 2015; Runner, Yoshihama, & Novick, 2009; Sabri, Campbell, Messing, 2018). Sabri et. al (2018) analyzed data from the CDC's NVDRS data and uncovered foreign-born Hispanic women and mixed racial women were at a higher risk of IPH compared to white women. Interestingly, they also found that non-immigrant women were more likely to be killed with a gun compared to immigrant women (Sabri, Campbell, Messing, 2018). Given the unique history and risk facing Hispanic and foreign-born women in the United States, I also consider whether the ethnic make-up of a county moderates the role of gun access on IPH risk.

Holes in the Literature

Despite discourse on guns, and evidence that women are more likely to be murdered by an intimate partner with a gun, criminologists have not come to grips with the best way to measure the prevalence of guns. This was a topic at one of the plenary sessions at the 2018 American Society of Criminology annual meeting. In this thesis, I assessed the role of legal firearms dealers in the United States. Although some studies have assessed the effect of gun stores on violent crime in the surrounding neighborhood or city (Steidley et al., 2009), the role of legal gun stores in IPH incidents is poorly understood. There are several reasons why a higher rate of legal gun stores could relate to more IPH incidents. Firstly, legal gun stores may increase the opportunity for an angry or aggrieved partner to purchase a firearm before "cooling off" and committing IPH during the current or next domestic altercation. Although unclear from the literature, more gun stores may signal more disorder in a community (Steidley et al., 2017) and a proliferation of illegal guns. The ATF provides the number of federally licensed firearm dealers in each county which includes gun broker, pawnshops, and sports / recreational stores. This measure is one way to truly examine ease of access to guns. While states differ in terms of gun licensing laws, cultural differences between rural and urban areas may also condition the effect of guns across location.

Data and Methods

The current study was obtained from the National Violent Death Registry System (NVDRS): The CDC's Restricted Access Database and combined with census data from the American Communities Survey 2011-2015. Data were collected at the county level for 962 counties within 16 states available in the NVDRS from 2010-2015. The current study relies on data from the 16 states Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, Wisconsin. The NVDRS compiles data from several sources including law enforcement reports, medical examiner records and death certificates. The dataset is matched with county level population data (including sex, race composition, poverty etc.) using the American Communities Survey 2011-2015. Gun data are available from the ATF and represent the rate of federally licensed firearm dealers in a county.

The dependent variable is the intimate partner homicide rate, measured as the total number of homicides recorded by the NVDRS in each county of the 16 states between the years 2010 and 2015. The number of county homicides in the sample ranged from a minimum of 0, to a high of 85.

Independent Variables:

The key independent variable, gun stores, permits guns to be sold throughout the United States as a constitutional right of gun legislation. Gun stores was measured by the number of federally licensed firearm stores (including gun stores, pawn shops and sports stores) divided by the total county population and multiplied by 1,000. Guns are used as

the main weapon to kill a current or former partner by abusers (Bullock & Cubert, 2002; Wintemute, Wright & Drake, 2003; Zeoli, Malinski, & Turchan, 2016).

Guided by lots of prior literature (Hipp & Chamberlain, 2017; Parker & Reckdenwald, 2010; Stansfield & Parker, 2013), structural disadvantage was measured by combining five different measures of disadvantage with a factor analysis. The following measures were entered into a factor analysis and loaded onto a single factor with high internal consistency (alpha = .86): the percentage of families living below the poverty line, the percentage of households who received public assistance, the percentage of the population who did not have health insurance, the percentage of the population who were unemployed, and the percentage of female-headed households.

The county divorce rate was measured by the percentage of males 18 and over who are divorced. Dugan, Nagin, & Rosenfeld (1999) among others found that declining marriage rates led to a decline in victimization. The exposure reduction hypothesis allows for changes in divorce rates to decrease their chances of IPH (Reckdenwald & Parker, 2012; Rosenfeld, 1999, 2003; Rosenfeld, 1997). However, due to the backlash perspective, if women divorce, then the risk can increase and their former partner may retaliate.

Labor force ratio was measured by the percentage of females over the age of 16 who are in the labor force, divided by the number of males over the age of 16 who are in the labor force. Women in the labor force are not only creating income but may have better access and knowledge of resources about leaving abusive relationships. If a woman makes more money than her male partner, the male may be frustrated and does not feel in control of the relationship (Breitman et. al, 2004; DeJong, Pizarro, & McGarrell, 2011;

Websdale, 1999). In this instance, the male may kill their partner due to growing gender equality (Gillespie & Reckdenwald, 2017; Whaley & Messner, 2002).

I also consider gender equality in terms of education with the percentage of females over the age of 25 who have at least a 4 year college degree, divided by the number of males over the age of 25 who have at least a 4 year degree. Through greater gender equality in education, females may have better paying jobs and have more independence to leave relationships, but this may also increase the chances that certain men are aggrieved and upset (Kimmel, 1995). Males strive to feel power and domination within the relationship, and if they do not then violence can occur (Gillespie & Reckdenwald, 2017; Whaley & Messner, 2002).

I also collected data from the FBI's Supplementary Homicide Reports (2010-2015) on the number of homicides with a single victim and perpetrator that was non intimate partner related. I included all incidents except those where the victim-perpetrator relationship was between intimate partners. A non-intimate homicide rate was created by summing all homicides across 2010 – 2015, divided by the total county population and multiplied by a 1,000. The rate was then log transformed.

I also included two state level measures that could influence the handling of a domestic violence case, and so could also influence the likelihood of an intimate partner violence incidence turning lethal.

I included a dichotomous measure indicating whether a state has a policy in place to restrict gun purchases and dispossess guns from a perpetrator of domestic violence. Zeoli and colleagues (2019) outlined state laws regarding these laws, known as DVRO gun

laws, which may allow a perpetrator to keep their gun after a domestic altercation. Based upon the state, a policy may not even be in existence regarding dispossessing guns. Policies are used as a guide for law enforcement to remove a gun if permitted with instructions to handle a domestic dispute, and court personnel to facilitate to order or endure gun dispossession (Zeoli, et al., 2019). If a policy is nonexistent, no statutory language is given to law enforcement and court personnel. I included a binary measure of whether a state had a DVRO gun law or not.

Finally, I also included whether or not a state has a mandatory arrest policy. A mandatory arrest policy is based upon a police officer's discretion to make an arrest if violence has taken place at a domestic altercation. Police officers are the first exposure to a domestic violence scene. If the abuser is arrested, the beginning stages occur for the victim to seek help and receive judicial support.

Plan for Analysis

Given that the data represent counts of IPH incidents at the county level, negative binomial regression models were used to assess the association of gun stores and IPH incidents, controlling for society demographics and legal controls. Negative binomial models were needed because in looking at a histogram of IPH incidents, a large number of counties had zero IPH incidents between 2010 and 2015. The data were also over dispersed (with a standard deviation over twice the value of the mean). IPH counts were offset using the total population for each county (log transformed). Although, several alternative techniques were considered, including a multilevel analysis that nests counties within the 16 states, I followed previous studies of IPH at the county-level (Gillespie & Reckdenwald, 2017) in using a single-level negative binomial analysis. To control for clustering within states, I used standard errors clustered by state.

Results

Table 1: Descriptive Characteristics of Variables

Variable	Mean	Std. Dev.	Min	Max
Total IPH Incidents	3.673	7.775	0.000	80.000
IPH Incidents with a firearm	2.196	4.670	0.000	49.000
Gun Store Rate (log transformed)	3.559	0.908	0.000	7.005
Disadvantage Factor	0.000	0.944	-2.483	3.517
% Divorced	11.722	2.324	3.556	23.868
Labor Force Ratio	0.884	0.168	0.513	3.714
College Ratio	1.160	0.308	0.451	3.971
% Rural	0.490	0.500	0.000	1.000
% Hispanic	7.896	10.589	0.200	80.400
% Black	13.153	16.583	0.000	77.373
% With Mandatory Arrest Policy	0.408	0.492	0.000	1.000
% With DVRO Law	0.480	0.500	0.000	1.000
Non-IP Homicide Rate	1.586	1.956	0.000	21.036

Table 1 displays descriptive characteristics of each variable included in the

analysis. The average number of IPH incidents per county in the sample was 3.7. Almost

two-thirds of IPH incidents were homicides perpetrated with a gun, with an average of

2.2 per county between 2010 and 2015.

There was an average gun store rate of 35 per 100,000 of the population in the

sample. This measure was log transformed prior to inclusion in Table 1 given the large

amount of skew associated. The average rate of divorced males was 11.7%, which is in-

line with national estimates of divorce. Measures of gender equality revealed that a

higher percentage of males were in the labor force compared to their female counterparts,

but a higher percentage of females over the age of 25 were college educated. About half

of the counties in the sample were rural (49%), making this a good sample in which to

compare the relation of gun stores and IPH between rural and urban areas. The average

Hispanic make-up of counties in the sample was 8%, while the average black makeup

was 13%. Approximately 40% of the counties in the sample are in states with a

mandatory arrest policy and 48% are in states with a DVRO law for domestic disputes.

Table 2: Negative Binomial Regression Estimating All IPH Incidents

Variables	Coefficient	Standard Error	P Value
Gun Store Rate (log transformed)	.201	.045	0.000
Disadvantage	.150	.048	0.002
% Divorced	.041	.016	0.012
Labor Force Ratio	-.223	.357	0.533
College Ratio	.080	.175	0.652
% Rural	-.059	.073	0.416
% Hispanic	.000	.003	0.966
% Black	.005	.003	0.055
% With Mandatory Arrest	-.140	.060	0.017
Firearms Policy	.012	.062	0.842
Non-IP Homicide Rate	.045	.346	0.000

Table 2 displays the results of the negative binomial model estimating the

incidence of IPH. Counties with higher rates of guns stores also have a significantly

higher incidence of IPH, even after controlling for all county-level control measures and

state-level policies pertaining to domestic violence offenders. Specifically, if a county increased its gun store rate by one unit, the difference in the logs of expected IPH incidents is expected to increase by .20, while holding the other variables constant in the model. To make this finding more relatable, this translates into an incident rate ratio of 1.234, or a 23% increase.

Counties in states with a mandatory arrest policy for domestic violence incidents tended to have fewer IPH incidents, but the presence of laws related to gun dispossession and keeping guns out of the hands of DV offenders (DVRO law) was not associated with county IPH. Several other county-level measures were also associated with IPH. Structural disadvantage ($p = .002$), the non-IP homicide rate ($p < .001$), and the divorce rate ($p = .012$) were all significantly associated with more IPH. Measures of gender equality, county type (rural v urban), or racial / ethnic composition were not statistically significant.

Table 3: Negative Binomial Regression For Urban Areas

Variables	Coefficient	Standard Error	P Value
Gun Store Rate (log transformed)	.218	.053	0.000
Disadvantage	.087	.065	0.183
% Divorced	.067	.021	0.002
Labor Force Ratio	-2.521	.725	0.001
College Ratio	.340	.284	0.230
% Rural	(OMITTED)		
% Hispanic	-.001	.004	0.883
% Black	.009	.003	0.005
% With Mandatory Arrest	-.036	.070	0.607
DVRO Law	.076	.074	0.308
Non-IP Homicide Rate	.045	.015	0.003

Tables 3 and 4 re-estimate the full model separately for urban and rural counties. Urban counties with higher rates of gun stores have a significantly higher incidence of IPH (Incident Rate Ratio = 1.234), while the presence of mandatory arrest and a DVRO gun law were not associated with the incidence of IPH. County-level measures of the divorce rate, the labor force ratio, and general violence were significantly associated with higher IPH incidence. A higher percentage of the population that was Black was also associated with more IPH, and because of a high correlation between percent black and economic disadvantage in Urban counties, this explains the non-significance of

disadvantage in the models. (Without percent black in the model, disadvantage is significant).

Table 4: Negative Binomial Regression For Rural Areas

Variables	Coefficient	Standard Error	P Value
Gun Store Rate (log transformed)	.035	.098	0.724
Disadvantage	.193	.076	0.011
% Divorced	.021	.027	0.438
Labor Force Ratio	.422	.305	0.167
College Ratio	-.058	.221	0.794
% Rural	0	(OMITTED)	
% Hispanic	.001	.004	0.809
% Black	-.000	.004	0.945
% With Mandatory Arrest	-.202	.118	0.087
DVRO Law	.002	.114	0.984
Non-IP Homicide Rate	.048	.026	0.067

Table 4 shows that gun stores are not associated with IPH incidence in rural areas, even though rural areas have a higher rate of IPH. Structural disadvantage is the only significant factor in higher incidences of IPH in rural counties.

Table 5: Negative Binomial Regression Exploring Moderating tdEffects of Race /

Ethnicity

Variables	Coefficient	Standard Error	P Value
Gun Store Rate (log transformed)	.2472829	.0702626	0.000
Disadvantage	.1348102	.0502932	0.007
% Divorced	.0442113	.0167793	0.008
Labor Force Ratio	-.1683056	.3549472	0.635
College Ratio	.061961	.1743073	0.722
% Rural	-.0607252	.0731968	0.407
% Hispanic	.0130829	.0099155	0.187
% Black	-.003619	.0065348	0.580
% With Mandatory Arrest	-.1536797	.0599185	0.945
DVRO Law	.004266	.0620931	0.945
Non-IP Homicide Rate	.0487853	.0150393	0.001
Gun Stores % Black	.0005775	.0019798	0.771
Gun Stores % Hispanic	-.0040869	.0030069	0.174

Table 5 displays results of the negative binomial estimates of IPH, but this time I included two interaction terms to answer my third research question, whether the relationship between gun stores and IPH is moderated by race or ethnicity. Given that neither interaction term (between gun stores and % black, and gun stores and %

Hispanic), was significant, I can say that a county's racial and ethnic composition does not moderate the association. That is to say, the rate of gun stores is significantly associated with IPH in urban counties irrespective of the racial and ethnic make-up of the county.

Supplementary Tests

I also examined whether the association between gun stores and IPH differed depending on the strength of DVRO gun laws (not just the presence). Based upon research conducted by Zeoli and colleagues (2019), I created my own measure of DVRO gun law strength by counting if each of the sixteen states has an existing policy or no policy about law enforcement procedures and court proceedings regarding seizing a firearm at a domestic dispute. Based upon if a policy exists, a specific state has certain criteria that is implemented and followed by the Criminal Justice System. No policy states for firearms removal from a DVRO include Georgia, Kentucky, New Mexico, Oklahoma, Oregon, South Carolina and Utah. Policy states include Massachusetts, North Carolina, Colorado, Virginia, New Jersey, Rhode Island, Wisconsin, Alaska, and Maryland. Massachusetts represents a well representative state with low Intimate Partner Homicides and multiple steps to be taken by law enforcement and the court to retrieve firearms. Additionally, I examined the strength by counting the number of additional provisions states had, including whether the law stipulated a timeframe of when to dispossess a gun, which should do so, and stipulated punishments for not relinquishing a gun. Although important policies, the presence or strength of DVRO laws did not affect the association of gun stores and IPH incidents.

Conclusion

As a majority of women murdered in the United States are killed at the hands of their partner, research in to the causes and consequences of intimate partner violence remain a critical public health goal. The overarching goal of this thesis was to promote greater attention on the issue of guns and their role in the killing of intimate partners by examining the association of federally licensed firearm dealers with IPH incidents. This research shows that a higher prevalence of legal gun stores is strongly associated with IPH in urban counties. While the data analyzed here confirm prior research that found rural areas to have higher rates of intimate partner homicide (Gillespie & Reckdenwald, 2017; Vittes & Sorenson, 2008; Weisheit, Falcone & Wells, 2006), my findings suggest that legal gun stores are not associated with IPH in rural areas. This might be because rural areas already have a high existence of gun ownership, thus decreasing the need for new purchases prior to gun murder (Wiebe et al., 2009). Relatedly, victims in rural areas may know that their intimate partner has a gun hidden within the household and constantly fear for their safety on a daily basis (Lynch & Logan, 2018).

Unfortunately, data limitations prevent me from fully understanding how and when a gun travels from a gun store to a home prior to an incident of partner homicide. These limitations emphasize the need for better data collection and more consistent reporting on the history of the gun used in a homicide. Without that information it is difficult to suggest concrete policies for the operations of federally licensed firearm dealers. Nevertheless, gun stores are clearly associated with an increased prevalence of IPH in urban areas so more research is needed to explore the selling practices and locations of gun stores. Additional research is needed on how federal and state policies

pertaining to ease of access also influence the role of legal gun stores. As an example, New Jersey is currently considering changing the cost of a permit to $550. Studies should consider how such changes in policy alter the relative importance of legal and non-legal pathways to obtaining guns.

Other findings in this thesis offer insight for existing theories. As an example, divorce rates were consistently associated with IPH, offering support for the backlash hypothesis (Browne, 1987; Vieraitis & Williams, 2002; Reckdenwald & Parker, 2010). Policy recommendations are needed to provide more support and readily available domestic violence resources such as therapists, psychologists, and guidance for women in the process of leaving abusive marriages. Women may seek more than a phone call of a domestic hotline; they need infrastructure and supportive avenues from domestic violence shelters. Risk assessment tools may also help to determine which divorcees are at higher risk for violence. Women need to receive the appropriate type of treatment and treatment program. Research can help to determine women's risk of violence and the tools needed to provide appropriate support. The study also confirmed the persistent importance of structural disadvantage and non-IP homicide rates for the perpetration of IPH. This means that even though IPH occurs in a more private setting, prevention of IPH still requires attention to broader structural conditions, which provoke and intensify strain.

Policies pertaining to gun restrictions for domestic violence offenders were not significantly associated with IPH in my analysis. This may be partly explained by only having 16 states in my sample, limiting the analytical power compared to previous studies by Zeoli and colleagues (2017) who have studied the effects of such policies using 50 states. Even though these policies were not significant in my analysis, we know

them to be a crucial part of prevention. Women experience being threatened by the

possession of a gun by their former partner (Vittes & Sorenson, 2006). A partner may

still have eligibility to obtain a legal or illegal gun even if a restraining order does exist.

Based upon each individual state and federal law, a DVRO gun policy involves the

possible seizure of guns or allowing an abuser to possess their gun, yet law enforcement

may not have the needed structure on gun control (Zeoli, et al., 2019). Domestic violence

victims apply for a DVRO to legally restrain their abuser from communication, but they

are not always successful. States have neglected to implement policies on gun

dispossession, which leave victims knowing their abuser may still have their gun (Zeoli,

et al., 2019). The discrepancies between federal and state laws need to change regarding

gun possession policies. Based upon if the state is rural or urban, we see a difference in

policies. Law enforcement and court personnel need strict guidelines to protect a victim

from their abuser. Women victims have discussed being ignored by criminal justice

system actors about gun possession and future violence (Lynch & Logan, 2018). Policy

needs to start at the hands of a victim receiving the best possible protection the law can

provide as soon as law enforcement arrive at a domestic altercation.

There are several limitations associated with the data and approach. Firstly, the

focus on homicide incidents represents a rare form of partner violence in relation to non-

fatal injuries. The role of gun stores in non-fatal acts and threats with a weapon also need

to be considered, but like many previous studies, I focus on homicides because the data

are more reliable and complete. Secondly, this research only explores county0-level

factors. I do not examine individual factors such as the influence of alcohol and/or drug

use, factors known to increase the risk of an IPV incident turning lethal. This limitation

affects my results because being under the influence may change the data set findings. With the influence of alcohol and/or drugs, we may find men have higher rates of substance abuse within urban or rural areas. I do not examine relationship factors such as being single, divorced, or in a new relationship, important considerations knowing that separation and estrangement are key predictors of lethal partner violence (Campbell, 2002). The limitations of relationship factors can undermine my conclusions due to the fact prior relationships can fatally end in the killing of a former or current partner. Prior literature discusses the steps of a relationship that result in stalking, abuse, threats, and ultimately a murder. Finally, this thesis studied total IPH incidents in a county. Given that females represent the vast majority (about two-thirds) of people killed by a partner, it is likely that results presented here would be identical for female victims. However, it is unclear how these results relate to male victims.

Future research should examine urban areas access to guns. Interviews should be conducted with gun dealers about the types of guns in their store, why they chose their specific location, the policies and regulations of background checks to purchase a gun, and if they have frequent customers purchasing new guns. Research may examine a particular type of gun that is frequently purchased to commit intimate partner homicides. Qualitative interviews of domestic violence perpetrators should ask why the guns were purchased, if the gun was purchased before or after their relationship ended, the type of gun purchased, and if the feeling of control/power was obtained by their gun purchase. Additionally, DV perpetrators should be asked if they were ever denied a gun purchase and if they sought out illegal guns instead of a legal gun. Future research should also examine the separate and combined effects of legal and illegal gun access, gun possession

and gun purchasing options in urban areas. Historically there has been a lot of difficulty in measuring both legal and illegal gun availability and ownership, with studies often relying on small-scale or outdated surveys. Finally, given that the focus should be on prevention, further research needs to examine the effectiveness of individual and combinations of policies targeting domestic violence offenders including policies on removing firearms from the home. In addition, future research should examine DVRO's restrictions and changes that need to be implemented. Law enforcement and court personnel need instructional guidance on proceeding in domestic disputes.

Potential implications could include local officials creating zoning laws to impact IPH. At a local level, individuals can be taught about IPH and the small changes that can be done to combat it. In addition, local officials may even not want gun stores in their neighborhood. Law enforcement need to have extensive tracking on guns beginning at the stage of gun purchase. Since we have a vague connection of racial/ethnic composition, background checks of individuals could include their race/ethnicity to account for all gun purchases. Community accessibility in gun control can contribute not only at a local level, but counties and states can create and change gun policies.

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