An Examination into the Covariates Surrounding Children and Teen

Firearm Homicide Victimization

by

Karissa R. Pelletier

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Graduate Supervisory Committee:

Jesenia M. Pizarro, Chair
Kathleen A. Fox
Shi Yan

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ABSTRACT

Scholars have found that firearm-related deaths are the third leading cause of death in 2019 overall among U.S. children and teens between ages 1 and 19, surpassing the number of deaths from other diseases including the flu and heart disease. Despite this, recent scoping reviews have highlighted the limited knowledge in the field surrounding the impact of risk factors for firearm homicide victimization for children and teens at the situational- and community-level. Those that have researched children and teen firearm violence have focused mainly on individual-level risk factors and largely ignored situational and community-level factors, such as the impact of the presence of domestic violence and other interpersonal conflicts within the home. Moreover, researchers who have examined risk factors and correlates for firearm homicide have yet to include gun laws as a covariate of firearm homicide in conjunction with individual, situational, and other structural factors. Given the clear need to remedy these gaps in our understanding of firearm homicide, in this dissertation, I seek to examine what the correlates are for children and teen firearm victimization and how these two age groups differ. Children and teen victims are examined in the context of risk factors at the micro-, situational, and macro-level. I examine three research questions: What are the significant individual and situational variables for firearm homicide among children and teens? How do the individual and situational covariates of firearm homicide differ for children relative to teens? Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children relative to teens? Findings from this dissertation demonstrate the importance of the disaggregation of homicide typologies. Differences

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were discovered at the individual and situational levels for child and teens. The results of this dissertation demonstrated that firearms were less likely to be used in incidents involving child victims. Further, race, sex, gang-involvement, engagement in delinquency, and the victim-offender relationship were particularly important for predicting the likelihood of a child or teen being killed in a homicide. When compared to teens, children were more likely to be killed with a non-firearm weapon within the home by a family member. In the multilevel models, individual and situational level factors were the most salient predictor of firearm homicide among children and teens during the study time period. Results of the multilevel models showed that states that had laws requiring a permit to purchase a firearm and domestic violence restraining order (DVRO) firearm laws outside of the automatic prohibition of a DVRO subject from possessing a firearm had a decreased likelihood of the firearm being used in a child or teen homicide.

DEDICATION

This dissertation is dedicated to all the lives lost to senseless gun violence.

ACKNOWLEDGMENTS

grateful for all that you both have done for me. They say it takes a village and I am lucky

my village has wonderful people who support and push me.

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CHAPTER 1

STATEMENT OF THE PROBLEM

Scholars have found that firearm-related deaths are the third leading cause of death in 2019 overall among U.S. children and teens between ages 1 and 19, surpassing the number of deaths from other diseases including the flu and heart disease (Centers for Disease Control and Prevention [CDC], 2021). The CDC reports that every day an approximate 14 youth are the victim of homicide while an additional 1,100 are treated in emergency rooms for non-fatal assault injuries (CDC, 2021). These trends extend across all demographics and communities (urban, suburban, rural, and tribal). The role of firearm violence in homicide for children and teens cannot be understated as it is a significant contributor to morbidity (Schmidt et al., 2019). Using the CDC's Web-based Injury Statistics Query and Reporting System tool, in 2019 alone, across all races and genders, 2,770 children and teens between the ages of 0 and 19 were the victim of a homicide. Of those 2,770 children and teen homicide victims, 2,023 (73.0%) were killed with a firearm.

While researchers have established risk factors for youth violence, there is an overwhelming gap in the literature on the specific risk factors for firearm homicide victimization. Children and teens are victimized by firearm homicide at a higher rate than the heart disease and the flu, yet scholars have not been able to determine what the risk factors for firearm homicide victimization among children and teens are. Before researchers can develop interventions, they must first identify what risk factors exist for firearm homicide victimization. Recent scoping reviews conducted by Cunningham and

colleagues (2019) and Schmidt and colleagues (2019) have highlighted the limited knowledge in the field surrounding the impact of covariates for homicide victimization, particularly firearm-homicide victimization, for children and teens at the situational- and structural-level as well as at the individual-level.

Historically, research on both firearm victimization and firearm homicide victimization for children and teens has been restricted due to funding constraints (Carter & Cunningham, 2016). The work that exists has focused on children and teens in separate examinations. While some scholars have examined multiple levels of factors (i.e., Wu, 2018), the majority of researchers have not examined factors at multiple levels in the same model. Further, researchers have not focused on situational risk factors for children and teen firearm homicide victimization. This dissertation tests whether factors present in a youth's surrounding environment increase their likelihood of firearm homicide victimization (Schmidt et al., 2019).

While researchers have established the association between race, age, sex, and socioeconomic disadvantage and homicide victimization for teen and adult populations (Bennett et al., 2006; Centerwall, 1995; Fowler et al., 2017; Lo et al., 2012; Loeber et al., 1999), limited research exists on firearm homicide victimization among children concerning race, age, sex, and socioeconomic disadvantage. Docherty and colleagues' (2019) study found an association between drug dealing, peer delinquency, and aggressive behavior and higher rates of homicide victimization. Other researchers have established the association between gang membership and homicide victimization among youth (Chassin et al., 2013; Ezell & Tanner-Smith, 2009; Loeber et al., 1999). Thus, this

dissertation seeks to understand the covariates for children and teen firearm homicide, so I include measures of gang membership, drug-related deaths, and the occurrence of a crime before or during the homicide.

Researchers have also established the consumption of drugs and alcohol as risk factors for violent victimization (Gover, 2004; Lauritsen et al. 1992; Pedersen et al., 2001; Shaffer & Ruback 2002; Spano & Freilich, 2009). However, few scholars have examined the consumption of drugs and alcohol as a situational-level risk factor for youth violent victimization (for the exceptions, see Averdijk & Bernansco, 2015; Felson & Burchfield, 2004) and no study to date has examined it as a situational-level covariate for youth firearm homicide victimization. Thus, the inclusion of variables surrounding alcohol and substance use are important to an examination of the covariates for firearm homicide victimization among children and teens.

One group of scholars has shown that teens are at a greater risk for homicide victimization by peers and other non-familial individuals in the absence of adults and the presence of peers (Bernasco et al., 2013). Researchers have also demonstrated that higher rates of firearms within the home have a significant impact on the outcome of homicide victimization for children (Anglemyer, Horvath & Rutherford, 2014; Miller, Hemenway & Azrael, 2007; Ruback, Shaffer & Clark, 2011). Thus, variables that capture the presence of firearms within the home are important to control for in an examination of firearm homicide victimization for children and teens. Research is needed to understand how engagement in delinquent behaviors and the presence of firearms within the home increases the likelihood of firearm homicide victimization for children and teens.

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Researchers have also established that intimate partner violence within the home is a risk factor for children and teen homicide victimization (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019b; Dobash & Dobash, 2012; Fridel & Fox, 2019). Moreover, researchers have shown that younger children are at the greatest risk to be killed by someone in the home (Bennett et al., 2006; Hunnicutt & LaFree, 2008; Kunz & Bahr, 1996; Plass, 1993) while older children and teens are more likely to be killed outside the home (Maltz, 2010; Sillito & Salari, 2011). Therefore, I seek to understand the risk factors of firearm homicide victimization for children and teens in this dissertation and include measures of intimate partner violence, victim-offender relationships, and location. To further determine what important covariates of firearm homicide victimization for children and teens exist, known covariates of children and teen homicide, such as intimate partner violence and location of the homicide, should be controlled for so the variation of newly introduced variables is not overstated.

In terms of multilevel examinations of risk factors, scholars that have examined risk factors for homicide victimization among youth are far and few between, except for studies by MacDonald and Gover (2005) and Wu (2018). MacDonald and Gover examined the impact on youth-on-youth homicide city rates by analyzing structural factors of concentrated disadvantage. The results of the study showed that concentrated disadvantage is associated with youth-on-youth homicide rates in large cities across the United States between the 1980s and the 1990s. Using childhood homicide data from 1990 and 1999, Wu examined the impact had by three community-level explanations (social deprivation, female workforce participation, and social isolation) for child

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homicide using negative binomial regression. Results showed that social deprivation was the most salient variable to explain childhood homicide victimization while female workforce participation and social isolation were weak predictors for explaining childhood homicide victimization.

The United States has changed drastically since the 1980s and 1990s in both technology and the population make-up, thus there is a need to examine this issue with more up to date data. Neither of these studies examined multilevel nested data using multilevel logistic modeling and instead used cross-sectional negative binomial regression models (MacDonald & Gover, 2005) and negative binomial regression (Wu, 2018) to answer their research questions. This dissertation centers on using more recent data from the National Violent Death Reporting System (NVDRS) to gain a better understanding of children and teen firearm homicide victimization to make relevant policy recommendations.

This dissertation also includes measures of how firearm laws impact children and teen firearm homicide victimization as no known studies to date have examined firearm laws as a covariate of child and teen firearm homicide victimization. Some scholars have examined the impact of firearm laws on violent deaths (e.g., Azad et al., 2020; Crifasi et al., 2015; Crifasi et al, 2017; Crifasi et al, 2018; Marvell, 2001; Rosengart et al., 2005; Webster et al., 2004). These scholars have mainly focused on the impact had by firearm laws on firearm suicides and unintentional firearm death for children and teens, but few have examined the impact of these laws on firearm homicide rates for children and teens (except Azad et al., 2020; Raissian, 2015). One such example would be Azad and

colleagues' (2020) examination of child access prevention (CAP) firearm laws on firearm fatalities among children between the ages of 0 and 14. CAP firearm laws refer to a group of laws that make it illegal for an adult to keep a firearm in a place and manner so that a child can easily access and use it. Researchers who conducted this study did not focus on homicide solely but also included firearm suicide and unintentional firearm death. Their findings revealed that negligence-specific child access prevention laws reduced childhood firearm homicides by 15%. Azad and colleagues' (2020) contribution to the literature is their focus on firearm laws associated with firearm deaths for those aged 0 to 14 years. This dissertation expands the focus on children and teen firearm homicide victimization and examines multiple gun laws (e.g., CAP laws, Minimum Age Restriction laws, Permit-to-Purchase laws, and Domestic Violence Restraining Order firearm relinquishment laws) at the state-level with nested data in a longitudinal panel model.

Considering that researchers have given little attention to situational- and structural-level variables, there are clear gaps in the research. In this dissertation, I fill these gaps by examining three research questions: *What are the significant individual and situational variables for firearm homicide among children and teens? How do the individual and situational covariates of firearm homicide differ for children relative to teens? Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children relative to teens?* The addition of gun laws as a protective factor opens a new route of research that has both relevance and importance for policy and prevention efforts. If research can determine what firearm laws are best

suited for preventing child and teen firearm homicide victimization, then more focus can fall to those laws by firearm advocacy groups and researchers alike. Thus, the need for a study such as this is evident and contributes to the knowledge base in multiple ways through the introduction of gun laws as a factor in conjunction with individual, situational, and other structural factors.

It is important to fully understand the situational transactions that result in homicide. Youth firearm homicide is a serious problem as evidenced by the statistics presented above and it can have lasting harmful effects on friends and family of the homicide victim. Prevention of firearm homicide for children and teens is best informed by research. To implement appropriate prevention strategies, scholars must first understand what the risk factors are for children and teen firearm homicide victimization. For example, as previous scholars have established, intimate partner violence is a risk factor for children and teens dying from homicide within the home (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019). Thus, research-informed policies aimed at preventing homicide within the home for children and teens should incorporate strategies that help reduce domestic violence. However, the association between risk factors and firearm homicide victimization has yet to be fully understood; leaving research limited in its ability to inform on what firearm homicide victimization prevention strategies should incorporate. It is pivotal for research to examine risk factors at the individual, situational, structural, and state levels if it is to assist in the creation of prevention and intervention strategies for firearm homicide victimization that are most appropriate for children and teens. Given the clear need to

remedy these gaps in our understanding of youth homicide, this study examines the risk factors are for children and teen firearm homicide victimization and how these two age groups differ.

This dissertation consists of six chapters. I begin by describing the status of the literature in Chapter 2, beginning with a discussion of the definition of who is a child and who is considered to be a teen, followed by a brief overview of the youth homicide trends and the covariates for youth homicide. The literature on risk factors for children and teens for homicide victimization is discussed at length. Risk factors are broken down into a total of five sections: individual-level risk factors; family-level risk factors; social situational-level risk factors which include sections on intimate partner violence, delinquency, and a discussion of firearms; macro-level risk factors; and a discussion of the few studies that have examined risk factors for children and teen homicide at multiple levels. A discussion on the impact of gun laws on firearm violence are presented to support the inclusion of gun legislation in this dissertation.

Chapter 3 presents the current study and the methodology which includes a discussion of the population, where the data comes from, the variables examined in the study, and a discussion of the modeling strategies used. Chapters 4 discusses the results of the bivariate analysis and logistic regression modeling for the first two research questions while Chapter 5 discusses the results of the multilevel modeling for research question three. Chapter 6 presents the discussion of the results of the models, the policy implications, and the limitations of this dissertation. Chapter 7 contains the conclusion of

this dissertation with a summation of the study's findings followed by a discussion of

directions for future research.

CHAPTER 2

LITERATURE REVIEW

The age groups examined in this dissertation are children, ages 0 to 12, and teens, ages 13 to 19. While both age groups fall into the overall category of youth, there are differences in what it means to be considered a "child" and what it means to be considered a "teen." Although these words are often used interchangeably in both professional works and the media, there is a difference between the two. The classification "youth" is determined based on age and competency through legislative decisions (Butts & Snyder, 1997). The federal government and the FBI consider any individual who is under the age of 18 to be a "juvenile," which can be a child or a teen (Bortner, 1988; Sickmund, 1994). Experts generally consider the shift from childhood to adolescence to begin with the onset of puberty, which occurs around the age of 12 or 13 and continues until the late teens and early twenties (Lee, Lee, & Chen, 1995; Solomon, Schmidt, & Ardragna,1990). A child, in this dissertation, refers to youth who are 12 and under (Lee et al., 1995; Solomon et al., 1990). A teen, in this dissertation, refers to a youth who is between age 13 and 19. These definitions will be used as the basis for this dissertation and inclusion in the study. Further, the terms "child/children" and "teen(s)" will be used from this point out to refer to those individuals as defined prior. The term "youth" will be used to refer to both children and teen(s) collectively.

Youth Homicide Victimization Trends

Crime patterns over the years have demonstrated that homicide has been a consistent problem for youth in the United States. As previously discussed in the

introduction, across all races and genders, a total of 2,770 children and teens died from

homicide, with 2,023 children and teens between the ages of 0 and 19 died because of a

firearm injury in 2019. Firearms were used in approximately 69% of children and teen

homicides in 2018. These trends in overall homicide have remained consistent across

time. For example, homicide was among the top 13 leading causes of death for these

aforementioned age groups. Homicide is ranked 13th for children under the age of 1;

ranked 3rd for children between 1 and 4; ranked 5th for children and teens between 5 and

14; and ranked 3rd for teens and young adults aged 15 to 24 in 2018 according to a CDC

report (Murphy et al., 2021). More specifically, firearm homicides were the leading cause

of death for 1-4-year olds; 2nd leading cause of death for 5-14-year olds; and the 3rd

leading cause of death for 15-24-year olds in 2018 (Murphy et al., 2021). Using data from

the FBI's Supplementary Homicide Report (SHR), trend visualizations for child and teen

homicide victimization and firearm homicide victimization for 1981 to 20119 can be seen

in Chats 1 and 2 below.

Chat 1.
Number of Victims by Year for Youth Age Groups, 1981-2019

Chart 2.
Number of Firearm Homicide Victims by Year for Youth Age Groups, 1981-2019
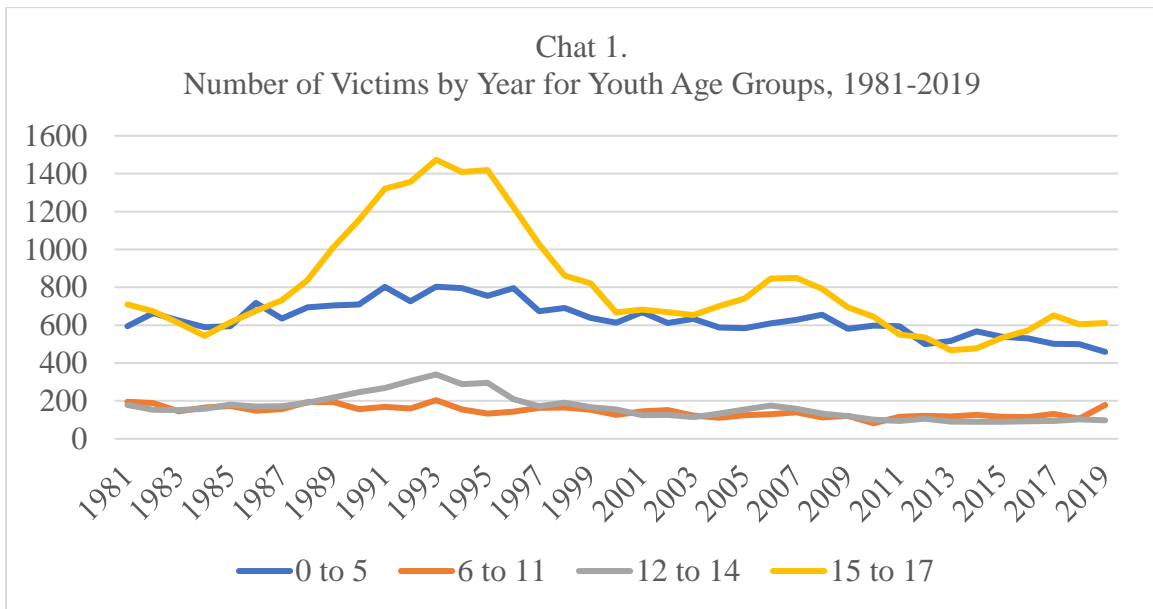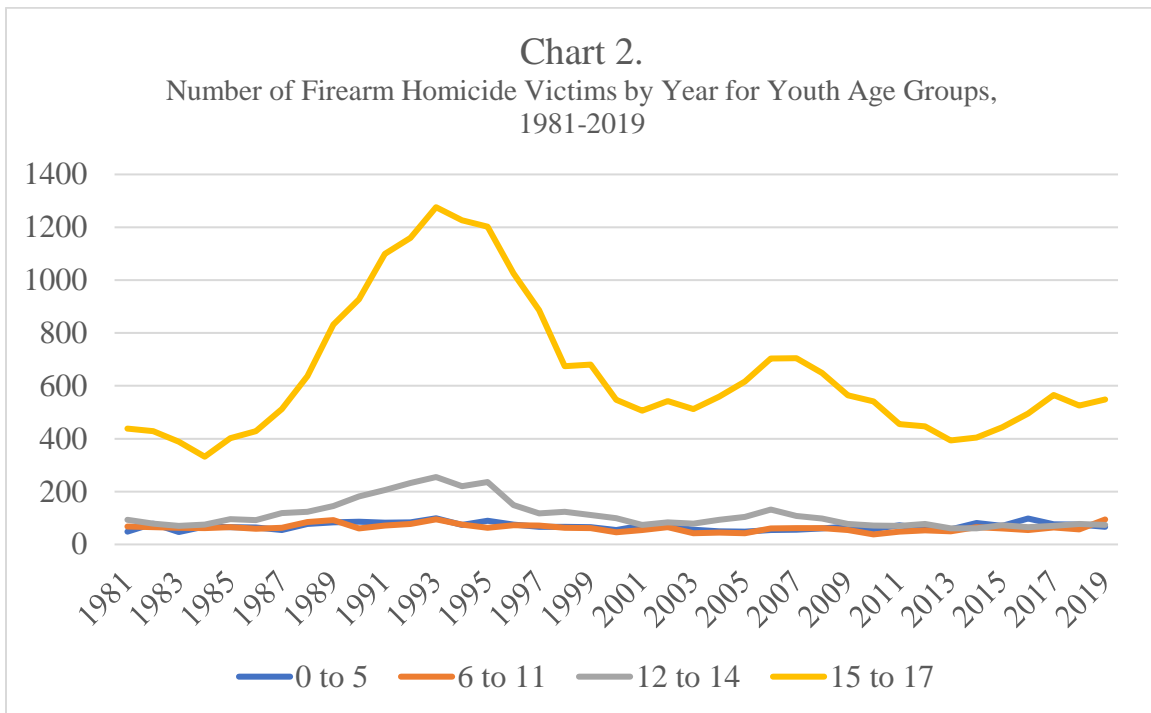
Earlier work has established that homicide victimization for children and teens has been an issue for decades. Homicide trends indicate that youth homicide increased between 1984 and 1993 (Muschert, 2007). Youth homicide trends peaked in 1993 with 14 per 100,000, which was more than double the rate of youth homicide in the early 1980s (Snyder, 1997). Data from the FBI's Supplementary Homicide Report (SHR) from 1980 to 2016 and the Forum on Child and Family Statistic's Child Population demonstrates that increases in youth homicide started in 1980 with a total of 1,748 homicides for those between 0 and 17. Between 1981 and 1985, the number of youth homicides dipped from 1,748 to a low of 1,457 in 1984. Then, in 1986, youth homicide numbers began to increase with a total of 1,712. With the exception of 1987 which had a total of 1,696 youth homicides, the United States began to experience an increase in

youth homicide numbers until 1998, with a peak in 1993 of 2,820 youth homicides. These trends decreased in later decades but have remained consistent over time.

Regarding firearm homicide trends for youth specifically, per the FBI's SHR data from 1980 to 2016, firearms were the weapon most commonly used in the homicide of children and teens. Specifically, of the total 65,900 youth homicides from 1980 to 2016, there were 32,496 firearm homicides for youth between 0 and 17 years old, meaning that just under half of the homicides were committed with a firearm. While firearms were used less often in the homicide of youth between 0 and 11, most homicides of youth aged 12 to 17 were committed using a firearm. For example, in 1980, 609 of the total 976 (62.4%) youth homicides were committed with a firearm. This trend continues until 1987 and then increases to approximately 85.2% of youth homicides being committed with a firearm in 1995. From 2000 to 2016, the average percentage of youth homicides committed with a firearm is approximately 80.2% per year. Thus, youth firearm homicide has remained a large problem in the U.S. across multiple decades.

While more recent years have not seen the peak numbers of the 1990s for both homicide and firearm homicide, there are still over a thousand children and teens who die from homicide, specifically firearm homicide, each year. Between 2000 and 2016, youth homicide numbers peaked in 2007 at 1,776 and had a low of 1,194 youth homicides in 2013. For youth firearm homicide, between 2000 and 2016, firearm homicides peaked in 2006 and 2007 with 951 and 931, respectively, with a low of 561 firearm homicides in 2013. Despite these decreases in youth homicide numbers in recent years, there are still hundreds of children and teens dying and research still has a lot to learn if it is to suggest

evidence-based practices for youth homicide prevention. The current homicide rate for 15 to 24-year-olds in the United States is still 31.1 times higher than the rate of homicide in other high-income countries (Grinshteyn & Hemenway, 2019). Further, work conducted by Murphy and colleagues (2021) also listed the death rates by age for 1999 to 2018, demonstrating that homicide has been a consistent cause of death for those between 0 and 19 for nearly two decades. To put the homicide problem into perspective, heart disease killed 2,355 of those between age 0 and 24 in 2018, and data from the flu season for 2018 to 2019 for ages 0 to 17 reported 620 deaths (Murphy et al., 2021). Homicide has killed more children and teens, 2,770 in 2019 alone, in recent years than both heart disease and the flu combined (Murphy et al., 2021).

This youth homicide problem has not only cost thousands of children and teens their lives but has also cost the United States billions of dollars per year. According to the CDC (2019), outside of the death of children and teens, the combined cost of medical and work loss due to youth homicide, particularly firearm homicide, costs the United States approximately $3.1 billion per year. Thus, the problem of youth homicide has been a consistent public health problem for the United States. Despite these facts, there is still much to understand about why youth homicide is still a problem. This dissertation begins to fill this gap by establishing an understanding of what the risk factors for children and teen firearm homicide are. Moreover, recent research has suggested that firearm-related deaths remain among the top five leading causes of death overall among U.S. children between ages 1 and 17 (Fowler et al., 2017). Thus, continued research is needed to

understand the risk factors for children and teen firearm homicide victimization at multiple levels for appropriate and efficient prevention strategies to be implemented.

The Covariates of Youth Homicide

Risk factors in this study refer to the varying (e.g. education level, poverty) and non-varying (e.g. race, age, and sex) covariates of youth firearm homicide victimization. The work conducted by scholars in the field of developmental psychology has demonstrated that children and teens are influenced by risk factors across micro-, meso- and macro-levels; and to neglect these levels in firearm violence research, let alone homicide research more generally, is a serious gap in the literature that requires remedy (Schmidt et al., 2019). Schmidt and colleagues (2019, p. 720), stated, "… these limitations emphasize the need to expand our understanding of risk and protection across multiple ecological levels, with a focus on understudied family, peer, and community-level factors." Further, to the best of the knowledge available, a line of research on the impact of gun laws as a risk factor for children and teen firearm homicide is a novel area of research that requires attention. Scholars have stated there is a need to understand the risk factors associated with youth firearm homicide and a need for these factors to be examined with enhanced methodological analyses to create evidence-based intervention and prevention strategies (Heide, 2003). Thus, identifying risk factors at the micro-, situational-, and macro-level for youth firearm homicide is a vital step in finding effective, evidence-based prevention efforts (Hawkins et al., 2000; Herrenkohl et al., 2000; Pollard et al., 1999).

Some scholars have examined youth homicide victimization and identified several notable risk factors. Dahlberg (1998) published a study on youth violence in the U. S. that summarized the major trends, risk factors, and prevention approaches in the context of the youth homicide epidemic between 1985 and 1991. As suggested by Dahlberg and other researchers, some risk factors exist for youth homicide victimization including early onset of aggressive behavior during childhood, social problem-solving skill deficits, early and prior exposure to violence, poor parenting practices and family environment, negative peer influences, accessibility of firearms within the home, highly impoverished neighborhoods, family disruption, and social isolation (Dahlberg, 1998; Coyne-Beasley et al., 2003; Ruback et al., 2011). However, efforts to address these risks for youth firearm homicide victimization and evaluations of related programing are still needed. Overall, while researchers have examined a multitude of risk factors for overall youth homicide, few scholars have examined them at multiple levels (MacDonald & Gover, 2005; Wu, 2018) and none have examined the covariates of firearm homicide victimization for youth; thus, justifying the need for a study that does so. The next sections will examine these risk factors in more detail for both children and teens at the individual-, family-, situational-, and macro-level. Table 1 presents a summary of the overall findings from previous research.

Individual-Level Risk Factors

Race, Age, and Sex. Scholars have established the association between ascribed characteristics as risk factors for fatal victimization including race, age, and sex across all populations (Bennett et al., 2006; Centerwall, 1995; Lo, Howell & Cheng, 2013;

Papachristos & Wildeman, 2014). Researchers have shown that African Americans are at a greater risk for homicide than other races across all populations, including children and teens (Jones-Webb & Wall, 2008; Loeber & Farrington, 2011; Najem et al., 2004; Papachristos & Wildeman, 2014; Peterson & Krivo, 2005; Pyrooz, 2012). Work conducted by Najem and colleagues (2004) examined homicide data from New Jersey death certificates from 1989-1997. Their results showed that there was a statistically significant racial disparity in homicide rates, with homicide rates for African Americans being 4 times higher than homicide rates for white youth between the ages of 15 and 19.

Later work conducted by Farrington and colleagues (2011) using data from 1997 also found racial disparities in homicide victimization…. More recently, researchers have shown this remains true (Papachristos & Wildeman, 2014; Pyrooz, 2012). Scholars have also shown that most youth homicides, like most homicides in general, are intraracial, meaning that Whites kill other Whites and African Americans kill other African Americans (Farrington et al., 2011; Fox & Zawitz, 1999; Snyder & Sickmund, 2006).

Beyond race, several individual-level characteristics have emerged as robust predictors of homicide victimization risk. Age is a robust correlate of homicide victimization, with the majority of results from research finding that victims are between the age of 15 and 24 (Bennett et al., 2006; Farrington et al., 2011; Fowler et al., 2017; Schmidt et al., 2019). Rates for homicide victimization for youth skyrocketed between the 1980s and peaked in 1993. Rates for those aged between 13 and 17 in 1985 was nearly triple the rate in 1993 and, for those aged between 18 and 24, the rates at the peak

in 1993 were approximately double the rate in 1985. Further, the ages of homicide offenders and victims have been demonstrated through research to be positively correlated, meaning that offenders and victims are often around the same age in youth homicide (Farrington et al., 2011). Work conducted more recently by researchers continues to support that youth between the ages of 13 and 19 are most at risk for homicide (Fowler et al., 2017; Schmidt et al., 2019). Regarding sex, researchers have also found that sex is a robust correlate of homicide victimization as males are more likely to be a victim than females (Fowler et al., 2017; Levine et al., 2012; Schmidt et al., 2019).

Intersectionality of Race, Age, and Sex. Researchers have also demonstrated the intersectionality of these three robust predictors of youth homicide (Coyne-Beasley, Moracco & Casteel, 2003; Cooper & Smith, 2012; Glass et al., 2008). It has been well established that there is a link between being a minority, being male, and being young. More specifically this convergence of characteristics increases the likelihood of homicide across all populations (Alvarez & Bachman, 2019; Cooper & Smith, 2012; Fowler et al., 2017; Levine et al., 2012; O'Brien & Stockard, 2009).

In regard to age and female victims, Coyne-Beasley, and colleagues (2003) examined youth femicide, or the killing of a young female victim, to understand the differences of femicide for children when compared to teens. Results showed that femicide did differ by age as children were more likely to be killed by a family-member in the context of an argument as opposed to by an intimate partner while teens were more likely to be killed by an intimate partner or peers than family members. Femicide victims were also more likely to engage in risky behaviors such as running away from home,

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using drugs, and dating partners who were much older than themselves. Further, Glass and co-authors (2008) found that the average age of femicide cases was around 19 when killed by an intimate partner, providing further support for Coyne-Beasley and colleagues' (2003) findings.

Specific to firearm homicide victimization, Fowler, and colleagues (2017) examined fatal and nonfatal firearm injuries among youth between 0 and 17-years-old from various data sources. Results demonstrated that teens, males, and minorities were disproportionately at risk for firearm death. Other researchers have affirmed these earlier assertions with findings that show that firearm homicide is seven times more likely for non-Hispanic African American youth when compared to non-Hispanic White youth between the ages of 15 and 24-years-old (Levine et al., 2012). Thus, any examination into the risk factors for children and teen firearm homicide victimization must include measures of race, age, and sex as there are differences that have been established by prior research across these variables[1].

Other Individual-Level Risk Factors. Only two studies to date have examined individual-level risk factors outside of race, age, and sex: Loeber and colleagues (1999), which examines youth firearm homicide specifically, and Docherty and colleagues (2019), which examines youth homicide more generally. Further, it is important to note from the outset that these studies focus on teens and largely ignore children. Loeber and colleagues (1999) used data from the Pittsburgh Youth Study to examine inner-city male youth and firearm homicide rates. The results from this study suggested that 1 in 10 male

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[1] However, it is important to note that the majority of these scholars either exclude ethnicity or collapse it into the race variable.

youth were either killed or injured by a firearm by the age of 19. They also suggested that the findings demonstrated that victims of firearm violence were male youth who engaged in serious delinquency, gang altercations, and drug distribution. Further, these youth were more likely to carry firearms themselves, did poorly in school, received poor parental supervision, and had a history of behavioral problems (Loeber et al., 1999).

Using data from the Pittsburgh Youth Study to examine the problem of youth homicide in the United States, Docherty and colleagues (2019) examined waves of first and seventh-grade students. The researchers examined race, gun carrying, and drug dealing among other things. Results showed that individual differences in drug dealing, peer delinquency, and aggressive behavior impacted gun carriage for African American youth. Further, drug dealing, gun carriage, peer delinquency, and aggression were significant predictors of white youth homicide. Race and drug dealing mattered as a risk factor for homicide.

Family-Level Risk Factors

Race. Some researchers have examined the risk factors that exist at the family-level for children and teen homicide (Allen, Salari, & Buckner, 2020; Bennett et al., 2006; Fox & Fridel, 2017; Fridel & Fox, 2019; Hunnicutt & LaFree, 2008; Kunz & Bahr, 1996; Maltz, 2010; Plass, 1993; Sillito & Salari, 2011). Early work by Plass (1993) examined family homicide in the context of African American families to understand patterns in partner, parent, and child homicide victimization. The results of this study showed that African American children were more likely to be killed by their father than their mother. This is particularly interesting as the majority of African American children

in the United States live in single-parent, female-headed households (Plass, 1993). However, this study did not cover the risk of death for teenage youth. It is significant that children who largely live apart from their fathers are at a higher risk of being killed by their fathers than by their mothers.

Age of Youth. Further, Kunz and Bahr (1996) did a profile on parental homicide against children. Using Uniform Crime Reports (UCR) data from 1976 to 1985, results showed that both male and female children were at heightened risk for being killed by a parent in the first week of life. However, male children were at an increased risk for being killed by a parent from that first week on to age 15 by 55% and then by approximately 77% for those aged between 16 and 18, relative to females. Of infants who were killed within the first week, the overwhelming majority were killed by their mother(s). From a little after birth to teenage years, both parents are equally likely to kill their children but for ages 13 to 15, fathers became more likely to kill their children by 63% and then by 80% for children aged 16 to 18. Younger children were more likely to be killed with personal weapons, asphyxiation, or drowning while, as children aged, they were more likely to be killed with a firearm or a knife.

Victim-Offender Relationship. More recently, Allen, Salari, and Buckner (2020) used 34 years' worth of data from the FBI's SHR to understand patterns across ages, by sex, and victim-offender relationship for youth homicide more generally. While these scholars examined patterns across all ages and not just youth, their findings did pertain to youth homicide as well. Results of this study led them to suggest that homicide committed by parents against children between the age of 0 and 5 is not a rare occurrence

as these children are at the mercy of parents while children aged 6 to 12 are the least likely to die by homicide as they are becoming more self-sufficient and spend more time away from the home. Further, these older children may have developed more risk-aversive behaviors that allow them to avoid conflict-driven environments and have the ability to disclose violence to those outside the family.

Other recent work conducted by Fridel and Fox (2019) demonstrated that child homicide victims were slightly more likely to be killed by a family member at earlier ages while teenagers were slightly more likely to be killed by an intimate partner. This work also suggested that younger youth were less likely to be killed with a firearm, with firearm use in homicide increasing as age increases. Further, results showed that both males and females were at similar risk for homicide earlier in life while males were more likely to be the victim of a homicide as age increased when compared to females. These findings are consistent with previous work conducted by Fox and Fridel (2017).

Child Homicide Risk Factors. While some scholars have looked at youth more generally, others have specifically focused on child homicide risk factors at the family-level. For example, Bennett and colleagues (2006) used NVDRS data from 2003 and 2004 across 7 states to identify characteristics of children (aged 0 to 4) who are most at risk of becoming a homicide victim. Results showed that African American children were at a greater risk for homicide than Whites, the child was most often killed by a parent or caregiver, the act occurred in a house or apartment, and children were killed with a household object. Conclusions drawn from this study suggest that the risk of child homicide was greatest within the primary caregiving environment. Later work by

Hunnicutt and LaFree (2008) showed that female workforce participation, or the number of women working regular jobs outside of the home, and income inequality are salient predictors of infant homicide victimization. Further, this work found that other countries that scored lower in terms of a "culture of violence" experienced significantly decreased rates of infant homicide.

Location of Homicide. Maltz (2010) and Sillito and Salari (2011) demonstrated the importance of the location of the homicide. Maltz (2010) suggested that children in 5-9 age range are, "relatively safe from homicides, too old to be killed by their 'caregivers' yet too young to be killed by their peers" (p. 37). Sillito and Salari (2011) found that children were protected from family-based violence during the day as they were in school. Based on the scholar's findings in these two studies, pre-school aged children (0-4) were more likely to be killed in the home and older children (5-12) were less likely to be killed in or outside the home. If an older child was killed, it was likely to be a familicide, or an instance of homicide where the entire family is killed. This section focused on family-level risk factors for homicide victimization, teens were largely left unexplored by researchers as they are more likely to be killed by someone outside the home (Maltz, 2010; Sillito & Salari, 2011). Thus, the need for an examination into understanding why teens die within the home is warranted, as researchers have focused on homicide more generally and not specifically firearm homicide victimization. Given this research, any study conducting work to understand the differences between risk factors for children and teen firearm homicide victimization must include family-level risk factors.

Social Situational-Level Risk Factors

Researchers have suggested that situational factors play a role in determining the schemas that bring youth into situations where they can be killed and have an important impact on the outcome of the violent victimization (Wilkinson, 2003, 2011, 2012). This logic can be applied to studies that attempt to understand the risk factors for children and teen firearm homicide. Researchers in this area have demonstrated that several situational correlates of crime and violence increase the likelihood of youth mortality: 1) intimate partner violence between parents within the home; 2) participation in crime and delinquency; and 3) firearm carrying and firearm presence within the home; (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Anglemyer et al., 2014; Branas et al., 2009; Cornell, 1993; Circo, Pizarro, & McGarrell, 2018; Dahlberg, Ikeda & Kresnow, 2004; Dobash & Dobash, 2012; Ezell & Tanner-Smith, 2009; Fridel & Fox, 2019; Kung et al., 2005; Miller, Hemenway & Azrael, 2007; Ruback, Shaffer & Clark, 2011; Wiebe, 2003). Notably, these scholars examined youth homicide victimization more generally, thus leaving questions regarding the specific covariates of youth firearm homicide victimization for this dissertation to examine.

Intimate Partner Violence and Homicide. Intimate partner violence is an important predictor of youth homicide, especially with younger children. For example, work conducted by Fridel and Fox (2019) suggested that approximately 30% of females were killed by intimate partners in later adolescence (18-24). Other research has found that childhood homicide involves previous incidents of violence to the child and living in a home where intimate partner violence occurs (Dobash & Dobash, 2012). Regarding

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youth firearm homicide victimization, Adhia, Kernic, and colleagues (2019) sought to understand the proportion of youth victims who were the victim of intimate partner homicides. This study used the National Violent Death Reporting System (NVDRS) data from 2003 to 2016 to examine homicides involving victims between the ages of 11 and 18 for 32 states. They found that 150 out of 2,188 homicide victims aged 11 to 18 (6.9% of victims) were killed by an intimate partner. They also found that victims were more likely to be females and were more likely to be killed with a firearm. Results of this study led researchers to conclude that most victims were females who were killed with handguns by perpetrators who were over the age of 18.

Further, Adhia, Austin, Fitzmaurice, and Hemenway (2019) used the NVDRS data to examine child victims of homicide (between 2 and 14 years old) that were related to intimate partner violence. Of the nearly 1,400 cases examined across 16 states from 2005 to 2014, findings indicated that a little more than 10% of homicides involving children were related to intimate partner homicide within the home in the NVDRS and, when narratives were examined, that number jumped to over 20%. Those child victims that died in incidents related to intimate partner violence were more likely to be killed by White perpetrators who then committed suicide and used a firearm to commit the homicide.

Crime and Delinquency. Researchers have also demonstrated that teen participation in crime and delinquency is a risk factor for firearm homicide victimization (Cornell, 1993; Circo, Pizarro, & McGarrell, 2018; Ezell & Tanner-Smith, 2009). However, these scholars have mainly focused on teens given the nature of what is being

examined. Cornell (1993) compared adult offenders to youth offenders in terms of increasing arrests for violence between 1984 and 1991 using data from the FBI's Supplemental Homicide Report (SHR). Cornell's results indicated that the largest increase in youth homicide arrests during that time came from non-White and/or Hispanic males who used firearms to kill acquaintances during another crime or interpersonal conflict, by 200% and 83% respectively. When compared to adults, youth offenders were more likely to use a firearm and have committed the homicide with an accomplice.

Circo, Pizarro, and McGarrell (2018) compared targeted violence prevention programs to address gun violence in Detroit based on offender age using police incident reports to examine temporal, situational, and spatial patterns of offending. Results of this study showed that youth and adult offenders of gun crime did not significantly differ in the time or place in which they offend. The most significant differences between youth and adult offenders were the age of their victim and the presence of a co-offender, and these differences were modest at best. Researchers concluded youth and adults who engage in violent crimes are similar regarding the time, place, and circumstances in which they offend. However, these scholars have focused on homicide more generally and not looked at firearm homicide specifically.

Firearm Ownership and Presence Within the Home. Higher rates of firearm ownership by parents and caregivers have a significant impact on the outcome of homicide victimization for children and teens (Miller, Hemenway & Azrael, 2007). The presence and access to firearms within the home is a risk factor for violent firearm death for both children and teens (Anglemyer et al., 2014; Ruback, Shaffer & Clark, 2011).

Scholars have examined the association between firearm availability in the home and suicide or homicide outcomes for both children and teens (i.e., Branas et al., 2009; Kung et al., 2005; Ruback et al., 2011; Wiebe, 2003). Anglemyer and colleagues' (2014) meta-analysis concluded that accessibility and presence of firearms within the home put both children and teens at higher risk for completed firearm suicide and firearm homicide (2014). Scholars that have tested the association between firearms in the home and the risk of violent death have shown that the presence of firearms in the home increases the likelihood of both firearm-related homicide and firearm-related suicide for children, teens, and adults (Dahlberg, Ikeda & Kresnow, 2004; Ruback et al., 2011).

Macro- and Multilevel Examinations

Some studies have examined youth homicide victimization overall (MacDonald & Gover, 2005; Wu, 2018) and one study examined firearm homicide victimization specifically at multiple levels (Hohl et al., 2017). MacDonald and Gover (2005) examined the impact on youth-on-youth homicide city rates by analyzing structural factors of concentrated disadvantage. The results of the study showed that structural factors of concentrated disadvantage are associated with youth-on-youth homicide rates in large cities across the United States between the 1980s and the 1990s. More recently, Wu (2018) examined three community-level explanations (social deprivation, female workforce participation, and social isolation) for child homicide. Using childhood homicide data from 1990 to 1999, Wu (2018) examined the impact had by these explanations using negative binomial regression. Results of this study showed that social deprivation was the most salient variable to explain childhood homicide victimization

while female workforce participation and social isolation were weak predictors for explaining childhood homicide victimization. Thus, scholars have demonstrated that deprivation is an important predictor across both child and teen homicide.

Hohl and colleagues (2017) conducted the one known study that examined firearm homicide victimization for teens at multiple levels. In this study, the authors examined the association between drug and alcohol use with adolescent firearm homicide. Hohl and colleagues (2017) analyzed data from Philadelphia for all 13 to 20-year-olds who were the victims of homicide. Specifically, the researchers examined if the victim was using drugs and/or alcohol at the time of their death; if the victim had a history of drug and/or alcohol use; if their caregiver had a history of drug and/or alcohol use; and the presence of drugs and alcohol availability within the neighborhood. The scholars controlled for age, race, school suspensions, arrests, and neighborhood ethnicity using medical examiner and police reports. Conclusions drawn from this study led Hohl and colleagues to suggest that not only are most youth homicides committed with a firearm but substance use at the individual, family, and community level was associated with an increased likelihood of youth firearm homicide.

Summary

Researchers have established that certain risk factors exist for youth homicide victimization more generally. Prior scholars have established the association between ascribed characteristics as risk factors for fatal victimization including race, age, and sex (Bennett et al., 2006; Centerwall, 1995; Hummer, 1996; Lo, Howell & Cheng, 2011; Papachristos & Wildeman, 2014; Rogers, Hummer, & Nam, 2000). It has been well

established by scholars that there is a link between being a minority, being male, and being young. The trifecta of these correlates increases the likelihood of homicide victimization (Alvarez & Bachman, 2014; Cooper & Smith, 2012; Fowler et al., 2017; Levine et al., 2012; O'Brien & Stockard, 2009). Further, delinquency, gun carrying, and drug dealing have been shown to be a risk factor for homicide (Docherty et al., 2019). Other researchers have demonstrated that those who carried firearms themselves, engaged in serious delinquency, engaged in gang altercations, distributed drugs, did poorly in school, received poor parental supervision, and had a history of behavioral problems were at a greater risk for homicide victimization (Loeber et al., 1999).

In terms of family-level risk factors for children and teen homicide victimization, researchers have established that certain risk factors exist: males were more likely to be the victim of a homicide as age increased when compared to females (Fridel & Fox, 2019; Fox & Fridel, 2017). Younger children were more likely to be killed with personal weapons, asphyxiation or drowning while, as children aged, they were more likely to be killed with a firearm or a knife (Fox & Fridel, 2017; Kunz & Bahr, 1996), and the risk of child homicide is greatest within the caregiving environment (Bennet et al., 2006; Kunz & Bahr, 1996; Plass, 1993). African American children were at a greater risk for homicide than White children (Bennet et al., 2006). Children were most often killed by a parent or caregiver in a house or apartment with a household object (Bennet et al., 2006). Female workplace participation and income inequality are salient predictors of infant homicide victimization (Hunnicutt & LaFree, 2008).

Concerning situational-level risk factors, some risk factors have been established. These include intimate partner violence (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019); participation in crime and delinquency (Chassin et al., 2013; Cornell, 1993; Circo, Pizarro, & McGarrell, 2018; Ezell & Tanner-Smith, 2009); and firearm carriage and presence within the home (Anglemyer, Horvath & Rutherford, 2014; Miller, Hemenway & Azrael, 2007; Ruback, Shaffer & Clark, 2011).

Regarding macro-level risk factors, scholars have established the impact of concentrated disadvantage and social deprivation to be associated risk factors for children and teen homicide victimization (MacDonald & Gover, 2005; Wu, 2018). Further, some scholars have examined risk factors for children and teen homicide at multiple levels. Moreover, concentrated disadvantage is associated with youth-on-youth homicide rates (MacDonald & Gover, 2005) and social deprivation was the most salient variable to explain childhood homicide victimization while female workforce participation and social isolation were weak predictors for explaining childhood homicide victimization (Wu, 2018).

Table 1 above demonstrates the established risk factors for child and teen homicide based on prior literature discussed in this section. Visually, this demonstrates some of the current gaps in the literature. The next section of this chapter will examine the current firearm law literature and further elucidate the gaps that exist in our current knowledge of risk factors for child and teen homicide victimization.

Table 1. Established Risk Factors for Children and Teens Based on Prior Literature		
	Child	Teen
Risk Factors		
Individual-Level		
Race	X	X
Sex	X	X
Age	X	X
Intersection of Race, Age, and Sex	X	X
Delinquency by the Individual		X
Gun Carriage by the Individual		X
Drug Dealing by the Individual		X
Poor Educational Attainment		X
Poor Supervision by Parents		X
History of Behavioral Problems		X
Substance Use by the Individual		X
Family-Level		
Race of Family	X	
Sex of Children	X	X
Age of Youth in the Home	X	X
Weapon Type	X	X
Location of Homicide	X	
Female Workplace Participation and Income Inequality	X	
Substance Use Within the Family	X	X
Situational-Level		
Intimate Partner Violence		X
Participation in Crime and Delinquency		X
Firearm Carriage		X
Presence of Firearms Within the Home	X	X
Macro-Level		
Concentrated Disadvantage and Social Deprivation	X	X
Substance Use in the Community	X	X

Gaps in the Literature

This review demonstrates that gaps in the literature remain. Indeed, most studies have focused on teen homicide victimization (e.g., Docherty et al., 2019; Farrington et al., 2011), individual-level examinations of the covariates of firearm homicide for children have largely been unexplored along with examinations of the individual level covariates of firearm homicide for teens. Further, the scholars who have examined youth

homicide more generally (e.g., Chassin et al., 2013; Hohl et al., 2017) suggest that substance use is an important covariate of teen homicide, the role of alcohol and substance use in teen firearm homicide has largely been left unexamined. Researchers who have examined overall homicide victimization for youth have found an association between delinquency and risk of homicide (e.g., Chassin et al., 2013; Cornell, 1993; Circo, Pizarro, & McGarrell, 2018; Ezell & Tanner-Smith, 2009), the engagement in delinquency as a risk factor for teen firearm homicide victimization has yet to be understood by researchers.

While researchers have established the link between intimate partner violence and risk of homicide for children within the home (e.g., Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012), they have yet to examine the impact of intimate partner violence within the home for teen firearm homicide victimization. Lastly, while some scholars have examined homicide victimization for youth at multiple levels (MacDonald & Gover, 2005; Wu, 2018) and one has examined firearm homicide victimization for youth at multiple levels (Hohl et al., 2017), there is still yet to be a proper examination across multiple levels of the covariates of children and teen firearm homicide victimization with firearm laws included in the models.

Firearm Laws

While there have been examinations of the impact of firearm laws on children and teens, the studies that have done so have mainly focused on unintentional firearm death and firearm suicide (Zeoli et al., 2019a). Few scholars have examined the role of firearm laws on the prevention of children and teen firearm homicide. Firearm laws most

pertinent to impacting youth firearm homicide prevention are discussed in this section and will include child access prevention laws; minimum age requirement; permit-to-purchase laws; and domestic violence restraining order firearm laws. Table 2 below presents a summary of previous findings discussed in this section.

Child Access Prevention (CAP) Laws

The most commonly examined laws for children and teen firearm violence and homicide prevention are child access prevention laws, or CAP laws. These laws sanction adults who either negligently store or recklessly allow access to their firearms by children (Zeoli et al., 2019a). According to Zeoli and colleagues (2019a), states vary in the severity of the sanctions imposed by these laws (felony vs. misdemeanor crimes) and the age of the child who is allowed to access the firearm (from those under the age of 14 to under the age of 18). Much of the work in this area focuses on unintentional firearm death and firearm suicide for children and teens. Some scholars have shown that CAP laws are not associated with significant differences in unintentional firearm deaths (Guis, 2015; Lott & Whitley, 2001; Ruddell & Mays, 2004) while some found there was an association between CAP laws and reductions in unintentional firearm deaths (Cummings et al., 1997; Hepburn et al., 2006; Webster & Starnes, 2000). However, it is important to note that not all studies discussed here are created with equal rigor. For example, Lott and Whitley's 2001 study has numerous flaws (i.e., the assumption that proper firearm storage reduces accidental shootings despite other scholars finding the opposite [see Cummings et al., 1997; Hepburn et al., 2006; Webster & Starnes, 2000]) and Ruddell and Mays (2004) use of cross-sectional data.

Researchers have found that there is an association between larger reductions in unintentional firearm deaths when CAP laws imposed felony penalties on law breakers as opposed to a misdemeanor or other non-felony treatment (Cummings et al., 1997; Hepburn et al., 2006; Webster & Starnes, 2000). Additionally, Prickett and colleagues (2014) examined the impact of safe storage practices and carriage to understand if either had an impact on youth firearm victimization outcomes. Pricket and colleagues (2014) found no marginal effect of storage habits on youth firearm victimization outcomes but did find an impact of firearm legislation on youth firearm victimization if states had CAP laws.

In regard to children and teen suicide, some evidence suggests that there is an association between CAP laws and firearm suicide reductions (Guis, 2015; Webster et al., 2004) while another work did not (Cummings et al., 1997). Despite findings from studies on unintentional firearm deaths suggesting that the severity of penalty included in CAP laws was associated with a greater reduction in deaths, researchers have not found the same association for homicide and suicide rates. Cummings and colleagues (1997) also did not find an association between CAP laws and firearm homicide reductions. Some scholars have studied the association of CAP laws on firearm homicides for children and teens. Azad and colleagues (2020) examined child access prevention firearm laws on firearm fatalities among children between the ages of 0 and 14. This study did not focus on homicide solely but also included firearm suicide and unintentional firearm death. Their findings revealed that negligence-specific child access prevention laws, or laws regarding the safe storage and locking up of firearms, were associated with reductions in

childhood firearm homicides by 15% but recklessness laws, or laws that state adults

cannot provide children easy access to firearms, were not associated with a significant

decrease in firearm homicides for children between 0 and 14.

Further, researchers who have examined the impact of CAP laws on child and

teen homicide rates are relatively few (except for Azad et al., 2020; Cummings et al.,

1997). Only Azad and colleagues (2020) have examined the differences in stronger CAP

laws, such as those that require firearms to be locked up (negligence laws, see Child

Access Prevention Laws, 2021), and weaker CAP laws that state that adults cannot

provide children with firearms (recklessness laws, see The Effects of Child-Access

Prevention Laws, 2021). They found that negligence specific CAP firearm laws were

associated in a 13% overall reduction in all-intent firearm fatalities, with a specific 15%

reduction in firearm homicides for children aged 0 to 14. The authors concluded that the

passage of specific CAP firearm laws may be key in reducing firearm fatalities among

children.

Minimum Age Restrictions

While states vary in their firearm laws, federal law states that anyone under the

age of 18 is prohibited from possessing a handgun and must be over the age of 21 to be

able to purchase a firearm from a federally licensed distributor (Zeoli et al., 2019a). This

varies to a degree by state and those under the age of 18 who are found to be possessing a

handgun can be charged with a crime (Giffords Law Center to Prevent Gun Violence ,

2020). According to a study conducted by the GLCPGV (2020), those between ages 18

and 20 can purchase handguns from private distributors. They also found that several

states and the District of Columbia have also increased the minimum legal age to purchase a firearm from a non-licensed dealer to 21 instead of the federally mandated age of 18. Researchers who have examined the impact of minimum age restrictions on firearm victimization for children and teens are relatively rare. The research that does exist typically has not found an association between minimum age restrictions and reductions in firearm violence for children and teens at the state or federal level (Marvell, 2001; Rosengart et al., 2005).

More specifically, Marvell (2001) found no association between minimum age gun possession laws and firearm homicide for ages 15 to 19 between 1976 and 1999. Similar results were found by Rosegart and colleagues (2005), who examined the impact of purchase restrictions and possession restrictions on firearm homicides and suicides for those between 0 and 19 from 1979 and 1998. Results from their study suggested that purchase restrictions and possession restrictions for those under the age of 21 were not associated with decreases in firearm homicides and suicides.

Permit-to-Purchase (PTP) Laws

Under federal law, an individual must undergo a background check to purchase a gun from a federally licensed firearms dealer. This background check is meant to determine whether they are prohibited from purchasing a gun. However, federal law does not require the licensing of firearm owners or purchasers. Some states have legislated that a background check must occur for an individual to purchase a gun from a private seller, as well. These are often called "universal background check" laws and are generally

implemented by having the purchaser and seller have a licensed firearm dealer or a law enforcement officer run the background check before the transfer of the weapon occurs.

Permit-to-purchase, or PTP, licensing laws go beyond universal background check laws in that they require prospective firearm purchasers to obtain a permit or license before the purchase of a firearm regardless of whether a licensed dealer or private seller will sell the firearm. PTP laws aim to keep firearms out of the hands of at-risk individuals by offering a waiting period, or the time between filing for a permit to possess a firearm and receiving a firearm, for at-risk individuals. However, these laws vary by state: for example, the state of Michigan requires a purchase permit only for private sales (*MCL 28.422(4)*). In general, to obtain a purchase permit from the state, individuals must pass a background check, but there may be additional requirements the prospective purchaser must meet, such as completing a firearm safety training course or being fingerprinted. The majority of states that impose a PTP law require that the individual applies for the permit in person at their local law enforcement agency (police department, sheriff's office, state trooper's office, etc.) as this discourages both straw purchases (where a purchaser is buying a gun on behalf of someone else) and attempts to make purchases using a fake identity (GLCPGV, 2020). Ten states and the District of Columbia had PTP laws as of March 2020.

While many of these laws have been implemented for several years, few researchers have examined how PTP laws impact homicide rates (Rudolph et al., 2015; Webster et al., 2014). Rudolph and colleagues (2015) examined Connecticut's implementation of a PTP law in 1995 to test how it impacted the state's homicide rate.

Results demonstrated that the implementation of the PTP law was associated with a 40%

reduction in murder rates over 10 years but was not associated with reductions in non-

fatal firearm incidents. Relatedly, Missouri's PTP law had been in effect since the early

1920s and was repealed in 2007. This repeal allowed for examinations into the impact of

the withdrawal of a PTP law on firearm deaths. Missouri's repeal of its PTP law was

examined by Webster and colleagues (2014) to understand the impact it had on

subsequent homicide rates. Through an examination of death certificate data from 2007

to 2010, the researchers determined that the repeal of the PTP law was associated with

the consequent increase in homicide rates by 16 to 23%, with an increase from the

average of 55 homicides per year to 63 homicides per year. Thus, this study demonstrates

that PTP laws are associated with reductions in annual homicide rates.

Similarly, one study examined the impact of PTP laws on suicide rates in both

Connecticut and Missouri (Crifasi et al., 2015). Researchers examined data from 1981 to

2012 to test the impact on suicide trends for the implementation and repeal of PTP laws.

The model estimated that Connecticut's implementation of a PTP law was associated

with a decrease in firearm suicide rates by 15.4% while Missouri's repeal of their PTP

law was associated with an increase in firearm suicide rates by 16.1%. The concluding

thought on these three studies is that there is an association between PTP laws and a

decrease in firearm deaths, both in terms of homicide and suicide. Work conducted by

Crifasi and colleagues (2018) examined the impact had on firearm laws on homicide in

larger urban U.S. counties. PTP laws were found to be associated with a 14% decrease in

firearm homicides in urban counties (Crifasi et al., 2018). These findings strengthen the

available evidence by isolating the impact of geographic locations as it looked at large urban areas where firearm homicides concentrate.

Overall, research has suggested that PTP laws have been effective in decreasing homicide rates. However, none of these studies examined the association of PTP laws with children and teen homicide victimization. It is important to understand the impact these laws may have on children and teen firearm homicide victimization. The reduction in firearm homicides in aggregated age groups, as evidenced by work in this area, suggests that there is a possibility that these laws may play a role in the reduction of youth firearm homicide victimization.

Domestic Violence Restraining Order (DVRO) Firearm Laws

Domestic violence restraining order firearm laws (henceforth called DVROs) are a variation on more general firearm restriction laws that center on removing firearms from those who are the subject of domestic violence restraining orders. Recently, Zeoli and colleagues (2019b) summarized the state of domestic violence restraining order firearm laws. They found these laws varied greatly between states. Common variations between states were: 1) whether the court must order relinquishment of firearms or had the discretion to order (or not order) relinquishment; 2) whether the law specified the process by which relinquishment was to occur; 3) whether there was a time limit during which relinquishment must occur; 4) whether relinquishment must be to law enforcement or if individuals were allowed to transfer guns to licensed firearms dealers or, less commonly, other third parties; 5) whether non-compliance penalties were specified in the law; and 6) whether the court may issue a warrant for search and seizure of the

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firearm(s). For example, California's domestic violence restraining order firearm relinquishment law requires these newly prohibited persons to relinquish their firearms immediately upon a law enforcement officer's request, or within 24 hours of being served with the order. They may relinquish their gun to a licensed firearm dealer but must file receipt of this transfer within 48 hours of being served with the order.

Some researchers have examined whether states that authorize or require judges to order a DVRO respondent to relinquish their firearms experience a decrease in intimate partner homicide, or IPH (Diez et al., 2017; Zeoli et al., 2018). For example, Zeoli and colleagues' (2018) results showed that states with DVRO firearm relinquishment laws had an associated 12% reduction in IPH and 16% decrease in specifically firearm-related IPH. Results of their study further suggested that state DVRO firearm restriction laws that did not have a relinquishment provision were not statistically significantly associated with reductions in IPH rates and firearm-related IPHs.

These results were similar to those found in Diez and colleagues' 2017 study; thus, researchers suggest that relinquishment provisions can save lives. Further, other work has demonstrated that DVRO laws in California were related to a reduction in firearm purchase applications for those under restraining orders (Vittes & Sorenson, 2008). Relatedly, Lynch and Logan's (2017) study was conducted in Kentucky, which does not have DVRO firearm relinquishment laws. These scholars found that the lack of resources was the main reason why law enforcement does not enforce firearm relinquishment for prohibited persons (Lynch & Logan, 2017). Despite these findings, there is a suggestion in the literature that the majority of domestic violence victims feel

safer that initiatives exist to remove firearms from the subjects of restraining orders (Vittes et al., 2013). However, all of these studies point out that more research is necessary to further understand the impact of DVRO firearm laws.

As mentioned prior, other researchers have shown that intimate partner violence is an important predictor of youth homicide, especially with younger children (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019). Further, researchers have found that children and teens are particularly in danger when domestic violence is present in the home (Dobash & Dobash, 2012) and that most of these domestic violence-related homicides are perpetrated with a firearm (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019). Thus, the examination of DVROs along with other firearm laws is essential if researchers are to understand the impact of firearm laws on child and teen homicide and if that research is later to inform practice.

Summary

Table 2 below presents the main focuses and findings discussed in this section. In summary, the majority of these scholars have focused on several types of violent deaths for youth and often not firearm homicide; thus, the need for a study that examines the impact and strength of firearm laws present within a state on youth firearm homicide victimization. Researchers who have examined CAP laws have focused on unintentional firearm death and firearm suicide for children and teens. Some scholars have shown that CAP laws are not associated with significant differences in unintentional firearm deaths (Guis, 2015; Lott & Whitley, 2001; Ruddell & Mays, 2004) while some found that there was an association between CAP laws and reductions in unintentional firearm deaths

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(Cummings et al., 1997; Hepburn et al., 2006; Webster & Starnes, 2000). In regard to children and teen suicide, some scholars have suggested that there is an association between CAP laws and firearm suicide reductions (Guis, 2015; Webster et al., 2004) while another work did not (Cummings et al., 1997). Until now, there has been a lack of work that examines firearm homicide for children and teens and the impact of CAP laws specifically (except for Azad et al., 2020; Cummings et al., 1997).

Research surrounding the impact of minimum age restrictions on firearm victimization for children and teens is relatively rare. The research that does exist typically does not find an association between minimum age restrictions and reductions in firearm violence for children and teens at the state or federal level (Marvell, 2001; Rosengart et al., 2005). Overall, researchers suggest that PTP laws have been effective in decreasing homicide rates (Crifasi et al., 2018; Rudolph et al., 2015; Webster et al., 2014). However, these scholars that have focused on general populations and researchers have yet to examine the impact of PTP laws on children and teen homicide victimization.

Scholars who have examined DVRO relinquishment laws has demonstrated a decrease in firearm homicide rates linked to intimate partner violence (Diez et al., 2017; Zeoli et al., 2018). These scholars have focused on general population intimate partner homicide and not specifically on firearm homicides of children and teens despite the knowledge that intimate partner violence is an important predictor of youth homicide, especially with younger children (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019).

Table 2. Focus and Main Findings in Firearm Law Research		
	Focus	Main Findings

Law Categories		
Child Access Prevention (CAP)		
	Unintentional Firearm Death	Mixed findings on the effectiveness of CAP laws in preventing unintentional firearm death.
	Firearm Suicide	CAP laws mainly should reductions in firearm suicide.
Minimum Age Requirement		
	Firearm Victimization Among Children and Teens	Findings do not support association between minimum age restrictions and reductions in firearm violence at the state or federal level, though this work is relatively rare.
Permit-to-Purchase (PTP)		
	Firearm Homicide	Findings support an association between PTP laws and decreases in homicide rates. Has not focused on children and teen firearm homicide.
Domestic Violence Restraining Order (DVRO)		
	Firearm Intimate Partner Homicide	Findings support association between DVROs and decrease in firearm homicide among intimate partner. Has not focused on intimate partner violence-related homicides of children and teens.

Taken together, the research I reviewed in this chapter has demonstrated the clear

gaps in the literature surrounding risk factors for firearm homicide victimization among

children and teens. Through this review, I have further shown the importance of

incorporating firearm laws into multilevel examinations of these risk factors, as scholars have yet to fully elucidate the role played by CAP laws, minimum age restrictions, PTP laws, and DVRO relinquishment laws on decreasing firearm homicide victimization among children and teens.

CHAPTER 3

METHODOLOGY

Current Study

As discussed in the literature review, there are still gaps in our understanding of the risk factors for children and teen homicide victimization. As most scholars have focused on teen homicide victimization (e.g., Docherty et al., 2019; Farrington et al., 2011), individual-level examinations of the covariates of firearm homicide for children have largely been unexplored along with examinations of the individual level covariates of firearm homicide for teens. The first research question stems from these gaps in the literature: *What are the significant individual and situational variables for firearm homicide among children and teens?* Further, scholars who have examined youth homicide more generally (e.g., Chassin et al., 2013; Hohl et al., 2017) have suggested that substance use is an important covariate of teen homicide, yet the role of alcohol and substance use in teen firearm homicide has largely been left unexamined. Researchers who have examined overall homicide victimization for youth have found an association between delinquency and risk of homicide victimization (e.g., Chassin et al., 2013; Cornell, 1993; Circo, Pizarro, & McGarrell, 2018; Ezell & Tanner-Smith, 2009), still the engagement in delinquency as a risk factor for teen firearm homicide victimization has yet to be understood by research.

Moreover, while scholars have established the link between intimate partner violence and risk of homicide victimization for children within the home (e.g., Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012), they have yet

to examine the impact of intimate partner violence within the home for teen firearm homicide victimization. The second research question stems from these gaps in the literature: *How do the individual and situational covariates of firearm homicide differ for children relative to teens?* Scholars have yet to compare child and teen homicide victimization and understand how the covariates differ.

While a few scholars have examined homicide victimization for youth at multiple levels (MacDonald & Gover, 2005; Wu, 2018) and one has examined firearm homicide victimization for youth at multiple levels (Hohl et al., 2017), there is still yet to be a proper examination across multiple levels of the covariates of children and teen firearm homicide victimization. Most firearm law studies have focused on several violent death types, such as accidental and suicide, for youth and not firearm homicide victimization specifically; thus, this research on the impact of state firearm laws on youth firearm homicide victimization is greatly needed. There has been a lack of work that examines firearm homicide for children and teens and the impact of CAP laws specifically (except for Azad et al., 2020; Cummings et al., 1997); thus, leaving a gap for this dissertation to fill.

Research surrounding the impact of minimum age restrictions is not only outdated as it examines data from the 1970s to the late 1990s but it also has focused more on teen violence as opposed to firearm homicide victimization for children and teens (Marvell, 2001; Rosengart et al., 2005). Research has shown that PTP laws have been effective in decreasing homicide rates (Crifasi et al., 2018; Rudolph et al., 2015; Webster et al., 2014). These studies that have focused on general populations and researchers have yet to

show the impact of PTP laws on children and teen homicide victimization.; thus, leaving a gap for this dissertation to fill. Research surrounding DVRO relinquishment laws has demonstrated a decrease in firearm homicide rates linked to intimate partner violence (Dietz et al., 2017; Raissian, 2015; Zeoli et al., 2018). These studies have focused on general population homicide and not specifically on firearm homicides of children and teens despite the knowledge that intimate partner violence is an important predictor of youth homicide, especially with younger children (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019).

This dissertation intends examine the different covariates of firearm homicide victimization among children and teens at multiple levels (*Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children relative to teens?*). Thus, the need for a study such as this is evident and contributes to the knowledge base in multiple ways through the novel introduction of firearm laws as a risk factor in conjunction with individual, situational, and other structural factors.

There are several hypotheses presented in this dissertation. The first hypothesis draws from established links in prior literature (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Anglemyer et al., 2014; Fowler et al., 2017; Levine et al., 2012) and is linked to research question one:

RQ$_1$: What are the significant individual and situational variables for firearm homicide among children and teens?

H_1: Race, sex, gang-involvement, the homicide occurring during the progress of another crime, and victim-offender relationship will emerge as a significant individual and situational factors that increase the likelihood of firearm use in homicide among teens.

The second hypothesis is drawn from what previous work has found regarding firearm usage in homicide and the victim-offender relationship (Allen et al., 2020; Maltz, 2010; Sillito & Salari, 2011) and the location of the homicide (Pelletier & Pizarro, 2019; Pizarro, 2008). The second hypothesis examined in this dissertation relates to the second research question:

RQ_2: How do the individual and situational covariates of firearm homicide differ for children relative to teens?

H_2: Homicides involving child victims will be more likely to involve other weapons or unknown weapons than firearms, occur inside the home, and be committed by a family member.

The last hypothesis is related to research question three. Based on the literature examined that demonstrates that specific firearm laws decrease overall homicide rates (e.g., Azad et al., 2020; Rudolph et al., 2015; Webster et al., 2014), the hypotheses are as follows:

RQ_3: Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children relative to teens?

H_3: Domestic violence restraining order firearm laws will most saliently predict the reduction of risk for the use of a firearm in homicides involving children and teens.

Data

The data for this dissertation comes from three sources: The *Centers for Disease Control and Prevention's National Violent Death Reporting System (NVDRS)*, *Census Bureau data from the American Community Survey (ACS)*, and the *State Firearm Laws* database that collects data on the state-level firearm laws to understand the differences in surrounding firearm purchasing and possession.

National Violent Death Reporting System. The National Violent Death Reporting System (NVDRS) collects data from police reports, medical examiner reports, death certificates, and toxicology reports to understand the intricacies of differences between victims, offenders, and incidents. The NVDRS allows research to link information on the who, when, where, and how violent deaths occur and allow researchers to understand why violent deaths occur. While this system contains information regarding all violent deaths including suicide and unintentional deaths, the focus of this study is homicide. The NVDRS is a state-based reporting system that combines around 600 data elements from multiple sources across all settings and age groups listed previously into a usable, anonymous database accessible to the public and researchers alike. As of 2020, all states in the United States were submitting to the NVDRS. California is currently only submitting reports from four counties to the NVDRS (Los Angeles, Sacramento, Shasta, and Siskiyou). However, not all states have been reporting to the NVDRS since it began collecting data in 2004.

The NVDRS allows for data from several different administrative sources including law enforcement, coroners, and medical examiners to be combined to give

researchers a comprehensive view of the situation. These spheres allow for a greater understanding of the homicide event to be understood: the law enforcement reports allow for a greater understanding of the situational-level variables (e.g., intimate partner violence occurrence within the home and participation in delinquent behavior) and how the homicide occurred; the medical examiner's and coroner's reports allows for more information to be understood about the individual and the physiological state the person was in (e.g., the toxicology and the number of wounds) when they died. This allows for variables about the individual, the offender (in non-suicidal incidents), the incident itself, the weapon, and the toxicology for a comprehensive view of the violent death event. In doing so, this combination across various spheres allows for researchers to be able to link data to save lives and prevent injury as this data set provides valuable context about violent deaths.

American Community Survey. The American Community Survey (ACS) is a data source collected by the Census Bureau that aims to help local officials, community leaders, and businesses understand the changes undergone by their communities' overtime. The ACS collects detailed data on the population and housing information for the United States by state, county, census block, and zip code. This survey contains information from the U.S. census, which is taken every ten years, to make estimates about the population for years between the decennial data collections. The ACS contains information about the demographic make-up of the population including information about the employment and the educational status of the U.S. population, and household information which includes information about whether the household is family, single, or

a single-parent household. However, it is important to note that there is a margin of error at smaller geographic units. This is less prominent when researchers examine state-level geographic units.

State Firearm Laws database. This database incorporates state-year level firearm data from Boston University School of Public Health's State Firearm Laws. This database carefully monitors firearm legislation that is aimed at preventing firearm-related violence and allows researchers to evaluate the effectiveness of various firearm laws across states. This data combines the differences in state's approaches to firearms and laws that require the prohibition of certain persons from purchasing and possessing them to understand the safety of the public in each state. This dataset has variables that contain information about firearm legislation that exists within the U.S. and whether each state has the firearm law enacted. These are coded as 0 or 1, either enacted or not enacted, within each state. The rationale for using this dataset is that it collects data on state-level firearm laws across multiple years.

To answer the research questions outlined previously, this dissertation examines data from 15 states using the National Violent Death Reporting System for 8,172 violent deaths of children and teens aged 0 to 19. The NVDRS data was merged with data from the Census Bureau's American Community Survey and the database of firearm laws present on the State Firearm Laws website. These datasets were combined to capture a spectrum of variables across multiple levels: individual, situational, structural, and macro. This combination of datasets is used to examine research question three. The NVDRS comprises victims and incidents from multiple states across the United States, it

allows for a greater amount of generalizability across the U.S. and differences across communities. Further, this population is diverse across different states (e.g., percent of the population that is Black, percentage of female-headed households), and states vary in their state-level firearm laws.

Setting

This study examines data from fifteen states over 12 years (2005 to 2017): Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, and Wisconsin. For the number of cases per state and per year, please see Appendices A and B. These states were selected due to the data available from the NVDRS and their diversity in population and firearm laws, which will now be discussed. This information is also presented in Table 3 below.

Table 3. State Facts								
State	% Black	% Unemployed	% Below Poverty Line	% Female-Headed Households	Laws in 2005	Homicide Rate (2005)	Laws in 2017	Homicide Rate (2017)
CO	4	7	12.3	20.3	17	2.4	30	2.81
GA	30.5	8.9	16.8	29.6	11	4.78	6	6.42
KY	7.7	8.1	18.3	25.9	6	3.63	7	5.36
MD	29.3	6.8	9.3	26.3	55	7.64	66	7.89
MA	6.6	7.3	10.9	24.3	101	1.7	101	1.58
NJ	13.5	7.9	9.9	22.8	63	3.51	75	3.14
NC	21.4	8.7	16.3	27.7	29	5.16	30	5.24
OK	7.3	6.3	16.6	25.2	10	3.89	9	6.15
OR	1.8	8.3	15.1	22.1	24	1.46	35	1.85
RI	5.9	7.9	13	29	45	1.84	53	0.98
SC	27.9	9.1	16.9	32.1	15	5.53	12	7.71
UT	1.1	5.6	11.4	13.2	11	1.29	13	1.72
VA	19.4	6.1	10.9	23.5	12	6.59	13	4.05
WI	6.1	6.3	12.1	22.3	24	2.88	23	2.92

Taken together, there are clear differences that exist between states during the period examined in this study. Utah had the lowest average percentage of Black citizens (1.1%), Utah had the lowest average percentage of unemployed citizens (5.6%), Maryland had the lowest average percentage of its population living below the poverty line (9.3%), and Utah had the lowest average percentage of its population living in female-headed households (13.2%). Comparatively, Georgia had the highest percentage of black citizens (30.5%), South Carolina had the highest percentage of unemployed citizens (9.1%), Kentucky had the highest average percentage of its population living below the poverty line (18.3%), and South Carolina had the highest average percentage of its population living in female-headed households (32.1%).

The state of Massachusetts had the highest number of firearm laws at the beginning of this study period (2005) and at the end of this study period (2017). For overall firearm homicide rates, Utah had the lowest in 2005 (1.29 per 100,000) and Rhode Island had the lowest in 2017 (0.98 per 100,000). In regard to the highest rates of firearm homicide, Maryland had both the highest rate in 2005 (7.64 per 100,000) and in 2017 (7.89 per 100,000). Due to these clear differences between states, it is important to control for structural- (census) and macro-level (firearm laws) variables in all multilevel models. For a more specific breakdown of the number of homicides for children and teens by year and by state in this dissertation, please see Appendices A and B.

Unit of Analysis and Analysis Plan

Given the nature of the data and the research questions examined, there were multiple analyses run to answer the research questions. The first research question (*What*

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individual and situational variables are significant for firearm homicide for children and teens?) was tested using t-tests and chi-squares to understand what significantly differentiated child homicide victims from teen homicide victims. The unit of analysis for this research question was the homicide victim being a child or a teen. The second research question (*How do the individual and situational covariates of firearm homicide differ for children relative to teens?*) was tested using logistic regression. The unit of analysis for this research question was the homicide victim being a child or a teen.

In order to answer research question three (*Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children relative to teens?*), a separate panel data set was created by combining data from the NVDRS, the American Community Survey, and the State Gun Law Database. To model the impact of the use of a firearm in child and teen homicides, the firearm laws and census datasets were transformed into a combined panel dataset of firearm laws and census information for states. Thus, there was one observation for each year in the data from 2005 to 2017 for all 15 states. This resulted in a dataset with 180 observations nested across 12 years and within 15 states.

This data set was used to examine the relationship between child and teen homicide rates and gun laws as a multilevel logistic model. Since the observations were nested in time, a multilevel logistic regression was run with goodness-of-fit tests. This model examined research question number three and tested the significance of associations between child and teen firearm homicides and the multiple covariates described previously (Morenoff, Sampson, & Raudenbush, 2001; Peterson, Krivo, & Harris, 2000).

This model also included firearm laws that were both collapsed and disaggregated to understand the impact of these variables when controlling for individual, situational, and community-level factors.

Measures

Coding Schema for Descriptive and Binary Logistic Models

Table 4 below presents the coding schema for the descriptive statistics and the binary logistic tables discussed in Chapter 4, which answer research questions one and two. The dependent variable for the first set of analyses is *Child or Teen.* The main independent variable of interest is the *Firearm*. *Child or Teen* is coded as 0 for children and 1 for teens. The main independent variable of interest is *Firearm.* This variable, *Firearm,* is coded as 0 for firearm and 1 for other weapons.

Control Variables

There are several different levels of control variables examined in this study. Individual level variables are characteristics unique to the individual, such as race or sex. Situational level variables refer to characteristics of the homicide situation, such as the gang related situations or intimate partner violence related situations. These levels are examined to answer research questions one and two.

Individual. Variables at the individual-level are race, ethnicity, and sex. *Race* of the victim captures the racial background within the following categories: 0 = White, 1 = African American, 2 = Asian/Pacific Islander, 3 = Native American, 4 = Other, 5 = two or more races, or 999 = unknown. The *ethnicity* variable measures whether the victim was Hispanic and is broken down into two categories: 0 for not Hispanic, 1 for Hispanic.

The inclusion of this variable is important as the impact of ethnicity on firearm homicide victimization for children and teens is unexplored. *Sex* for the victim is broken down into male, female, or unknown. As the literature review has shown, the sex of the victim is an important covariate for homicide victimization (Fowler et al., 2017; Levine et al., 2012; Messner & Sampson, 1991; Schmidt et al., 2019; Smith & Visher, 1980; Steffensmeier & Allan, 1996). This is coded as 0 for male and 1 for female. Unknown categories for age, race, ethnicity, and sex exist as sometimes bodies have decomposed to a point where medical examiners and coroners cannot determine the race, ethnicity, or sex to a level of certainty needed. These cases are excluded from analyses since most of the information in cases that involve decomposing bodies or body dumps is missing.

      Situational.[2] The NVDRS dataset provides interrater reliability when the variables in this section are coded. Coders read police narratives and then input them into an online system based on a code book available on the CDC's NVDRS page. Cases are then randomly selected to be reviewed by other coders to ensure accuracy. Situational variables capture the circumstantial variables surrounding the death of the victim including familial-level variables. *Precipitated by another crime* captures whether the homicide was precipitated by another crime but had been concluded before the homicide occurring and is coded as 1 = yes or 0 = no/not applicable/unknown. *Other crime in progress* encapsulates whether the homicide occurred during the commission of another crime and that crime has not been completed before the death. This is coded as 1 = yes or

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[2] It is important to note that no/not applicable/unknown are grouped together due to their coding in the NVDRS codebook. There is not a way to separate them, unfortunately. This is a major limitation of this dissertation.

0 = no/not applicable/unknown. *Gang-related* captures whether the victim's death was related to gang activity, was committed by a gang member, and/or the victim was a gang member. This variable is coded as 1 = yes or 0 = no/not applicable/unknown. This variable is important for teen firearm homicide victimization as established by the literature on non-fatal firearm victimization (Paris et al., 2002; Spano et al., 2008). The inclusion of variables that capture delinquency and criminal behavior are particularly important as demonstrated prior literature on teen homicide victimization (Chassin et al., 2013; Cornell, 1993; Circo et al., 2018; Ezell & Tanner-Smith, 2009).

Since research has shown that intimate partner violence is an important predictor of youth homicide, especially with younger children (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019), variables that capture important information regarding the presence of domestic violence and problems within the home are included in the models. *Intimate partner violence-related* "identifies cases in which the homicide or legal intervention is related to immediate or ongoing conflict or violence between current or former intimate partners. This includes all deaths where a victim is killed by their current or former intimate partner." (CDC, 2015, p. 78). This is coded as 1 = yes or 0 = no/not applicable/unknown. The next four variables discussed are exploratory in nature as they have not been examined in the homicide literature for children and teens to date. *Abuse/neglect led to death* encapsulates whether abuse or neglect led to the death of the violence and is coded as 1 = yes or 0 = no/not applicable/unknown. *Excessive violence* which includes incidents where the victim was not killed through excessive violence (coded as 0), shot multiple times (coded as 1),

stabbed multiple times (coded as 2), and beaten to death (coded as 3). *History of child abuse/neglect* captures whether the victim had a history of child abuse/neglect and is coded as 1 = yes or 0 = no/not applicable/unknown. *History of family problems* variable captures whether the victim had family relationship problems that are thought to contribute to the victim's death and are coded as 1 = yes or 0 = no/not applicable/unknown.

The mode variables capture how the homicide was committed. This variable is included as homicide research has established this as an important variable that predicts what type of weapon is used in the homicide (e.g. Pelletier & Pizarro, 2019; Pizarro, 2008; Pizarro, Holt & Pelletier, 2019). In this dissertation, mode is divided into two separate variables: *Walk-by* and *Drive-by*. *Walk-by* is coded as 1 = yes or 0 = no/not applicable/unknown and *Drive-by is coded as* 1 = yes or 0 = no/not applicable/unknown. *Drug-related* captures whether drug dealing, drug trade, or drug use by the victim and/or offender is thought to have precipitated the victim's death and played a role in it and this is coded 1 = yes or 0 = no/not applicable/unknown. This is important for teens as evidenced by the literature (Gover, 2004; Lauritsen et al. 1992; Malik, Sorenson, & Aneshensel, 1997; Mustaine & Tewksbury 1998; Pedersen et al., 2001; Sampson & Lauritsen 1990; Shaffer & Ruback 2002; Spano & Freilich, 2009; Vogel & Himelein 1995). *Alcohol-related* is coded as 1 = yes or 0 = no/not applicable/unknown. While not relevant for children, this variable is particularly relevant for teens as suggested by the literature (Averdijk & Bernansco, 2015; Felson & Burchfield, 2004). As research on violent victimization has suggested that alcohol use is a risk factor for youth violence

victimization, it is important to include a variable such as this in a dissertation examining the risk factors for children and teen firearm homicide.

Location of the Homicide captures where the injury that led to death occurred. This is currently coded as 0 is an inside area (home, apartment, school, etc.), 1 is outside area (street, park, driveway, etc.), and 999 is unknown. This coding schema is based on previous literature (e.g., Pelletier & Pizarro, 2019; Pizarro, 2008; Pizarro, Holt & Pelletier, 2019), and the due to the fact that the vast majority of locations where the homicide occurred were inside a residence or in an outdoor area. To capture firearm access within the home, firearm storage and firearm locked is used to determine the amount of firearm access children and teens have within the home. Firearm storage is coded as 0 = loaded, 1 = unloaded, and 999 = unknown or not applicable. Victim-offender relationship captures the relationship between the victim and the offender. While this is currently coded as an extensive list of possible victim-offender relationships, it is coded as 0 = family member; 1 = other relationship; and 999 = unknown relationship. This coding schema is based on previous literature (e.g., Pelletier & Pizarro, 2019; Pizarro, 2008; Pizarro, Holt & Pelletier, 2019).

Table 4. Coding Schema for Descriptive and Logistic Models	
Variable Name	Variable Values
Dependent Variable	
Child or Teen	0= Teen; 1 = Child
Main Independent Variable of Interest	
Firearm	0 = Firearm; 1 = Other Weapon Type; 999 = Unknown
Demographics	
Race	0 = White; 1 = Non-White; 999 = Unknown
Ethnicity	0 = Non-Hispanic; 1 = Hispanic; 999 = Unknown
Sex	0 = Male; 1 = Female; 999 = Unknown
Situational Variables	

Precipitated by Another Crime	0 = No/Not Available/Unknown; 1 = Yes
Occurred during Another Crime in Progress	0 = No/Not Available/Unknown; 1 = Yes
Gang-Related	0 = No/Not Available/Unknown; 1 = Yes
Intimate Partner Violence Related	0 = No/Not Available/Unknown; 1 = Yes
Abuse or Neglect Led to Death	0 = No/Not Available/Unknown; 1 = Yes
Excessive Violence	0 = No; 1 = Yes
History of Family Problems	0 = No/Not Available/Unknown; 1 = Yes
Walk-By	0 = No/Not Available/Unknown; 1 = Yes
Drive-By	0 = No/Not Available/Unknown; 1 = Yes
Drug-Related	0 = No/Not Available/Unknown; 1 = Yes
Alcohol-Related	0 = No/Not Available/Unknown; 1 = Yes
Location of the Homicide	0 = Inside Area; 1 = Outside Area; 999 = Unknown
Gun Storage	0 = Loaded; 1 = Unloaded; 999 = Unknown/ Not Applicable
Gun Stored Locked	0 = Locked; 1 = Unlocked; 999 = Unknown/ Not Applicable
Victim-Offender Relationship	0 = Family Member; 1 = Other Relationship; 999 = Unknown Relationship

Note: The No/Not Available/Unknown was not collapsed in this study. This is how these variables are coded in the NVDRS.

Coding Schema for Multilevel Models

Table 5 below displays the coding schema for the multilevel models. The

dependent variable in the multilevel models is *Firearm.* This is coded as 0 for Other

Weapon, 1 for Firearm, and 999 for Unknown. The main independent variable of interest

is *Child or Teen.* This is coded as 0 for Teen and 1 for Child. It is important to note that

the coding schema was adjusted to the multilevel models due to stability within the

models. Specifically, several variables were collapsed into one variable due to model

instability when the variables separated. For example, the variables of a race and

ethnicity were combined into a new *Race and Ethnicity.* This is coded as 0 for White,

non-Hispanic and 1 for Non-White and/or Hispanic. The variables *Precipitated by Another Crime* and *Occurred during Another Crime in Progress* were collapsed into one variable *Precipitated by Another Crime or Occurred During the Commission of Another Crime*. This is coded as 0 for No/Not Available/Unknown and 1 for Yes. Further, the variables of *Abuse or Neglect Led to Death* and *History of Abuse/Neglect* were collapsed into one variable *History of Abuse and/or Neglect or Abuse Led to Death*. This is coded as 0 for No/Not Available/Unknown and 1 for Yes. Lastly, the variables of *Drug-Related, Alcohol-Related,* and *Gang-Related* were collapsed into the variable *Drug-, Alcohol-, and/or Gang-Related*. This is coded as 0 for No/Not Available/Unknown and 1 for Yes. The decision to disaggregate care-giving facilities, such as schools and daycares, from inside locations, such as residences, is based in prior literature (Bennet et al., 2006). Apart from these variables, the rest of the demographic and situational variables remained the same in their coding (see Table 3).

Structural Characteristics. The census data was abstracted from the Census Bureau's American Community Survey. The inclusion of these variables is based on the findings of Jones-Webb and Wall (2008) and MacDonald and Gover (2005). To capture a youth's socioeconomic disadvantage, several variables were used. *Percentage of African American households* captures the percentage of households that are African American families in a state. This is calculated by dividing the total African American households by the total households and multiplying by 100. *Percentage Unemployed in the State* captures the rate of unemployment of households in a state. This is calculated by dividing the total unemployed individuals by the labor force, which is the sum of the unemployed

and employed individuals. *Percentage Living Below the Poverty Line* captures the

number of people living in a state. This is calculated by dividing the total households that

are living below the poverty line by the total households in the state and multiplying by

100. Lastly, the *percentage of female-headed households* captures the percentage of

households that have children under the age of 18 who live in a household without a

husband in a state. This is calculated by dividing the total households that have female-

headed households by the total households and multiplying by 100. These rates were not

shown to be collinear with each other in the models through variance inflation factor

(VIF) tests.

     Firearm Law Variables. It is also important to note the addition of law variables

into these models. The initial model was run with collapsed law variables for *Child

Access Prevention (CAP) Laws, Minimum Age Requirement Laws, Permit-to-Purchase

(PTP) Laws, Domestic Violence Restraining Order (DVRO) Laws,* and *Total Gun Laws

in the State*. These laws were coded as 0 for no law in the state and 1 for yes there was

one of these laws in the state. The *Total Gun Laws in State* variable was a count variable

for the total number of firearm laws present in a state. For the next four models, these law

types (*Child Access Prevention Laws, Minimum Age Requirement Laws, Permit-to-

Purchase Laws,* and *Domestic Violence Restraining Order Laws*) were disaggregated into

separate variables.

     Seventeen additional multilevel models were run for specific firearm laws of

interest. Each law was run in a separate model. There were several specific CAP laws

examined in the separate multilevel models. These laws are all coded as 0 for the state

does not have any CAP laws, 1 for if the state has other CAP laws apart from the specific

CAP law of interest, and 2 for the state does have that specific CAP law. These variables

were considered categorical in the modeling. The *Child Access Prevention Liability Law*

variable refers to a law that delineates criminal liability for negligent storage of guns,

regardless of whether a child gains access. The *Safety Lock Required Law (Lock*

Standards) variable requires a safety lock for handguns and must be approved by state

standards. The *CAP Liability 16 Law* variable requires criminal liability for negligent

storage applies to access by children less than 16 years old. Lastly, the *CAP Liability 18*

Law variable requires criminal liability for negligent storage applies to access by children

less than 18 years old.

Three *Minimum Age Requirement Laws* were also examined in the separated

multilevel models. Similar to the way the CAP laws were coded, these were also coded as

0 for the state that does not have any minimum age requirement law, 1 for the state does

have minimum age requirement laws apart from the specific minimum age requirement

law of interest, and 2 for the state does have that specific minimum age requirement law

of interest. *No Possession of Handguns Until Age 21* refers to a law that mandates an

individual may not have possession of handguns until age 21. *No Possession of Long*

Guns Until Age 18 delineates that an individual may not possess a long gun until age 18.

No Possession of Long Guns Until Age 21 requires an individual to be age 21 before

being allowed to possess a long gun legally.

In another set of separate multilevel models, specific *Permit-to-Purchase Laws*

were examined. All of these variables were coded as 0 for the state that does not have any

PTP laws, 1 for if the state has other PTP laws apart from the specific PTP law of interest, and 2 for the state that does have that specific PTP law. The variable *A License or Permit is Required to Purchase All* requires a license or permit is required to purchase all firearms.

In the last set of separate multilevel models, specific *Domestic Violence Restraining Order Laws* were examined. Similar to the previously discussed models, all of these variables were coded as 0 for the state that does not have any DVRO laws, 1 for if the state has other DVRO laws apart from the specific DVRO law of interest, and 2 for the state that does have that specific DVRO law. *DVRO Dating* is a law that requires DVRO subjects are automatically prohibited from firearm purchasing and possession if the subject is a dating partner of the petitioner. *Ex Parte DVRO Subjects* is a law that prohibits ex parte (temporary) DVRO subjects from possessing a firearm.

Automatic Prohibition of DVRO Subjects From Possessing Firearms is a law that mandates that anyone with a domestic violence-related restraining order (DVRO) is prohibited from possessing firearms. The *DVRO Subjects Must Surrender Their Firearms* variable refers to a state law that requires DVRO subjects to surrender their firearms.

Table 5. Coding Schema For Multilevel Models: Individual, Situational, Structural, and State Firearm Law Variables

Variable Name	Variable Values
Dependent Variable	
Weapon	0 = Other Weapon; 1 = Firearm; 999 = Unknown
Independent Variables	
Child or Teen	0= Teen; 1 = Child
State_Year	Dummy variable for each state in the dataset from 2005 to 2017 (States: Alaska, Colorado, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, North Carolina, Oklahoma, Oregon, Rhode Island, South Carolina, Utah, Virginia, Wisconsin)

Individual	
Race and Ethnicity	0 = White, non-Hispanic; 1 = Non-White and/or Hispanic
Sex	0 = Male; 1 = Female;
Situational Variables	
Precipitated by Another Crime or Occurred During the Commission of a Crime	0 = No/Not Available/Unknown; 1 = Yes
History of Abuse and/or Neglect or Abuse Led to Death	0 = No/Not Available/Unknown; 1 = Yes
Excessive Violence	0 = No/Not Available/Unknown; 1 = Yes
Victim-Offender Relationship	0 = Family Member; 1 = Other Relationship; 999 = Unknown Relationship
Location of the Homicide	0 = House or Apartment; 1 = Outside Area; 2 = School or Child Care Center; 3 = Other (Commercial Establishments, Restaurants, etc.); 999 = Unknown
Structural Variables	
Percentage Black in the State	% Of The State's Population That Is Black
Percentage Unemployed in the State	% Of The State's Population That Is Unemployed
Percentage Living Below the Poverty Line in the State	% Of The State's Population That Lives Below The Poverty Line
Percentage of Female-Headed Households in the State	% Of The State's Population That Lives In Female-Headed Households
Law Variables – Collapsed	
Child Access Prevention Laws	0 = No Child Access Prevention Laws in State 1 = AT LEAST 1 Child Access Prevention Law in State
Minimum Age Requirements	0 = No Minimum Age Requirement Laws in State 1 = AT LEAST 1 Minimum Age Requirement Law in State
Permit-to-Purchase Laws	0 = No Permit-to-Purchase Laws in State 1 = AT LEAST 1 Permit-to-Purchase Law in State
Domestic Violence Restraining Order Laws (DVRO)	0 = No DVRO Laws in State 1 = AT LEAST 1 DVRO Law in State
Total Gun Laws in the State	Count; Total number of firearm laws across all types in the state
Specific Child Access Prevention Laws	
CAP Liability	0 = No CAP Laws in State 1 = State has CAP Laws But Not Liability Law 2 = Criminal Liability for Negligent Storage of Guns, Regardless of Whether Child Gains Access

Lock Standards	0 = No CAP Laws in State 1 = State has CAP Laws But Not Lock Standards 2 = Safety Lock is Required for Handguns and Must Be Approved by State Standards
CAP Liability 16	0 = No CAP Laws in State 1 = State has CAP Laws But Not Liability 16 Law 2 = Criminal Liability for Negligent Storage Applies to Access by Children Less Than 16 Years Old
CAP Liability 18	0 = No CAP Laws in State 1 = State has CAP Laws But Not Liability 18 Law 2 = Criminal Liability for Negligent Storage Applies to Access by Children Less Than 18 Years Old
Specific Minimum Age Possession Laws	
Age 21 Handgun Possess	0 = No Minimum Age Requirement Laws in State 1 = State has Minimum Age Possession Laws But Not Age 21 Handgun Possess 2 = No Possession of Handguns Until Age 21
Age 18 Long Gun Possess	0 = No Minimum Age Requirement Laws in State 1 = State has Minimum Age Possession Laws But Not Age 18 Handgun Possess 2 = No Possession of Long Guns Until Age 18
Age 21 Long Gun Possess	0 = No Minimum Age Requirement Laws in State 1 = State has Minimum Age Possession Laws But Not Age 21 Long Gun Possess 2 = No Possession of Long Guns Until Age 21
Specific Permit-to-Purchase Laws	
Permit to Purchase is Required	0 = No PTP Laws in State 1 = State has PTP Laws But Not Permit to Purchase Law 2 = A License or Permit is Required to Purchase All Firearms
Specific Domestic Violence Restraining Order Firearm Laws	
DVROs are automatically prohibiting if the subject is a dating partner of the petitioner	0 = No DVRO Laws in State 1 = State has DVRO Laws But Not DVRO Dating Law 2 = DVRO Dating
Ex parte (temporary) DVRO subjects are automatically	0 = No DVRO Laws in State 1 = State has DVRO Laws But Not Ex Parte Law

prohibited from possessing firearms	2 = Ex parte
DVRO Subjects Prohibited from Possessing Firearms	0 = No DVRO Laws in State 1 = State has DVRO Laws But Not DVRO Subject Prohibited from Possessing a Firearm Law 2 = Prohibition DVRO Subjects from Possessing Firearm
DVRO Subjects Surrender	0 = No DVRO Laws in State 1 = State has DVRO Laws But Not DVRO Subjects Surrender Law 2 = DVRO Subjects to Surrender Their Firearms

CHAPTER 4

RESULTS FOR CHILD-TEEN DYADS AND LOGISTIC REGRESSION

Descriptive Statistics for Teen and Children Homicide Victims Across 15 States, 2005-

2017

Table 6 below presents the descriptive statistics for children and teens across a

multitude of variables. It is important to note that the characteristics between child and

teen victims were significant except for gun storage and locking, and intimate partner-

related. The total number of teen homicide victims present in this dataset is 5,559 and the

total number of child homicide victims is 2,965. Teen homicides were committed with a

firearm in 83.02% (n=4,615) of cases and 15.3% (n=454) of cases with child victims.

Other weapons were used in about 15% of teen homicide cases (n=837) while child

homicide cases involved other weapons in approximately 75% (n=2,220) cases.

Unknown weapons were used in about 2% of teen homicides and about 9.8% of child

homicides. This demonstrates the firearms were more likely to be used in teen homicide

cases and other weapons were more likely to be used in child homicide cases.

In regard to demographics, the majority of teen victims were male (n=4,661,

83.85%) as were the majority of child victims (n=1,654, 55.78%). There were almost as

many female child victims (n=1,310, 44.18%) as male child victims. Consistent with

other homicide research, the majority of teen victims were of a non-White race (n=4,109,

73.92%) as opposed to White (n=1,401, 25.20%). However, child victims were more

evenly split between White (n=1,462, 49.95%) and non-White (n=1,481, 49.31%) races.

There were 49 teen victims and 22 child victims were of an unknown race. In terms of

ethnicity, the majority of both teen (n=4,854, 87.32%) and child (n=2,510, 84.65%) victims were non-Hispanic. Approximately 11.4% (n=635) of teen homicide victims and 13.4% (n=398) child homicide victims were Hispanic while only about 1% (n=70) teen victims and 2% (n=57) child victims were of unknown ethnicity.

The victim-offender relationship (VOR), in 134 (2.41%) teen homicide cases, the perpetrator of the homicide was a family member of the victim. Conversely, 457 child homicide cases involved a family member as the perpetrator of the homicide (15.42%). The perpetrator was another person known to the victim in 1,730 cases (31.12%) of teen homicide and 666 (22.47%) of child homicide. The relationship was unknown in 66.47% (n=3,695) of teen homicide incidents and in 62.11% (n=1,841) of child homicide incidents. About 28% (n=1,571) of teen victim homicides and 18% (n=526) of child victim homicides were precipitated by another crime. Approximately 18% (n=1,016) of teen homicide cases and 8% (n=233) of child homicide cases occurred while another crime was in progress. For incidents related to gang activity, 12.52% (n=696) of teen homicide victims, and only 0.81% (n=24) of child homicide victims were killed in a gang-related incident. Though not statistically significant, about 6% (n=338) of teen homicide victims and 7% (n=202) of child homicide victims were killed in an incident that was related to intimate partner violence.

Child victims of homicide (n=923, 31.13%) were more likely to be killed as the result of abuse or neglect than teen homicide cases (n=26, 0.47%). Relatedly, about 9% (n=261) of child victims had a history of abuse or neglect before death while less than one percent (n=23) of teen victims had the same history. Excessive violence, or where the

victim was shot multiple times, stabbed multiple times, or beaten to death, occurred in 67.21% (n=3,736) of teen homicide cases and 86.61% (n=2,568) of child homicide cases. The homicide was related to a family problem in about 1.5% (n=82) of teen homicide victim cases and 4% (n=130) of child homicide victim cases. In regard to the mode of the homicide, 0.85% (n=47) of teen homicide victims and 0.10% (n=3) child homicide victims were killed in a walk-by incident; and 6.21% (n=345) of teen homicide victims and 0.84% (n=25) of child homicide victims were killed in a drive-by incident. About 10% (n=549) of teen homicide victim cases and 2% (n=58) of child homicide victims cases were drug-related while about 9% (n=479) of teen homicide victim cases and less than one percent (n=25) of child homicide victim cases were alcohol-related.

As research has shown, the location of where the homicide takes place is important for how the homicide occurs. About 55% (n=3,059) of teen homicide cases occurred in an inside area such as a house or apartment, a bar, or other indoor establishments while 92% (n=2,249) of child homicide cases occurred in an inside area. Approximately 41% (n=2,249) of teen homicide cases and 4% (n=111) occurred in an outside area such as a street, parking lot. or park. Some homicides did occur in an area unknown and separate from where the body was located. About 5% (n=251) of teen homicides and 4% (n=125) of child homicides occurred in an unknown location.

Regarding firearm storage, about 1% (n=53) of teen homicide cases and 1% (n=24) cases of child homicide occurred where the firearm was stored loaded. Less than one percent (n=8) of teen homicide cases and less than one percent (n=6) of child homicide cases occurred where a firearm was stored unloaded. Most cases for both teens

(n=5,498, 98.90%) and children (n=2,934, 98.99%) had firearms that were stored in an unknown capacity or were not applicable as firearms were not used. Regarding firearm storage locking, less than one percent (n=19) of teen homicides and less than one percent (n=6) of child homicides involved firearms that were stored in locked containers. Less than one percent (n=33) of teen homicide cases and about 1% (n=24) of child homicide cases involved firearms that were stored in unlocked containers. Again, most firearms for both teens (n=5,507, 99.06%) and children (n=2,934, 98.99%) involved firearms that were in an unknown storage capacity or were not applicable as firearms were not used in the homicide.

As demonstrated by the discussion above, there are clear covariates of child and teen homicides; thus, answering research question 1: "*What are the significant individual and situational variables for firearm homicide among children and teens?*" The covariates identified at this stage are the type of weapon used in the homicide, sex of the victim, the race of the victim, and ethnicity of the victim. Whether another crime precipitated the homicide, the homicide being in commission during another crime, the homicide was related to a gang situation, abuse or neglect of the victim led to their death, there is a history of abuse or neglect in the victim's background, and the homicide occurred in the context of a family problem were all identified as significant covariates. Whether the homicide was committed via walk-by and drive-by, the homicide was related to a drug or alcohol situation, the location of where the homicide took place, the homicide involved excessive violence, and the victim-offender relationship. This also provides insight into hypothesis 1: *Race, sex, gang-involvement, the homicide occurring*

during the progress of another crime, and victim-offender relationship will emerge as a

significant individual and situational factors that increase the likelihood of firearm use in

homicide among teens. Race, sex, gang-involvement, the homicide occurring during the

progress of another crime, and victim-offender relationship were all significant covariates

in predicting the use of a firearm in teen homicides, thus providing support for hypothesis

1.

	Teen N (%)	Child N (%)	Chi-Squares
Table 6. Descriptive Statistics for Teens and Children Homicide Victims Across 15 States, 2005-2017			
Independent Variable			
Weapon			0.001***
Firearm	4,615 (83.02)	454 (15.31)	
Other Weapon	837 (15.06)	2,220 (74.87)	
Unknown	107 (1.92)	291 (9.81)	
Demographics			
Sex			793.83***
Male	4,661 (83.85)	1,654 (55.78)	
Female	898 (16.15)	1,310 (44.18)	
Unknown	0 (0.00)	1 (0.03)	
Race			504.37***
White	1,401 (25.20)	1,462 (49.31)	
Non-White	4,109 (73.92)	1,481 (49.95)	
Unknown	49 (0.88)	22 (0.74)	
Ethnicity			13.68***
Non-Hispanic	4,854 (87.32)	2,510 (84.65)	
Hispanic	635 (11.42)	398 (13.42)	
Unknown	70 (1.26)	57 (1.92)	
Situational Variables			
Victim-Offender Relationship			528.71***
Family Member	134 (2.41)	457 (15.42)	
Other Person Known to Victim	1,730 (31.12)	666 (22.47)	
Unknown Relationship	3,695 (66.47)	1,841 (62.11)	
Precipitated by Another Crime			115.37***
Yes	1,571 (28.26)	526 (17.74)	

Other Crime in Progress			167.83***
Yes	1,016 (18.28)	233 (7.86)	
Gang-Related			342.92***
Yes	696 (12.52)	24 (0.81)	
Intimate Partner Related			1.75
Yes	338 (6.08)	202 (6.81)	
Abuse or Neglect Led to Death			0.001***
Yes	26 (0.47)	923 (31.13)	
History of Abuse or Neglect			422.51***
Yes	23 (0.41)	261 (8.80)	
Excessive Violence			377.99***
Yes	3,736 (67.21)	2,568 (86.61)	
Family Problem Related			67.49***
Yes	82 (1.48)	130 (4.38)	
Walk-By			18.37***
Yes	47 (0.85)	3 (0.10)	
Drive-By			133.94***
Yes	345 (6.21)	25 (0.84)	
Drug-Related			183.37***
Yes	549 (9.88)	58 (1.96)	
Alcohol-Related			208.53***
Yes	479 (8.77)	25 (0.86)	
Location of the Homicide			0.001***
Inside Area	3,059 (55.03)	2,728 (92.04)	
Outside Area	2,249 (40.46)	111 (3.74)	
Unknown	251 (4.52)	125 (4.22)	
Gun Storage			0.84
Loaded	53 (0.95)	24 (0.81)	
Unloaded	8 (0.14)	6 (0.20)	
Unknown/Not Applicable	5,498 (98.90)	2,934 (98.99)	
Gun Stored Locked			0.27
Locked	19 (0.34)	6 (0.20)	
Unlocked	33 (0.14)	24 (0.81)	
Unknown/Not Applicable	5,507 (99.06)	2,934 (98.99)	

$*p < 0.05, **p < 0.01, ***p < 0.001$

Binary Logistic Regression for Child Victims Compared to Teen Victims of Homicide

Table 7 shows the results of a logistic regression comparing children (=1) to teens (=0). Only results with significant values will be discussed[3]. There were clear differences between child homicide victims and teen homicide victims. Regarding demographic variables, other weapons ($OR = 12.16$, $p < 0.001$) and unknown weapons ($OR = 17.75$, $p < 0.001$) were more likely than firearms to be used in child homicides. Females were more likely than males to be a child victim ($OR = 1.82$, $p < 0.001$). Non-White and/or Hispanic victims were less likely than White, non-Hispanic victims to be a child victim ($OR = 0.59$, $p < 0.001$).

Clear differences emerged between child homicide victims and teen victims regarding the situational-level factors present in each type of homicide. The victim-offender relationship was significant concerning the differences between child and teen homicides. Homicides committed by someone with a relationship to the victim that is not family are less likely than homicides committed by family members to involve a child victim ($OR = 0.22$, $p < 0.001$). Homicides committed by someone with an unknown relationship to the victim were less likely than homicides committed by a family member to involve a child victim ($OR = 0.36$, $p < 0.001$).

Homicide incidents that did not involve another crime in progress were less likely than homicide incidents that did involve another crime in progress to involve a child victim ($OR = 0.70$, $p < 0.05$). Gang-related homicides were less likely than non-gang

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[3] It is important to note that unknowns for sex, race, and ethnicity were dropped before regression. Gun storage, gun locking, walk-by, and drive-by variables were also not included in the model due to issues with model stability.

related homicides to involve a child victim ($OR = 0.20$, $p < 0.001$), and situations that did involve intimate partner violence were less likely than situations that did not involve intimate partner violence to have a child victim ($OR = 0.73$, $p < 0.05$). Incidents that involved abuse or neglect were more likely than incidents that did not involve abuse or neglect to have a child victim ($OR = 20.58$, $p < 0.001$) and homicides involving excessive violence (such as being beaten to death or stabbed multiple times) were more likely than homicides that did not involve excessive violence to have a child victim ($OR = 1.49$, $p < 0.001$).

Incidents that involved a family problem within the house were more likely than incidents that did not stem from a family problem within the household to have a child victim ($OR = 1.71$, $p < 0.001$). Drug-related incidents were less likely than non-drug-related incidents to involve a child victim ($OR = 0.40$, $p < 0.001$) and alcohol-related homicides were less likely than non-alcohol-related homicides to involve a child victim ($OR = 0.10$, $p < 0.001$). The location of the homicide was significant. Homicides that occurred in an outside area were less likely than homicides that occurred in an inside area to involve child victims ($OR = 0.12$, $p < 0.001$) and homicides that occurred in an unknown location were less likely than homicides that occurred in an inside location to involve a child victim ($OR = 0.35$, $p < 0.001$).

In summary, homicides involving a weapon other than a firearm were more likely to be used in cases involving a child victim. White, non-Hispanic victims were more likely to be a child victim and male victims were less likely to be child victims. The homicide of a child was more likely to be committed by a family member. Homicide

incidents involving another crime and those that involved an intimate partner situation were less likely to involve a child victim. Non-gang-related crimes, homicides involving abuse or neglect, family-problem-related incidents, and incidents involving excessive violence (such as being beaten to death) were more likely to involve a child victim. Homicides that were alcohol- or drug-related were less likely to involve a child victim. Lastly, homicide incidents that occurred outside or in an unknown location.

The results of these models demonstrate that there are clear differences between child homicide victims and teen homicide victims. This allows to answer research question 2: *How do the individual and situational covariates of firearm homicide differ for children relative to teens?* There are significant differences between child and teen homicides concerning several variables. These variables include: the weapon used to commit the homicide and the sex and the race. The homicide occurred in the process of another crime, the homicide was gang-related, and the homicide was drug-related and/or alcohol-related were also significantly different between children and teens. Abuse or neglect led to the death of the victim, the homicide was related to a family problem, and the homicide was related to an intimate partner violence situation were also significantly different between the homicides of children and the homicides of teens. The homicide involved excessive violence, the location of the homicide, and the victim-offender relationship were significantly different between child and teen homicide victims. These findings give insight into hypothesis 2: *Homicides involving child victims will be more likely to involve other weapons or unknown weapons than firearms, occur inside the home, and be committed by a family member.* As children were more likely to be killed

with a weapon other than a firearm or an unknown weapon in the home, and be

committed by a family member, this provides support for hypothesis 2.

	β	*SE*	exp(*β*)
Table 7. Binary Logistic Regression for Child Victims Compared to Teen Victims of Homicide, N=8,172			
Weapon: Firearm			
Other Weapon	2.50***	1.00	12.16
Unknown	2.88***	2.98	17.75
Sex: Female	0.60***	0.15	1.8
Race: Non-White	-0.53***	0.05	0.59
Ethnicity: Hispanic	0.13	0.14	1.14
Victim-Offender Relationship: Family Member (Reference)			
Other Relationship	-1.54***	0.03	0.22
Unknown	-1.01***	0.05	0.36
Precipitated by Another Crime: Yes	-0.12	0.11	0.89
Other Crime in Progress: Yes	-0.35*	0.11	0.70
Gang-Related: Yes	-1.62***	0.05	0.20
IPV-Related: Yes	-0.31*	0.10	0.73
Abuse or Neglect Led to Death: Yes	3.02***	4.43	20.58
History of Abuse: Yes	0.48	0.46	1.62
Excessive Violence: Yes	0.40***	0.15	1.49
Family Problems: Yes	0.54*	0.36	1.71
Drug-Related: Yes	-0.91***	0.08	0.40
Alcohol-Related: Yes	-2.34***	0.02	0.10
Location: Inside (Reference)			
Outside Area	-2.16***	0.01	0.12
Unknown Location	-1.04***	0.06	0.35
Constant	-0.59***	0.09	0.56
Nagelkerke R^2		0.70	

*p < 0.05, **p < 0.01, ***p < 0.001

Note: Unknowns for sex, race, and ethnicity were dropped before regression. Walk-by and drive-by were not included in the model due to issues with model stability.

CHAPTER 5

RESULTS FOR MULTILEVEL MODELS

Multilevel Logistic Models with Collapsed Law Variables

Table 8 presents the results of a multilevel model comparing firearm use (=1) to

non-firearm use (=0) in homicide with all individual, situational, structural, and collapsed

firearm law variables. To be specific, these results are about the ratio between firearm

and non-firearm homicides and not the rate of homicide cases. It is also important to note

that these results were nested within states across years and within states; though, there

were no significant differences across states or years. It is important to note that this

model only contains collapsed dummy variables for the state firearm laws (0 is the state

does not have that specific type of firearm law and 1 is the state does have a law that is

that specific type of firearm law). This is done in an effort to establish whether or not the

presence of these specific types of firearm laws have an impact on firearm homicide

victimization among children and teens. Taken as a whole, the results of this table

demonstrate that, between states and across time, the most salient covariates of firearm

homicides involving children and teens exist at the individual, situational, and structural

levels. The results of the intraclass correlations for the multilevel models reveal that there

is not a strong correlation between individual realizations of the latent response within

the same subject. This means that when controlling for all the levels, the differences

across state and year were not significant. Only significant variables will be discussed in

detail below due to the nature of this dissertation and its focus on establishing the

covariates of firearm homicide victimization among children and teens.

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When differences at the state level and states across time are controlled for, child victims are less likely than teen victims to be killed in a firearm homicide ($OR = 0.065$, $p < 0.001$). Non-White and/or Hispanic children and teens were more likely to be killed in a firearm homicide than White, non-Hispanic children and teens ($OR = 1.663$, $p < 0.001$). Female homicide victims were less likely than male homicide victims to be killed with a firearm ($OR = 0.506$, $p < 0.001$).

Regarding situational-level covariates, when differences at the state level and states across time are controlled for, salient covariates of firearm homicide emerged. Homicides that were precipitated by another crime or occurred during the commission of a crime were more likely to be a firearm homicide than those that were not precipitated by another crime or occurred during the commission of a crime ($OR = 1.240$, $p < 0.01$). The homicide victims who had a history of abuse or neglect or having abuse lead to the death of the victim were less likely than those without those experiences to be killed with a firearm ($OR = 0.404$, $p < 0.001$). The homicide being drug-, alcohol-, or gang-related made it more likely to be a firearm homicide than a homicide that was not drug-, alcohol, or gang-related ($OR = 1.229$, $p < 0.05$).

Those that were killed with excessive violence (i.e. shot multiple times, stabbed multiple times, beaten to death) were less likely to be the victim of a firearm homicide than those that were not killed with excessive violence ($OR = 0.299$, $p < 0.001$). The victim-offender relationship was also a salient covariate of firearm homicide among children and teens. Those victims killed by a family member were less likely than those killed by someone else known to the victim, such as a friend or acquaintance, to be the

victim of a firearm homicide ($OR = 0.609$, $p < 0.001$). The location of where the homicide occurred was also a salient covariate of firearm use in homicides involving children and teens. Those victims killed in an outdoor area, such as a street or park, were more likely than those killed in an indoor area, such as a residence, to be killed with a firearm ($OR = 1.624$, $p < 0.001$) and those killed in an unknown location were less likely than those killed in an indoor area to be killed with a firearm ($OR = 0.350$, $p < 0.001$).

In regard to structural-level covariates, when differences at the state level and states across time are controlled for, salient covariates of firearm homicide emerged. Specifically, the percentage of the state's population that is unemployed and the percentage of the state's population living below the poverty line. The results show that those victims living in a state with higher rates of unemployment were less likely to be killed with a firearm than those living in a state with lower rates of unemployment ($OR = 0.946$, $p < 0.05$). Those living in a state with higher rates of its population living below the poverty line were more likely to be killed with a firearm than those living in a state with lower rates of its population living below the poverty line ($OR = 1.101$, $p < 0.01$).

Few collapsed law variables emerged as salient covariates of firearm homicide among children and teens. Child Access Prevention (CAP) laws and the total number of firearm laws present within a state were the only law variables that were significant within this model. More specifically, a state that has at least one CAP law was more likely than a state that did not have at least one CAP law to have more victims of a firearm homicide ($OR = 1.706$, $p < 0.001$).

Table 8. Multilevel Logistic Models Firearm Use in Child and Teen Homicides
Across States Within Study: Collapsed Law Variables, 2005-2017
N = 7,794

	β	SE	exp(β)
Child Victim	-2.725***	0.083	0.065
Individual-Level			
Race and Ethnicity	0.503***	0.077	1.653
Sex	-0.682***	0.075	0.506
Situational-Level			
Precipitated by Another Crime or Occurred During the Commission of a Crime	0.216**	0.081	1.241
History of Abuse or Neglect or Abuse Led to Death	-0.939***	0.123	0.391
Drug-, Alcohol-, and/or Gang-Related	0.199*	0.091	1.220
Excessive Violence	-1.213***	0.084	0.29
Victim-Offender Relationship			
Other Person Known to Victim	-0.506***	0.090	0.603
Unclear Relationship or Stranger	-0.083	0.128	0.920
Location			
Outdoor area (e.g., Street, Park, etc.)	0.478***	0.090	1.612
School or Child Care Center	-0.339	0.211	0.712
Other	0.199	0.108	1.222
Unknown	-1.057***	0.156	0.348
Structural Variables			
Percentage Black in the State	0.016	0.011	1.016
Percentage Unemployed in the State	-0.072**	0.026	0.930
Percentage Living below the Poverty Line in the State	0.142***	0.035	1.153
Percentage of Female-Headed Households in the State	-0.072*	0.034	0.931
Firearm Law Variables			
Child Access Prevention Laws	0.389*	0.194	1.476
Minimum Age Possession Laws	-0.106	0.149	0.899
Permit-to-Purchase Laws	-0.983*	0.401	0.374
Domestic Violence Restraining Order Laws	-0.072	0.186	0.931
Constant	3.392***	0.631	29.730
State by Year Constant	0.089	0.035	0.089
State Constant	0.017	0.019	0.017
Residual Intraclass Correlation	ICC	SE	
State	0.005	0.005	
State by Year	0.031	0.010	

*p < 0.05, **p < 0.01, ***p < 0.001

The next set of analyses examine the same set of individual, situational, and structural levels variables but include specific law variables from the CAP, Minimum Age Requirement, PTP, and DVRO law categories. These firearm law categories are disaggregated into individual firearm laws which are then examined with the other level variables. For example, the CAP law variable examined in the analyses for Table 8 is disaggregated into 4 laws: criminal liability for negligent storage of guns, regardless of if child gains access; safety lock is required for handguns and must be approved by state standards; criminal liability for negligent storage applies to access by children less than 16 years old; and criminal liability for negligent storage applies to access by children less than 18 years old. These laws were then examined in individual multilevel models without the presence of other law variables.

The next sections discuss the collapsed law variables disaggregated into separate models. The rationale in doing this is to understand whether or not each individual law is significant in reducing firearm homicide victimization among children and teens when other levels of covariates are controlled for. The next four tables will not display the coefficients, standard errors, and odds ratios for the variables at the individual, situational, and structural levels. This decision was made for simplicity's sake as the number's coefficients, standard errors, and odds ratios for those level variables did not substantially change [4]. Further, the next four tables display the results of independently

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[4] Full results for these tables are available in Appendices C through F.

run models for each of the firearm law variables of interest (see Zeoli et al., 2018 for further justification for this)[5].

Child Access Prevention Law Variables

Table 9 demonstrates the results of the separate models run for the disaggregated child access prevention law variables of interest comparing firearm use (=1) to non-firearm use (=0) in homicide. In this model, none of the specific laws emerged as salient covariates in any of the four models run. The results will be discussed below.

States that had other CAP laws apart from the criminal liability for negligent storage of guns regardless of if a child gains access law were more likely than a state that had no CAP laws to have a firearm used in a homicide ($OR = 1.191$). States that have a law for criminal liability for negligent storage of guns regardless of if a child gains access were less likely than a state that had no CAP laws to have a firearm used in a homicide ($OR = 0.773$). States that had other CAP laws apart from a lock standards law were more likely than a state that had no CAP laws to have a firearm used in a homicide ($OR = 1.151$) while states that had a lock standards law were less likely than states with no CAP laws to have a firearm used in a homicide ($OR = 0.731$).

States that had other CAP laws apart from a law that has criminal liability for negligent storage applies to access by children less than 16 years old was more likely than a state with no CAP laws to have a firearm used in a homicide ($OR = 1.481$). States that had the criminal liability for negligent storage applies to access by children less than

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[5] Additionally, it is important to note that this model and the models that follow were run with SHR data for all states across the same time from 2005 to 2017. The results of those models were remarkably similar to those discussed in this dissertation. Tables available upon request.

16 years old was more likely than a state with no CAP laws to have a firearm used in a homicide (*OR* = 1.010). States that had other CAP laws apart from a law that has criminal liability for negligent storage applies to access by children less than 18 years old were more likely than a state with no CAP laws to have a firearm used in a homicide (*OR* = 1.213). Lastly, states that had the criminal liability for negligent storage applies to access by children less than 18 years old law were more likely than a state with no CAP laws to have a firearm used in a homicide (*OR* = 1.006).

Law	β	*SE*	exp*(β)*
Table 9. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Child Access Prevention Laws Specific, 2005-2017 N = 7,794			
Criminal Liability for Negligent Storage of Guns, Regardless of if Child Gains Access: No CAP Laws in State			
Other CAP Laws	0.175	0.129	1.191
Criminal Liability Law	-0.257	0.194	0.773
Safety Lock is Required for Handguns and Must Be Approved by State Standards: No CAP Laws in State			
Other CAP Laws	0.140	0.148	1.151
Lock Standards Law	-0.313	0.286	0.731
Criminal Liability for Negligent Storage Applies to Access by Children less than 16 years old: No CAP Laws in State			
Other CAP Laws	0.393	0.248	1.481
CAP 16 Law	0.010	0.159	1.010
Criminal Liability for Negligent Storage Applies to Access by Children less than 18 years old: No CAP Laws in State			
Other CAP Laws	.193	0.196	1.213
CAP 16 Law	0.006	0.199	1.006
Residual Intraclass Correlation	ICC	*SE*	
State	0.003	0.005	
State by Year	0.033	0.011	

*p < 0.05, **p < 0.01, ***p < 0.001

Minimum Age Possession Law Variables

Table 10 demonstrates the results of the separate models run for the disaggregated no minimum age requirement law variables of interest comparing firearm use (=1) to

non-firearm use (=0) in homicide. In this model, none of the specific laws emerged as salient covariates in any of the three models run. The results will be discussed below.

States that had other minimum age requirement laws apart from the no possession of handguns until age 21 law were more likely than a state that had no minimum age requirement laws to have a firearm used in a homicide ($OR = 1.169$). States that have a law for no possession of handguns until age 21 were less likely than a state that had no minimum age requirement laws to have a firearm used in a homicide ($OR = 0.706$). States that had other minimum age requirement laws apart from a no possession of long guns until age 18 law were less likely than states with no minimum age requirement laws to have a firearm used in a homicide ($OR = 0.913$) and states that had a no possession of long guns until age 18 law were less likely than states with a no minimum age requirement laws to have a firearm used in a homicide ($OR = 0.993$). States that had other minimum age requirement laws apart from a law that has no possession of long guns until age 21 were less likely than a state with no minimum age requirement laws to have a firearm used in a homicide ($OR = 0.933$). States that had a no possession of long guns until age 18 law were less likely than a state with no minimum age requirement laws to have a firearm used in a homicide ($OR = 0.194$).

Table 10. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Minimum Age Possession Laws Specific, 2005-2017 N = 7,794

Law	β	SE	exp(β)
No Possession of Handguns Until Age 21: No Minimum Age Laws			
Other Minimum Age Laws	0.156	0.161	1.169
No Possession of Handguns Until Age 21 Law	-0.348	0.180	0.706
No Possession of Long Guns Until Age 18: No Minimum Age Laws			
Other Minimum Age Laws	-0.091	0.179	0.913

No Possession of Long Guns Until Age 18 Law	-0.007	0.195	0.993
No Possession of Long Guns Until Age 21: No Minimum Age Laws			
Other Minimum Age Laws	-0.070	0.149	0.933
No Possession of Long Guns Until Age 21 Law	-0.486	0.315	0.194
Residual Intraclass Correlation	ICC	SE	
State	0.006	0.006	
State by Year	0.035	0.011	

*p < 0.05, **p < 0.01, ***p < 0.001

Permit-to-Purchase Law Variables

Table 11 demonstrates the results of the separate models run for the disaggregated

permit-to-purchase law variables of interest comparing firearm use (=1) to non-firearm

use (=0) in homicide. States that had other permit-to-purchase laws apart from the license

or permit is required to purchase all firearms law were less likely than a state that had no

permit-to-purchase laws to have a firearm used in a homicide ($OR = 0.413$, $p < 0.05$).

States that did have a license or permit is required to purchase all firearms law were less

likely than a state that had no permit-to-purchase laws to have a firearm used in a

homicide ($OR = 0.429$, $p < 0.05$).

Table 11. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Permit-to-Purchase Laws Disaggregated, 2005-2017 N = 7,794			
Law	*β*	*SE*	exp(*β)*
A License or Permit is Required to Purchase All Firearms: No PTP Laws			
Other PTP Laws	-0.884*	0.412	0.413*
Permit Required to Purchase Law	-0.847*	0.394	0.429*
Residual Intraclass Correlation	ICC	SE	
State	0.027	0.022	
State by Year	0.091	0.035	

*p < 0.05, **p < 0.01, ***p < 0.001

Domestic Violence Restraining Order (DVRO) Firearm Law Variables

Table 12 demonstrates the results of the separate models run for the disaggregated permit-to-purchase law variables of interest comparing firearm use (=1) to non-firearm use (=0) in homicide. In this model, one law emerged as salient covariates of firearm homicide among children and teens: the law that states automatic prohibition of DVRO subjects from possessing firearms.

The only DVRO firearm law that was significant in these models was the model that examined a law that automatically prohibited subjects of a DVRO from possessing firearms. States that had other DVRO laws apart from a law that automatically prohibited subjects of a DVRO from possessing firearms were less likely than states with no DVRO laws to have a firearm used in a homicide. ($OR = 0.590$, $p < 0.01$). States that did have a law that automatically prohibited subjects of a DVRO from possessing firearms were more likely than states with no DVRO laws to have a firearm used in a homicide ($OR = 1.070$).

States with DVRO laws apart from a law that requires DVRO subjects to surrender their firearms were less likely than states with no DVRO laws to have a firearm used in a homicide ($OR = 0.890$). States with a law that requires DVRO subjects to surrender their firearms were less likely than states with no DVRO laws to have a firearm used in a homicide ($OR = 0.953$).

Table 12. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Domestic Violence Restraining Order Laws Disaggregated, 2005-2017 N = 7,794			
Law	β	*SE*	exp(β)

DVROs are automatically prohibiting if the subject is a dating partner of the petitioner			
Other DVRO Laws	-0.133	0.177	0.876
DVRO Dating	-0.042	0.153	0.959
Ex parte (temporary) DVRO subjects are automatically prohibited from possessing firearms			
Other DVRO Laws	-0.069	0.160	0.934
Ex Parte Law	-0.091	0.197	0.913
Automatic Prohibition of DVRO Subjects from Possessing Firearms: No DVRO Laws			
Other DVRO Laws	-0.528**	0.201	0.590**
Prohibition of DVRO Subjects Law	0.067	0.142	1.070
DVRO Subjects Must Surrender Their Firearms: No DVRO Laws			
Other DVRO Laws	-0.117	0.166	0.890
DVRO Subjects Must Surrender Law	-0.048	0.153	0.953
Residual Intraclass Correlation	ICC	SE	
State	0.008	0.007	
State by Year	0.037	0.012	

*p < 0.05, **p < 0.01, ***p < 0.001

Summary. The results of these models provide insight into research questions three: *Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children and teens.* The most salient covariates emerged at the individual and situational level across all models. Consistently, race and ethnicity, sex, precipitation by another crime or occurring during the commission of another crime, history of abuse or neglect or abuse that led to death, drug-, alcohol-, and/or gang-related, excessive violence, victim-offender relationship, and location were the most salient predictors of firearm use in a homicide involving children and teens.

The results of these models also give insight into hypothesis three: *Domestic violence restraining order firearm laws will most saliently predict the reduction of risk for the use of a firearm in homicides involving children and teens.* The results did not provide support for hypothesis three as only one DVRO law model had any significance.

Permit-to-purchase laws more saliently predicted the use of a firearm in a homicide

involving a child or teen. These results will be discussed further in the next chapter.

CHAPTER 6

DISCUSSION

Research Question 1 and Hypothesis 1

As demonstrated by the results presented in Chapter 4, covariates emerged for child and teen homicides, thus, answering research question 1: "*What are the significant individual and situational variables for firearm homicide among children and teens?*" The type of weapon selected to commit the homicide varied between children and teen homicides: firearms were less likely to be used in incidents involving a child victim. Moreover, covariates for child and teen homicide firearm victimization existed across both the individual and situational levels. At the individual level, the significant covariates identified included the sex of the victim, the race of the victim, and the ethnicity of the victim. In regard to the situational level, the victim-offender relationship was found to be a significant covariate of child and teen firearm homicide victimization. Further, whether another crime precipitated the homicide, occurrence of the homicide during another crime and being related to a gang situation were also significant covariates of child and teen firearm homicide victimization. Abuse or neglect of the victim led to their death, the homicide involved excessive violence, and there is a history of abuse or neglect in the victim's background were also significant predictors of firearm homicide victimization among children and teens.

Other significant covariates also emerged in the analyses: whether the homicide occurred in the context of a family problem; whether the homicide was committed via walk-by and drive-by, the homicide was related to a drug or alcohol situation, and the

location of where the homicide took place. These findings provide insight into hypothesis 1: *Race, sex, gang-involvement, the homicide occurring during the progress of another crime, and victim-offender relationship will emerge as significant individual and situational factors that increase the likelihood of firearm use in homicide among teens.* Race, sex, gang-involvement, the homicide occurring during the progress of another crime, and victim-offender relationship were significant covariates of firearm use in teen homicide, thus providing support for hypothesis 1.

Research Question 2 and Hypothesis 2

As demonstrated by the results presented in Chapter 4, the individual and situational covariates of firearm homicide significantly differ for children relative to teens. This provides insight into the second research question: "*How do the individual and situational covariates of firearm homicide differ for children relative to teens?*" Homicides involving a weapon other than a firearm were more likely to be used in cases involving a child victim. White, non-Hispanic victims were more likely to be child victims, and male victims were less likely to be child victims. Homicide incidents involving another crime and those that involved an intimate partner situation were less likely to involve a child victim. Non-gang-related crimes, homicides involving abuse or neglect, family-problem-related incidents, and incidents involving excessive violence (such as being beaten to death) were more likely to involve a child victim. Homicides that were alcohol- or drug-related were less likely to involve a child victim. Lastly, homicide incidents that occurred outside or in an unknown location and involved a person other

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than a family member or an unknown relationship to the victim were less likely to involve a child victim.

There are significant differences between child and teen firearm homicides. First, the weapon used to commit the homicide, as homicides involving a firearm were more likely to have a teen victim. Secondly, at the individual level, the victim's sex and race were statistically significant in predicting where a child or teen would be the victim of firearm homicide. Third, in regard to the situational level variables, several significant covariates emerged: the victim-offender relationship; the homicide occurred in the process of another crime; the homicide was gang-related; the homicide was related to an intimate partner violence situation; and abuse or neglect led to the death of the victim. Further, the homicide was related to a family problem; the homicide was drug-related and/or alcohol-related; the homicide involved excessive violence; and the location of the homicide were also significantly different covariates between child and teen firearm homicide victimization. This gives insight into hypothesis 2: *Homicides involving child victims will be more likely to involve other weapons or unknown weapons than firearms, occur inside the home, and be committed by a family member.* As children were more likely to be killed with a weapon other than a firearm or an unknown weapon in the home by a family member, this supports hypothesis 2.

Research Question 3 and Hypothesis 3

The results of the models in Chapter 5 models provide insight into research question three: "*Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children and teens?*" The most salient

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covariates emerged at the individual and situational level across all models. Consistently

across all multilevel models, race and ethnicity, sex, precipitation by another crime or

occurring during the commission of another crime, history of abuse or neglect or abuse

that led to death, drug-, alcohol-, and/or gang-related, excessive violence, victim-offender

relationship, and location were the most salient predictors of firearm use in a homicide

involving children and teens. These models' results also give insight into hypothesis

three: *Domestic violence restraining order firearm laws will most saliently predict the*

reduction of risk for the use of a firearm in homicides involving children and teens. These

results provided partial support for hypothesis three as only one DVRO law model had

any significance. Permit-to-purchase laws more saliently predicted the use of a firearm in

a homicide involving a child or teen. For a summary of the support found for the

hypotheses examined in this dissertation, please see Table 13 below.

Table 13. Summary of Support for Hypotheses	
Hypothesis	Supported?
Hypothesis 1: *Race, sex, gang-involvement, the homicide occurring during the progress of another crime, and victim-offender relationship will emerge as significant individual and situational factors that increase the likelihood of firearm use in homicide among teens*	**Yes**
Hypothesis 2: *Homicides involving child victims will be more likely to involve other weapons or unknown weapons than firearms, occur inside the home, and be committed by a family member*	**Yes**
Hypothesis 3: *Domestic violence restraining order firearm laws will most saliently predict the reduction of risk for the use of a firearm in homicides involving children and teens*	**Partial**

Logistic Regression Model

      The results for research questions one and two support the findings from studies

conducted by prior scholars. The use of firearms in teen homicide and the use of other

weapons in children homicides is consistent with prior literature (Fox & Fridel, 2017; Kunz & Bahr, 1996). Demographically, teens who were male were more likely to be the victim of a firearm homicide than male children (Fowler et al., 2017; Levine et al., 2012; Messner & Sampson, 1991; Schmidt et al., 2019), and teens who were non-White and/or Hispanic were the victims of a firearm homicide more frequently than non-White or Hispanic teens (Jones-Webb & Wall, 2008; Loeber & Farrington, 2011; Najem et al., 2004; Papachristos & Wildeman, 2014; Peterson & Krivo, 2005; Pyrooz, 2012). However, this study demonstrated a more even split among the children regarding sex, race, and ethnicity. The binary logistic model showed that female children were more likely than male children to be killed. This may be due, in part, to the fact that children are often killed within the home by a parent or guardian as a part of a familicide (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012).

The victim-offender relationship significantly demonstrated that were differences between child and teen homicides. Homicides committed by someone with a relationship to the victim that is not family are less likely than homicides committed by family members to involve a child victim. Finally, homicides committed by someone with an unknown relationship to the victim were less like than homicides committed by a family member to involve a child victim. These findings are unsurprising given what has been established by prior work in this area: specifically, children are more likely to be killed by a parent or caregiver (Bennet et al., 2006).

Homicide incidents that did not involve another crime in progress were less likely than homicide incidents that did involve another crime in progress to involve a child

victim (Chassin et al., 2013; Cornell, 1993; Circo, Pizarro, & McGarrell, 2018; Ezell & Tanner-Smith, 2009). This is consistent with other prior research as children (those under 12) are often kept closer to home and have fewer opportunities to engage in criminal or delinquent activity than their teenage counterparts (Averdijk & Bernasco, 2015; Bernasco et al., 2013; McNeeley, 2015; Osgood et al., 1996; Weerman et al., 2015; Wikstrom et al., 2012). The significance of gang-related homicides being less likely than non-gang-related homicides to involve a child victim (Chassin et al., 2013; Ezell & Tanner-Smith, 2009; Loeber et al., 1999) is consistent with prior research. The finding that situations that did involve intimate partner violence were less likely than situations that did not involve intimate partner violence to have a child victim stands in contrast with the findings of prior research (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019).

The findings show that incidents involving abuse or neglect were more likely than incidents that did not involve abuse or neglect to have a child victim. Incidents that involved a family problem within the house were more likely than incidents that did not stem from a family problem within the household to have a child victim. Both the existence of prior abuse leading to death (Damashek, Nelson & Bonner, 2013; Pierce et al., 2017) and the existence of a family problem within the home (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash & Dobash, 2012; Fridel & Fox, 2019). It is important to give parents proper training and resources about how to discipline and raise children, such as in-home nurses who visit during the early stages of life and access to affordable childcare. The findings from this dissertation also show that homicides

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involving excessive violence (such as being beaten to death or stabbed multiple times) were more likely than homicides that did not involve excessive violence to have a child victim. Researchers have observed that prior child abuse is found to be a predictor of child fatalities (King, Kiesel & Simon, 2006; Pierce et al., 2017). This finding is not surprising as it is consistent with the prior literature that children are more likely to be killed with a personal weapon (Fox & Fridel, 2017; Kunz & Bahr, 1996). Researchers can use this finding to better assist in prevention efforts by including preventions strategies aimed at decreasing child abuse and help parents better access resources that can assist them in the child rearing process.

Drug-related incidents were less likely than non-drug-related incidents to involve a child victim, and alcohol-related homicides were less likely than non-alcohol-related homicides to involve a child victim. These findings are consistent with some prior research (Chassin et al., 2013; Hohl et al., 2017). This study adds to the literature by examining firearm homicides that are related to alcohol and/or drugs in firearm homicides among children and teens and how those compare to non-firearm homicides. By examining alcohol and drug-related firearm homicides, researchers now understand the importance of alcohol- and drug-related firearm homicides, in comparison to non-firearm homicides, for teen victims as this dissertation establishes a link between alcohol-related and drug-related situations. Scholars can better recommend policy that includes prevention efforts surrounding alcohol- and drug-related activities and/or use. Finally, the location of the homicide was significant. Homicides that occurred in an outside area were less likely than homicides in an inside area to involve child victims, and homicides that

occurred in an unknown location were less likely than homicides in an inside location involve a child victim. These findings are overwhelmingly consistent with what prior scholars have found (Averdijk & Bernasco, 2015; Bernasco et al., 2013; McNeeley, 2015; Osgood et al., 1996; Weerman et al., 2015; Wikstrom et al., 2012). For a summary of these results, see Table 14 below.

Table 14. Summary of Risk Factors from Logistic Regression Model		
Risk Factor	Likelihood of Firearm Use in the Homicide	
	Children	Teen
Weapon: Firearm	↓	↑
Demographics		
Sex: Female	↑	↓
Race: White	↑	↓
Ethnicity: Hispanic	↓	↑
Situational Variables		
VOR[*]	↓	↑
Crime in Progress	↓	↑
Gang-Related	↓	↑
IPV-Related	↓	↑
Abuse or Neglect Led to Death	↑	↓
Family Problem	↑	↓
Excessive Violence	↑	↓
Drug-Related	↓	↑
Alcohol-Related	↓	↑
Location: Outside	↓	↑

[*]Note: VOR stands for Victim-Offender Relationship.

Multilevel Logistic Models

The multilevel logistic models were used to examine research question 3: *"Controlling for differences in state and year, what are the most salient covariates of firearm homicides involving children and teens?"* When differences at the state level and

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states across time are controlled for, child victims are less likely than teen victims to be killed in a firearm homicide. Non-White and/or Hispanic children and teens were more likely to be killed in a firearm homicide than White, non-Hispanic children and teens. Female homicide victims were less likely than male homicide victims to be killed with a firearm. Regarding situational-level covariates, when differences at the state level and states across time are controlled for, salient covariates of firearm homicide emerged. The victim-offender relationship was a salient covariate of firearm homicide among children and teens. Those victims killed by a family member were less likely than those killed by someone else known to the victim, such as friends or acquaintances, to be victims of a firearm homicide.

Homicides that were precipitated by another crime or occurred during the commission of a crime were more likely to be a firearm homicide than those that were not precipitated by another crime or occurred during the commission of a crime. The homicide victims who had a history of abuse or neglect or having abuse led to the victim's death were less likely than those without those experiences to be killed with a firearm. Those killed with excessive violence (i.e., shot multiple times, stabbed multiple times, beaten to death) were less likely to be victims of a firearm homicide than those who were not killed with excessive violence.

The homicide being drug-, alcohol-, or gang-related made it more likely to be a firearm homicide than a homicide that was not drug-, alcohol, or gang-related. The location of where the homicide occurred was also a salient covariate of firearm use in homicides involving children and teens. Those victims killed in an outdoor area, such as a

street or park, were more likely than those killed in an indoor area, such as a residence, to be killed with a firearm, and those killed in an unknown location were less likely than those killed in an indoor area to be killed with a firearm.

When differences at the state level and states across time are controlled for, salient covariates of firearm homicide emerged. Specifically, the percentage of the state's population is unemployed and the percentage of the state's population living below the poverty line. The results show that those victims living in a state with higher unemployment rates were less likely to be killed with a firearm than those living in a state with lower rates of unemployment. Those living in a state with higher rates of the population living below the poverty line were more likely to be killed with a firearm than those living in a state with lower population rates living below the poverty line.

Few collapsed law variables emerged as salient covariates of firearm homicide among children and teens. Child Access Prevention (CAP) laws and Permit-to-Purchase (PTP) were the only significant law variables within this model. More specifically, a state with at least one CAP law was less likely than a state that did not have at least one CAP law to have more victims of a firearm homicide versus non-firearm homicides. Lastly, a state with at least one PTP law was less likely than a state with no PTP laws to have more victims of a firearm homicide versus a non-firearm homicide.

The next 17 multilevel models were run with one firearm law at a time to fully understand impact of the law on firearm homicide victimization outcomes for children and teens when individual, situational, and structural level variables were controlled for. In the 17 separate multilevel models that were run, only two firearm laws of interest

emerge as significant: one permit-to-purchase laws and one domestic violence restraining

order law. Specifically, states that had a had a law that required a permit to purchase any

type of handgun were less likely to have a firearm used in a homicide. States with PTP

laws apart from a license required to purchase all firearms were also less likely to have a

firearm used in a homicide. States with the revokes concealed carry permits law were less

likely than a state with no permit-to-purchase laws to have a firearm used in a homicide.

States that had other DVRO laws apart from a law that automatically prohibited subjects

of a DVRO from possessing firearms were less likely than states with no DVRO laws to

have a firearm used in a homicide. For a summary of these findings, please see Table 15

below.

Table 15. Summary of Risk Factors from Multilevel Logistic Model	
Risk Factor	Likelihood of Firearm Use?
Independent Variable	
Child or Teen	Children were **less likely** to be killed with firearm.
Demographics	
Sex: Female	Females were **less likely** to be killed with a firearm.
Race: White	Non-white victims were **more likely** to be killed with a firearm.
Ethnicity: Hispanic	Hispanic victims were **more likely** to be killed with a firearm.
Situational Variables	
VOR[*]: Family	Those killed by a family member were **less likely** to be killed with a firearm.
Crime in Progress: Yes	Homicides that occurred during a crime in progress were **more likely** to be killed with a firearm.
Abuse or Neglect Led to Death: Yes	Victims who had experienced abuse or neglect or had abuse or neglect lead to death were **less likely** to be killed with a firearm.
Excessive Violence: Yes	Victims killed through excessive violence were **less likely** to be killed with a firearm.
Gang-, Alcohol or Drug-Related: Yes	Victims in gang-, alcohol-, and/or drug-related homicides were **more likely** to be killed with a firearm.
Location: Outside	Victims killed in an outdoor area were **more likely** to be killed with a firearm.
Structural	
% in Unemployment	Victims living in states with higher unemployment rates were **less likely** to be killed with a firearm.

% Living Below the Poverty line	Victims in states with higher rates of the population living below the poverty line were **more likely** to be killed with a firearm.
Collapsed Law Variables	
CAP Laws	Victims living in a state with at least one CAP law were **more likely** to be killed with a firearm.
PTP Laws	Victims living in a state with at least one PTP law were **less likely** to be killed with a firearm.
Permit-to-Purchase Laws	
Other PTP Laws Apart from Permit Required to Purchase All Firearm Laws	Victims living in states that had other PTP laws apart from a permit required to purchase all firearm laws were **less likely** to be killed with a firearm.
License Required to Purchase All Firearms	Victims living in a state with a law stating a permit is required to purchase all firearms are **less likely** to be killed with a firearm.
Domestic Violence Restraining Order Relinquishment Law	
Other DVRO Laws Apart from Automatic Prohibition of DVRO Subjects from Possessing Firearms	Victims living in states that had other DVRO laws apart from a law that automatically prohibited subjects of a DVRO from possessing firearms were **less likely** to be killed with a firearm.

Note: Only significant results are presented.
[*] VOR stands for Victim-Offender Relationship.

As illustrated in Table 15 above, the lack of significance to CAP laws outside of the collapsed CAP law variable contrasts with the limited work that has examined the impact of CAP laws on firearm homicide victimization for children and teens (Azad et al., 2020; Cummings et al., 1997). The lack of significance among minimum age requirement laws is an essential contribution of this study. This suggests that minimum age requirement laws are not effective in reductions for firearm homicide among children and teens. Based on this researcher, in terms of policy, advocates should promote other types of laws to be implemented, such as PTP laws and DVRO firearm relinquishment laws. Research surrounding the impact of minimum age restrictions on firearm victimization for children and teens is relatively rare. The research that does exist

typically does not find an association between minimum age restrictions and reductions in firearm violence for children and teens at the state or federal level (Marvell, 2001; Rosengart et al., 2005). This may be explained by the fact that most states have a minimum age requirement law enacted due to federal regulations. Federal regulations surrounding the possession and purchasing of firearms mandate that people must be over a particular age to purchase or possess a firearm. Given that it is federally mandated, all states have these laws. Thus, there would not be significant differences emerging between states surrounding this law.

Overall, research suggests that PTP laws have been effective in decreasing homicide rates (Crifasi et al., 2018; Rudolph et al., 2015; Webster et al., 2014). However, these scholars that have focused on general populations and researchers have yet to examine the impact of PTP laws on children and teen homicide victimization. Given that PTP laws significantly decreased the likelihood of firearm use in children and teen homicide, there is more in this area worth exploring. Per the discussion of the state of the literature in Chapter 2, scholars have not focused on PTP laws as a preventive factor for firearm homicide victimization for children and teens. Given the findings in this dissertation, this opens a new door for researchers to examine in greater detail.

Research surrounding DVRO firearm laws has demonstrated a decrease in firearm homicide rates linked to intimate partner violence (Diez et al., 2017; Zeoli et al., 2018). These scholars have focused on general population intimate partner homicide and not specifically on firearm homicides of children and teens despite the knowledge that intimate partner violence is an important predictor of youth homicide, especially with

younger children (Adhia, Austin, et al., 2019; Adhia, Kernic, et al., 2019; Dobash &

Dobash, 2012; Fridel & Fox, 2019). This study showed that both intimate partner

violence prevention and DVRO laws are important factors in solving the puzzle of

firearm victimization among children and teens. Specifically, states that had other DVRO

laws apart from a law that automatically prohibited subjects of a DVRO from possessing

firearms were less likely than states with no DVRO laws to have a firearm used in a

homicide. This suggests that DVRO firearm laws are important to the prevention of

firearm homicide among children and teens.

<u>Contributions to the Literature</u>

Policy Contributions. Evidence provided by previous studies supports the

disaggregation of homicide typologies as researchers have found that differences exist

between groups (Pizarro, 2008). Other scholars have also shown how vulnerability for

homicide varies across demographic groups, the homicide type, and where the homicide

occurs (Block & Block, 1992; Diem & Pizarro, 2010; Skott, 2019), thus supporting the

need for disaggregation of homicides by type. As demonstrate by previous literature (i.e.,

Clark, 2005; Diem & Pizarro, 2010; Pizarro, 2008; Skott, 2019; Tita & Griffiths, 2005),

the examination of between group differences in homicide typologies has been

established to be important. No study to date has examined and compared the covariates

of children and teen firearm homicide victimization and no study has examined these

differences at multiple levels (i.e., individual, situational, structural, and state). As

demonstrated in Chapter 2, most studies have focused on either child firearm homicide

victimization or teen firearm homicide victimization but not on the two together.

It is important to examine these two age groups together as it allows for a greater understanding of the similarities and differences in their covariates if research is to impact policy. This is important as every crime has unique characteristics and not every crime has the same risk factors that predict the likelihood of whether or not the crime will occur. This is particularly true regarding homicide as evidenced by prior literature (i.e., Clark, 2005; Diem & Pizarro, 2010; Pizarro, 2008; Skott, 2019; Tita & Griffiths, 2005). If children and teen firearm homicides have the same risk factors, then prevention strategies can be created that are effective for both groups. If the risk factors are different, then separate prevention strategies need to be implemented.

The rationale for examining these two age groups together is that both children and teens fall under the overarching umbrella of youth. It is imperative that researchers continue to disaggregate youth into separate categories for three main reasons. First, it is important for scholars to understand the nuances and dynamics that culminate in firearm homicide victimization for children and teens. As stated from the outset, firearm homicide has been among the leading causes of death for children and teens for decades. The severity of the problem warrants greater understanding into all of the factors that influence a violent outcome, especially how factors interact at multiple levels. Second, it is imperative that researchers understand the similarities and differences between the risk factors for firearm homicide victimization among children and teens through a disaggregation of the two groups in the same examination. From a practical standpoint, understanding these similarities and differences is important for the creation of impactful prevention and intervention strategies. Finally, related to prevention strategies, the

inclusion of firearm laws in a model with covariates at the individual, situational, and structural levels is necessary if researchers are to understand the true impact of firearm laws on homicide victimization for children and teens. Firearm laws are an important and heavily debated topic in the United States and the more we understand about their role in the reduction of fatal incidents, the more research can assist the lobbying of the implementation of firearm laws that save lives.

Methodological Contributions. Methodologically, this study contributes to the literature in three distinct ways. As stated in Chapters 1 and 2, researchers have yet to examine covariates of firearm homicide among children and teens at multiple levels. The only known studies that examined youth firearm homicide at multiple levels were conducted by Hohl and colleagues (2017). However, these researchers did not examine child firearm homicide victimization and solely focused on teen firearm homicide victimization. The use of multilevel modeling in this study is noteworthy as it demonstrates the importance of including structural level and firearm law variables when examining firearm homicide victimization among children and teens. Given the significance of the findings presented in this dissertation, it is clear that a study that examined both children and teen firearm homicide victimization at multiple levels was necessary to expand the homicide literature. When state level structural and firearm law variables were controlled for, result demonstrated that what really matters for predicting and preventing firearm homicide victimization among children and teens is the factors that exist at the individual and situational levels.

Through this examination of covariates at multiple levels for children and teens, results showed significant differences between the two, thus creating a more precise direction for further research and prevention strategies. The lack of significance for firearm laws when other covariates' levels were controlled is an important finding for policy moving forward: a greater focus should be placed on introducing prevention strategies targeted at those most at-risk at the individual level by finding ways to diffuse particular types of situations. Though, these findings should be taken with a note of caution. These firearm laws were only examined in the context of firearm homicide victimization among youth and thus cannot speak to the significance of these laws on other types of firearm violence and victimization, such as firearm suicide and accidental shootings.

Second, this study provided insight into the merging of multiple datasets to show the importance of combining multiple sources of data to understand the youth firearm homicide problem's complexities. The reliance on previous research (e.g., Hohl et al., 2017; Wu, 2018) on single datasets has been detrimental. The importance of using multiple datasets to garner a more comprehensive view of the homicide event should not be understated. Homicide is a convergence of many different levels of factors in the same space and time. By ignoring the context in which the homicide occurs, researchers can miss relevant covariates important for expanding the literature and creating more targeted prevention and intervention strategies.

This dissertation included an examination of multiple datasets, results showed the importance of covariates at the individual and situational levels, even when structural and

state-level covariates are controlled for. These results provide greater insight into the

firearm homicide victimization of children and teens: policy needs to target the situations

in which homicide occurs. This demonstrates the importance of merging and examining

multiple datasets when appropriate.

Third, the disaggregation of homicide is an important methodological contribution

to the literature. Previous work has demonstrated the importance for disaggregation of

homicide typologies (i.e., Diem & Pizarro, 2010; Pizarro, 2008; Skott, 2019). Yet

evidence of aggregation bias in criminological analyses still exists (Buil-Gil et al., 2021).

The methodological contributions of this dissertation stem from the fact that it presents

the benefits of further disaggregation of homicide typologies from youth firearm omicide

victimization to children and teen firearm homicide victimization. As demonstrated in

this study, there are clear differences that emerge when the two types are disaggregated.

For a visualization of these contributions, please see Table 16 below.

Table 16. Summary of Contributions
Policy
This dissertation disaggregated children and teen firearm homicide victimization and demonstrated the significant differences between the age groups. Based on the findings from prior work and the findings in this dissertation, it is clear that disaggregation of homicide typologies for youth homicide victimization is important for a greater understanding of the factors that lead to youth homicide.
Methodological
Multilevel studies with disaggregated typologies of homicide are important for gaining a greater understanding of situations that lead to homicide victimization among children and teens.
Merging of multiple datasets allow for more levels of data to be examined. This merging gives researchers a more complete view of the situations that lead to firearm homicide victimization among children and teens.
As aggregation bias still occurs in criminological work, this dissertation contributes by presenting the benefits of disaggregating youth firearm homicide into child and teen firearm homicide.

Policy Implications

Given the examination of firearm laws and their impact on firearm homicide victimization among children and teens, there are important policy implications that warrant discussion. The findings presented here demonstrate the potential for interventions at various levels: individual, situational, structural, and legal.

Individual Level Policy Implications. The findings presented in this dissertation demonstrate the need to introduce policy that targets individual level covariates as well as at other levels. Based on the results of this dissertation, policies aimed at working with the most at-risk populations: young children and older teens. These preventions can be conducted through safety and risk assessments given at pediatricians' or other doctors' offices based on the Child Welfare Bureau's assessment. Doctors should address this assessment with both children and teens in order to determine their risk of current or future harm that may lead to lethal consequences. Teachers at all levels should also be made aware of the risk factors and signs of violence in children and teens and the proper reporting techniques for when reporting is appropriate.

Situational Level Policy Implications. Based on the multilevel findings, policy should focus on the situations in which homicide occurs, given the significance maintained at the individual and situational levels across all models. For children, policy should focus on working with families who live in disadvantaged areas who struggle with domestic violence and familial problems. This may look like targeted preventions surrounding communicating the best practices for child rearing in low income neighborhoods and by providing greater access to resources such as daycares and nurses

who come to the home during infancy and early childhood. Policy should aim to create programs that work with families to resolve issues with childhood without violence. This may include targeted programs surrounding how to prevent child abuse and spreading awareness to community leaders, teachers, and other caregivers about how to recognize the signs of child abuse and how to report it. For teens, policy should focus on underprivileged neighborhoods where there are high gang involvement levels and drug transactions. Programs that expand after school activities in underserved neighborhoods may be helpful in decreasing the amount of unsupervised time that teens have after school while caregivers are still at work. Programs targeted at giving teens a sense of family and belonging that may be lacking at home, such as Big Brothers, Big Sisters, may be useful in getting teens out of gangs.

     Structural Level Policy Implications. Given these findings, prevention strategies that target troubles within the home for disadvantaged families are important to explore. Preventions that target at-risk teenagers for gang membership, delinquency, and substance use would likely decrease the likelihood of firearm homicide victimization. There have been several examples of successful preventive interventions in cities with firearm problems, such as Operation Ceasefire in Boston and the Cure Violence Program in Illinois. Studies have demonstrated that these interventions have been successful in reducing firearm violence (see Braga, Hureau & Papachristos, 2014; Butts, Roman, Bostwick & Porter, 2015). A similar preventive model may assist in the reduction of firearm homicide victimization among children and teens. This would be particularly

important as the most salient covariates of firearm homicide victimization among children and teens are at the individual and situational level.

Legal Policy Implications. This dissertation showed that states that had other permit-to-purchase laws apart from the license or permit is required to purchase all firearms law were less likely and states that had a license or permit is required to purchase all firearms law were both less likely than a state that had no permit-to-purchase laws to have a firearm used in a homicide. This suggests that PTP laws surrounding permitting are important for decreasing the likelihood of a firearm use in a child or teen homicide. Given these results, policymakers should implement further permitting laws that require individuals to receive a permit before purchasing a firearm. This is in conjunction with the April 2021 Biden-Harris announcement addressing gun violence, in which President Biden called for Congress to pass more legislation aimed at decreasing firearm violence. The implementation of further permitting laws would be consistent with both the President's call to action and the results of this study.

Previous scholars have examined DVRO firearm laws and found a decrease in firearm homicide rates linked to intimate partner violence (Diez et al., 2017; Zeoli et al., 2018). Specifically, states that had other DVRO laws apart from a law that automatically prohibited subjects of a DVRO from possessing firearms were less likely than states with no DVRO laws to have a firearm used in a homicide. This suggests that DVRO firearm laws are important to the prevention of firearm homicide victimization among children and teens. DVRO firearm relinquishment laws remove firearms from domestic violence perpetrators and can decrease their use in domestic violence. Children are often killed by

a family member in a domestic violence incident and the removal, revocation or forced

surrender of firearms can decrease the lethality of domestic violence incidents. This may

result in a decrease in the number of children being killed with a firearm. Thus, it is

important for policymakers to push for an increase in DVRO firearm relinquishment

laws, which is consistent with President Biden's push for further legislation aimed at

reducing firearm violence.

Despite controlling for individual, situational, and structural covariates, the

significant impact of these two types of firearm laws should not go understated regarding

prevention strategies for firearm homicide victimization among children and teens. Based

this research, lawmakers in states without permit-to-purchase firearm laws and strong

DVRO firearm laws should consider adopting these laws. While more research with a

pre- and post-data observation period would be strongly advised, the addition of these

firearms laws will likely decrease the amount of firearm victimization among children

and teens. For a summary of the policy implications from this dissertation, please see

Table 17 below.

Table 17. Summary of Policy Implications	
Individual Level Policy Implications	Targeted preventions aimed at identifying the most at-risk children and teens for firearm homicide victimization.
Situational Level Policy Implications	Targeted preventions that are aimed at getting teens out of gang-related and drug-related activities.
Structural Level Policy Implications	Targeted preventions in low income, disadvantaged neighborhoods that assist parents with the child rearing process and provide resources that assist in the process.
Legal Policy Implications	Implementation of more PTP and DVRO firearm prohibition laws across states.

Limitations

All studies have their limitations and this study is no exception. The most glaring example of these limitations is that it relied on pre-existing data instead of primary data collection. Primary data collection allows for researchers to create their own coding schema and to code the data based on that schema. The variables in primary data collection will be more accurate to what the researcher is interested in while pre-existing data must be used as is and there are limits to what can be done in the study. In this dissertation, the use of pre-existing data is problematic because the data source, the NVDRS, collapses situational level variables into two categories: yes and no/not applicable/unknown. There is a difference between no, not applicable, and unknown. For example, for a homicide being gang-related, if the answer is "No," then that would mean that there were no gang connections that lead to the death of the teen. If it is "Not applicable," this would mean that the homicide has no chance of being caused by a gang-related situation, i.e., the killing of a child within their home through abuse. If it is "Unknown," then there may be gang-related problems that the police could not capture and were not clear to the coder inputting the data. Given that the NVDRS does not give a way to separate the "No" from "Not applicable" and "Unknown," there could be further important situational factors that are unable to be captured by this dissertation. Moreover, these results should be taken with caution as the sample size was rather small as was the breakdown of observations between categories in the variables. It is also important to note that homicide is a rare event in the grand scheme of criminal activities.

Additionally, it is important to note that this study only examined fatal instances of gun violence, particularly homicide. Not all firearm violence is lethal and not all lethal firearm violence is a homicide. This is a limitation as this dissertation cannot speak to non-fatal firearm injuries as the circumstances surrounding those events may have different risk factors that impact their likelihood. The non-significance found with certain types of firearm laws should not be used as a reason to discount their impact on other types of firearm violence. As shown by previous literature (e.g., Rudolph et al., 2015; Zeoli et al., 2018; Zeoli et al., 2019a), different firearm laws are important for preventing different types of firearm violence. Though, if policymakers are specifically looking to create preventions that decrease firearm homicide victimization among children and teens, results from this dissertation are pivotal for creating effective policy for prevention. Thus, these results are still valuable as firearm homicide is a significant problem in the U.S. and affects children and teens across all states, demographics, and levels of urbanization.

This study is limited by the number of states that were examined. Only 15 out of 50 states in the United States were examined, making the results not nationally representative. However, despite this limitation, there were various states examined that have very different population make-ups and firearm laws. As evidenced by Table 3, there were clear differences between the states examined in regard to the population makeup, the number of firearm laws, and the firearm homicide rates. While not nationally representative, this dissertation's findings can be used to create policies and prevention strategies across multiple different kinds of states.

Lastly, the states and periods selected were due to the availability and completeness of data. This meant that the period selected was not selected due to firearm laws being enacted during it. In an ideal dissertation, the states and timeframe examined would have been selected due to the implementation or repeal of firearms laws to fully understand their impact. Moreover, the data selected would also have several years prior to the law being enacted or repealed and several years after to see the impact had by the enactment or repeal of the law. Even given this limitation, some firearm laws were enacted or repealed during the study period, though these laws did not have a significant impact on reductions in firearm homicide among children and teens when individual and situational level factors were controlled for. For more information on this, please see the Setting section of Chapter 3. Table 18 below shows an overview of the existing limitations in this dissertation.

Table 18. Summary of Limitations	
Limitation 1	Use of pre-existing data and the inability to separate "No/Not Applicable/Unknown" in situational-level variables.
Limitation 2	This only speaks to firearm homicide victimization among children and teens and cannot be used to create prevention for non-fatal firearm assaults or other types of firearm-related violence.
Limitation 3	Only 15 out of 50 states had enough data available to be examined thus this study is not nationally representative.
Limitation 4	States and time period were selected due to data availability instead of based on when firearm laws were implemented or repealed.

CHAPTER 7

CONCLUSION

Firearm homicide has been among the leading cause of death for children and teens for decades. While there are other important types of homicide, firearm homicide makes up the vast majority of homicides. Given the work presented in this dissertation, there are several directions for future research to take to expand on these findings and further the research surrounding firearm homicide victimization among children and teens. Future researchers would do well to examine more data from more states across more years. By examining more states across more years, scholars would be better able to understand the variations by state and year. Further, this would allow for pre/post-tests to be conducted and allow researchers to understand the impact of an implementation or repeal of firearm law on firearm homicide victimization among children and teens. The examination of more states would also allow for results to be nationally representative and given policymakers a better direction surrounding the prevention of firearm homicide.

Additionally, future researchers should use primary data collection. Primary data collection refers to scholars designing a research project and then collecting the data themselves in a manner to best answer their research questions and examine their hypotheses. Primary data collection is important as it allows researchers to accurately collect data by their definitions. This is important in order to improve on the situational variables examined in this dissertation as there were limits regarding the situational level variables. For example, future research should use primary data collection to measure

intimate partner violence more adequately and clearly in order to fully understand the scope of its impact on children's death.

Further, future researcher should examine instances of non-lethal firearm violence and other types of lethal firearm violence such as accidental shootings and suicides to be able to understand the full scope of the complexities of how individual, situational, structural, and firearm law factors impact one another. Through use of a larger dataset or a combination of more datasets that capture non-lethal firearm violence and other types of firearm violence, scholars would be able to see the full scope of preventions that would work across all or multiple types of firearm violence. Firearm homicide victimization among children and teens is one part of the problem of firearm violence among youth. For example, by examining non-lethal events and comparing them to homicide, future researchers would be better able to speak to more comprehensive policies and prevention strategies aimed at decreasing firearm violence among youth. Future researchers would do well to include the proximity of the hospital to where the firearm violence occurred, the presence of witnesses to the firearm violence, and where on the youth's body were the wounds are as this may be important in explaining why some youth survive gunshot wounds and others do not.

Future researchers should also examine the interactions between some of the factors examined in this study through the creation of interaction terms and analysis and modeling. As shown by prior literature discussed in Chapter 2, the interaction of race, sex, and age is important in predicting the likelihood of firearm homicide victimization. Other interactions, such as the presence of family problems and firearms in the home,

would also be important to examine to determine their impact on whether a firearm was used in the homicide of a child or teen. Further, future researchers would do well to expand on this by examining the impact of the interaction of race, sex, and age on lethality of firearm violence among children and teens.

Finally, scholars should examine the differences between more age groups, including young adults, older adults, and the elderly, to determine if there are salient risk factors for firearm use in homicide for each group. Through the use of further disaggregating age types in homicide datasets, scholars would be better able to suggest prevention strategies that can help decrease homicide across all typologies. This dissertation demonstrated the importance of disaggregation of homicide typologies by age groups. Future researchers should expand on this disaggregation by further separating youth categories into pre-school age, elementary age, middle school age, and high school age to understand the differences that may exist between these groups. This would allow for greater recommendations to be made surrounding policy implications and prevention strategies.

In conclusion, as stated at the beginning, scholars have found that firearm-related deaths are the second leading cause of death overall among U.S. children and teens between ages 1 and 19, surpassing the number of deaths from other diseases, including the flu and heart disease (Fowler et al., 2017; Schmidt et al., 2019). The Centers for Disease Control and Prevention (CDC) reports that an approximate 14 youth are the victim of homicide every day. At the same time, an additional 1,100 are treated in emergency rooms for non-fatal assault injuries. While researchers and policy analysts

alike continue to try to solve the firearm violence epidemic, there is still a lot to be understood about the covariates of firearm homicide victimization among children and teens. This study has begun to fill these gaps by shedding light on important unexamined topics. Taken as a whole, this research has shown that, while firearm laws are important, more attention needs to be paid to individual and situational factors in regard to the creation of prevention and intervention strategies.

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APPENDIX A.

FIGURE 1. CHILDREN AND TEEN HOMICIDES ACROSS STATES, 2005-2017

FIGURE 1. CHILDREN AND TEEN HOMICIDES ACROSS STATES, 2005-2017

Figure 1. Number of Children and Teen Homicides by State, 2005-2017

N (%)

	AK	CO	GA	KY	MD	MA	NJ	NC	OK	OR	RI	SC	UT
Teen	50 (0.90)	210 (3.78)	939 (16.89)	212 (3.81)	728 (13.10)	292 (5.25)	595 (10.70)	740 (13.31)	346 (6.22)	108 (1.94)	40 (0.72)	408 (7.34)	69 (1.24)
Child	47 (1.59)	245 (8.26)	493 (16.63)	144 (4.86)	179 (6.04)	78 (2.63)	198 (6.68)	373 (12.58)	234 (7.89)	123 (4.15)	17 (0.57)	244 (8.23)	123 (4.15)
Total	97 (1.14)	455 (5.34)	1,432 (16.80)	356 (4.18)	907 (10.64)	370 (4.34)	793 (9.30)	1,113 (13.06)	580 (6.80)	231 (2.71)	57 (0.67)	652 (7.65)	192 (2.25)

Note: The percentages presented are added together horizontally.

APPENDIX B..

FIGURE 2. CHILDREN AND TEEN HOMICIDES BY YEAR

APPENDIX B

FIGURE 2. CHILDREN AND TEEN HOMICIDES BY YEAR

Figure 2. Number of Children and Teen Homicides by Year
N (%)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Teen	500	512	560	473	405	415	386	363	316	309	368	459	493	5,559
	(8.99)	(9.21)	(10.07)	(8.51)	(7.29)	(7.47)	(6.94)	(6.53)	(5.68)	(5.56)	(6.62)	(8.26)	(8.87)	(100.00)
Child	215	254	270	249	232	214	231	208	205	196	242	213	236	2,965
	(7.25)	(8.57)	(9.11)	(8.40)	(7.82)	(7.22)	(7.79)	(7.02)	(6.91)	(6.61)	(8.16)	(7.18)	(7.96)	(100.00)
Total	715	766	830	722	637	629	617	571	521	505	610	672	729	8,524
	(8.39)	(8.99)	(9.74)	(8.47)	(7.47)	(7.38)	(7.24)	(6.70)	(6.11)	(5.92)	(7.16)	(7.88)	(8.55)	(100.00)

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APPENDIX C.

FIGURE 3. MULTILEVEL LOGISTIC MODELS:

CHILD ACCESS PREVENTION LAWS

FIGURE 3. MULTILEVEL LOGISTIC MODELS:

CHILD ACCESS PREVENTION LAWS

Figure 3. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Child Access Prevention Laws Disaggregated, 2005-2017
N = 7,794

	β	SE	exp(β)
Child Victim	-2.729***	0.005	0.065
Individual-Level			
Race and Ethnicity: Non-White and/or Hispanic	0.503***	0.128	1.654
Sex: Female	-0.678***	0.038	0.508
Situational-Level			
Precipitated by Another Crime or Occurred During the Commission of a Crime	0.226**	0.101	1.254
History of Abuse or Neglect or Abuse Led to Death	-0.911***	0.049	0.402
Drug-, Alcohol-, and/or Gang-Related	0.208*	0.112	1.232
Excessive Violence	-1.209***	0.025	0.299
Victim-Offender Relationship			
Other Person Known to Victim	-0.505***	0.085	0.604
Unclear Relationship or Stranger	-0.094	0.117	0.910
Location			
Outdoor area (e.g., Street, Park, etc.)	0.479***	0.146	1.614
School or Child Care Center	-0.361	0.147	0.697
Other	0.210	0.134	1.233
Unknown	-1.055***	0.054	0.348
Structural Variables			
Percentage Black in the State	0.011	0.010	1.011
Percentage Unemployed in the State	-0.047	0.024	0.954
Percentage Living Below the Poverty Line in the State	-0.085**	0.033	1.089
Percentage of Female Headed Households in the State	-0.038	0.027	0.963
Constant	2.226	4.271	9.262
State by Year Constant	0.103	0.038	0.103
State Constant	0.009	0.016	0.009
Residual Intraclass Correlation	ICC	SE	
State	0.003	0.005	
State by Year	0.033	0.011	

*p < 0.05, **p < 0.01, ***p < 0.001

APPENDIX D.

FIGURE 4. MULTILEVEL LOGISTIC MODELS:

MINIMUM AGE REQUIREMENT LAWS

APPENDIX D.

FIGURE 4. MULTILEVEL LOGISTIC MODELS:

MINIMUM AGE REQUIREMENT LAWS

Figure 4. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Minimum Age Requirement Laws Disaggregated, 2005-2017
N = 7,794

	β	SE	exp(β)
Child Victim	-2.733***	0.005	0.065
Individual-Level			
Race and Ethnicity: Non-White and/or Hispanic	0.507***	0.128	1.660
Sex: Female	-0.680***	0.038	0.507
Situational-Level			
Precipitated by Another Crime or Occurred During the Commission of a Crime	0.226**	0.101	1.253
History of Abuse or Neglect or Abuse Led to Death	-0.904***	0.050	0.405
Drug-, Alcohol-, and/or Gang-Related	0.201*	0.111	1.223
Excessive Violence	-1.210***	0.025	0.298
Victim-Offender Relationship			
Other Person Known to Victim	-0.500***	0.085	0.607
Unclear Relationship or Stranger	-0.089	0.118	0.915
Location			
Outdoor area (e.g., Street, Park, etc.)	0.490***	0.147	1.632
School or Child Care Center	-0.353	0.148	0.703
Other	0.206	0.133	1.228
Unknown	-1.048***	0.055	0.351
Structural Variables			
Percentage Black in the State	0.011	0.010	1.011
Percentage Unemployed in the State	-0.025	0.025	0.975
Percentage Living Below the Poverty Line in the State	0.040	0.034	1.040
Percentage of Female Headed Households in the State	-0.020	0.029	0.981
Constant	2.300***	4.220	9.971
State by Year Constant	0.101	0.038	0.101
State Constant	0.002	0.012	0.002
Residual Intraclass Correlation	ICC	SE	
State	0.001	0.004	
State by Year	0.031	0.010	

*p < 0.05, **p < 0.01, ***p < 0.001

APPENDIX E.

FIGURE 5. MULTILEVEL LOGISTIC MODELS: PERMIT-TO-PURCHASE LAWS

FIGURE 5. MULTILEVEL LOGISTIC MODELS:

PERMIT-TO-PURCHASE LAWS

Figure 5. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Permit-to-Purchase Laws Disaggregated, 2005-2017
N = 7,794

	β	SE	exp(β)
Child Victim	-2.725***	0.005	0.066
Individual-Level			
Race and Ethnicity: Non-White and/or Hispanic	0.503***	0.128	1.653
Sex: Female	-0.681***	0.038	0.506
Situational-Level			
Precipitated by Another Crime or Occurred During the Commission of a Crime	0.221**	0.101	1.247
History of Abuse or Neglect or Abuse Led to Death	-0.948***	0.048	0.388
Drug-, Alcohol-, and/or Gang-Related	0.191*	0.110	1.211
Excessive Violence	-1.209***	0.025	0.298
Victim-Offender Relationship			
Other Person Known to Victim	-0.506***	0.085	0.603
Unclear Relationship or Stranger	-0.084	0.118	0.919
Location			
Outdoor area (e.g., Street, Park, etc.)	0.480***	0.146	1.616
School or Child Care Center	-0.352	0.148	0.703
Other	0.201	0.133	1.223
Unknown	-1.059***	0.054	0.347
Structural Variables			
Percentage Black in the State	0.026*	0.013	1.027
Percentage Unemployed in the State	-0.054*	0.026	0.947
Percentage Living Below the Poverty Line in the State	0.124**	0.047	1.132
Percentage of Female Headed Households in the State	-0.071*	0.033	0.932
Constant	3.250***	16.318	25.781
State by Year Constant	0.086	0.035	0.086
State Constant	0.022	0.020	0.022
Residual Intraclass Correlation	ICC	SE	
State	0.007	0.006	
State by Year	0.032	0.011	

*p < 0.05, **p < 0.01, ***p < 0.001

APPENDIX F.

FIGURE 6. MULTILEVEL LOGISTIC MODELS:

DOMESTIC VIOLENCE RESTRAINING ORDER LAWS

APPENDIX F.

FIGURE 6. MULTILEVEL LOGISTIC MODELS:

DOMESTIC VIOLENCE RESTRAINING ORDER LAWS

Figure 6. Multilevel Logistic Models: Firearm Use in Child and Teen Homicides Across States within Study: Domestic Violence Restraining Order Laws Disaggregated, 2005-2017 N = 7,794			
	β	SE	exp(β)
Child Victim	-2.723***	0.005	0.066
Individual-Level			
Race and Ethnicity: Non-White and/or Hispanic	0.505***	0.128	1.656
Sex: Female	-0.676***	0.038	0.509
Situational-Level			
Precipitated by Another Crime or Occurred During the Commission of a Crime	0.226**	0.101	1.254
History of Abuse or Neglect or Abuse Led to Death	-0.921***	0.050	0.398
Drug-, Alcohol-, and/or Gang-Related	0.208*	0.112	1.231
Excessive Violence	-1.212***	0.025	0.298
Victim-Offender Relationship			
Other Person Known to Victim	-0.501***	0.085	0.606
Unclear Relationship or Stranger	-0.089	0.118	0.915
Location			
Outdoor area (e.g., Street, Park, etc.)	0.484***	0.146	1.623
School or Child Care Center	-0.353	0.148	0.703
Other	0.203	0.133	1.225
Unknown	-1.048***	0.055	0.351
Structural Variables			
Percentage Black in the State	0.010	0.010	1.010
Percentage Unemployed in the State	-0.036	0.026	0.965
Percentage Living Below the Poverty Line in the State	0.089*	0.044	1.093
Percentage of Female Headed Households in the State	-0.037	0.029	0.964
Constant	2.042***	4.034	7.707
State by Year Constant	0.084	0.036	0.084
State Constant	0.012	0.023	0.012
Residual Intraclass Correlation	ICC	SE	
State	0.004	0.007	
State by Year	0.028	0.010	

*p < 0.05, **p < 0.01, ***p < 0.001