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School Shootings In The United States: An Analysis Of Micro And Macro Level Variables

Vineeth Vijayan

SCHOOL SHOOTINGS IN THE UNITED STATES: AN ANALYSIS OF MICRO AND MACRO LEVEL VARIABLES

A Dissertation

by

VINEETH VIJAYAN

Submitted to the Office of Graduate Studies of

Prairie View A&M University

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2024

Major Subject: Juvenile Justice

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ABSTRACT

School Shootings in the United States: An Analysis of Micro and Macro Level Variables

(August 2024)

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Chair of Advisory Committee: Dr. Camille Gibson

In 2023, by November 2, there had been 45 school shootings resulting in fatalities and injuries (Matthews, 2023). There were 193 shooting incidents in preschools and K–12 schools during the previous school year, which is greater than an average of 49 incidents each school year since 2013 (Everytown Research & Policy, 2022). This predictive quantitative study offers a comprehensive analysis of various state-level, school-level, and individual-level variables, such as the laws related to guns, access to mental health services, economics, type of school shooting, socio-demographic indicators, school type, and timing of the incident toward informing effective preventative policies. It utilized information from five data sets: the K-12 School Shooting Data Base, Giffords Law Center, KFF Data Base, State of Mental Health in America Report, and the Washington Post School Shooting Database. The data were analyzed with t-tests and regression using a layered ecological contextual theoretical framework to understand what increases the possibility of school shootings with casualties. The findings revealed that school factors such as indoor locations, targeted victims, and the presence of School Resource Officers, and macro factors such as limited youth access to mental health services and a high percentage of youth in poverty are predictive of school shootings with casualties.

Keywords: school shootings, gun violence, school violence, school fatalities

SCHOOL SHOOTINGS IN THE UNITED STATES: AN ANALYSIS OF MICRO AND MACRO LEVEL VARIABLES

VINEETH VIJAYAN

DEDICATION

I want to extend my gratitude to people who have shown me love and support during times of need, including my parents, professors, spouse, friends, and even the department building that served as my second home.

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Finally, I would like to give the most heartfelt thanks to Dr. Anagha, my lifelong companion, for being so kind and patient with me as I entered the latter stages of my dissertation. Your understanding and support throughout all of my emotional moments are much appreciated.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

FIGURE Page

CHAPTER I

INTRODUCTION

Background of the Study

According to the Centers for Disease Control (2024), the number of individuals killed by firearms in the United States (U.S.) was 45,222 in 2020, 48,830 in 2021, and 48,204 in 2022, which is well over 100 persons daily. Suicide accounted for more than half of these deaths, while more than four of every 10 were murders. Black or African American, American Indian or Alaska Native and Hispanic or Latino groups had the most significant rates of homicide by firearm among those aged 15–34.

Gun violence in the U.S. has an economic impact of $557 billion (Everytown Research and Policy, 2020). This represents the range of expenses from law enforcement, courts, corrections, healthcare, and a loss of income, plus other suffering resulting from a shooting harm or death. Between 2019 and 2021, the number of American children and teenagers killed by firearms rose by 46% (2.4 per 100,000 minor inhabitants) between 2019 and 2021 (3.5 per 100,000) (Gramlich, 2023). For an extended period, automobile crashes were the leading killer of U.S. youths between the ages of 1 and 19. However, in recent years, firearm deaths have begun to close the gap with fatalities from automobile accidents. As of 2020, gun violence in the United States was the leading cause of fatalities for U.S. youth, surpassing automobile accidents (Everytown Research & Policy, 2023).

In June 2024, the U.S. Surgeon General Vivek H. Murthy declared gun violence,

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This dissertation follows the style of the Publication Manual of the American Psychological Association 7th edition.

including school shootings, a public health issue. His advisory accompanying the declaration highlights the increasing prevalence and severity of gun violence, particularly to children and adolescents. One of the primary objectives of the Surgeon General's advisory was to look into public health strategies to diminish firearm-related injuries and fatalities while simultaneously tackling the underlying societal factors that contribute to violence. It noted that gun violence exposure may lead to a pervasive array of mental health issues, such as depression, anxiety, and post-traumatic stress disorder.

The Surgeon General is advocating for improving the process of gathering and analyzing data for research purposes, understanding the consequences of firearm-related violence, assessing the efficacy of prevention efforts, advocating for the adoption of secure weapons protocols, enforcing comprehensive background checks and implementing regulations requiring individuals to get a license before purchasing firearms, prohibiting the possession and sale of assault weapons and large-capacity magazines The Surgeon General is also advocating for enhancing the availability of mental health services, giving priority to ensuring accessible and high-quality mental health treatment for those affected by firearm violence, and improving safety protocols and bolstering mental health support in schools. The Surgeon General's guidance (2024) acts as a summons for governments, healthcare practitioners, and communities to cooperate in reducing gun violence despite recent rulings by the U.S. Supreme Court that have increased the public’s access to firearms.

In the U.S., about 22% of individuals own at least one firearm (Smith & Son, 2015). The impact of gun violence in the United States extends beyond those who are wounded or killed. Families, communities, and individuals who have personally

experienced gun violence are also survivors of gun violence. More than half of all adults in the US know a gun violence victim (Gun Violence Survivors in America, 2023). In addition, research indicates that individuals with risk factors for firearm-related injury and mortality are less likely to store their firearms safely than gun owners without these risk factors (Nelson et al., 2014).

In considering how to prevent future violence in schools and the policies that support preventative approaches, it is crucial to understand the historical context as these relate to present circumstances of violence. For example, the first documented US school shooting was in Pennsylvania, called the Pontiac's Rebellion massacre. It occurred after a simmering conflict between the Lenni Lenape Native Americans and colonists on July 26, 1764. The headmaster and 10 of the 11 students present were killed (Keenan & Rush, 2016). In the years to follow, school shootings were more targeted, such as a parent who murdered a teacher for beating his child (Eadens et al., 2018; The Daily Phoenix, 1873).

Large-scale mass school shootings grew substantially in the late 1980s and 1990s (Agnich, 2014). School shootings reached a peak in the United States by 1993. In Olivehurst, California, on May 1, 1992, 25-year-old Eric Houston held members of his former high school hostage with a gun, killed four people, and injured 10 more. According to the prosecution, the attack was revenge for a bad grade (Glavin, 2018). Years later, 12 students and one teacher were murdered, and 21 others were injured by two 17- and 18-year-old students at Columbine High School on April 20, 1999. (Cullen, 2009). The Columbine school shooting incident was a turning point in how public, institutions and police perceived and responded to tragic events (Arslan & Olsen, 2016).

The mass shooting literature reveals that numerous mass shooters contemplated using explosives and claimed to be sacrificing themselves for an ideological cause (Jiao & Capellan, 2019). Among these attackers many of them had no organizational support or personal motives. Previous research has also identified several common factors in the lives of these offenders, including (a) suicidal tendencies and life indifference, (b) a sense of victimization, and (c) a desire for attention. It is not always simple for observers to perceive these factors in advance, so mental health professionals, the general public, and law enforcement officials require the assistance of mental health experts to identify at-risk individuals more effectively (Lankford, 2018).

The planning of a school shooting is a crucial indicator of an impending attack. For instance, Vossekuil et al. (2002) noted that the plotting of an attack is a defining feature of targeted violence in general and, thus, of targeted school violence in particular. This supposition is supported by the findings of various studies, which indicate that in many, if not the majority of cases, there was a long-term cognitive obsession with the offense and its planning before its execution. Most instances in the literature either involved the offender telling friends about their criminal activity or their peers learning about it through online chat rooms or social media. According to Vossekuil et al. (2002), in 87% of the analyzed cases, peers of the offenders knew about the planned offenses, sometimes in great detail. In more than half of these instances, more than one person knew the offender's intentions.

In some cases, teachers and other adults were also aware, typically through indirect rather than direct leaks. In school shootings, violent fantasies appear to be more prevalent than in other cases of juvenile homicides (Meloy et al., 2004). These delusions

are frequently documented in personal writing (Kidd & Meyer 2002). From an in-depth analysis of the school shooting literature from 2000 to 2020, Turanovic and Siennick (2022) concluded that the strongest predictors of school shootings were characteristics of the shooter and that person's experiences and interactions with others. If such persons are missed, these incidents can occur more often. However, the current study focused on other aspects of school shootings to determine if examining them reveals a potential to reduce school shooting casualties. For example, an important part of planning a school shooting is deciding when to do it.

There is not much literature on the significance of the timing of school violence. The timing can vary from the moment of the day to the part of the academic year. Understanding the timing should indicate patterns that are informative for safety planning. Further analyzing the sequencing of occurrences related to the life of the shooter is also beneficial because it may offer researchers opportunities to identify threats early enough to intervene.

Timing may indicate that the perpetrator was motivated by an event or emotion associated with that time of day. Typically, incidents of school violence occur at specific times of the day, week, and year. According to numerous studies, school violence may occur throughout the day, but especially during lunch and between classes. According to The National Center for Education Statistics (2022), the highest proportion of violent incidents occurred between 11 a.m. and 12 p.m. Other data show that the incidence of violent crimes perpetrated by young individuals reaches its highest point during the afternoon hours, mainly between 3 p.m. and 4 p.m., which coincides with the end of the school day. A significant proportion of violent crimes perpetrated by young individuals,

about 37%, occur throughout a period of five hours, beginning at midday and ending at 5 p.m. (Office of Juvenile Justice and Delinquency Prevention, 2022).

One of the primary areas of analysis at the macro level involves studying state-level characteristics and their link with incidents of school shootings. The consideration of state-level variables is crucial in understanding the broader context of school shootings. This includes the existence of laws on gun control at the state level, as well as other socio-demographic characteristics such as poverty levels and the unemployment rate.

Laws have been a significant talking point about gun violence at the state level. The interpretations of the Second Amendment were not subject to much controversy after its adoption because the prevailing interpretations emphasized the need to preserve a standing army to safeguard the citizens of the United States as constituents of a free state (Kryzanek, 2023). In the case of *District of Columbia v. Heller* (2007), the Supreme Court directed its attention toward interpreting and implementing the constitutional provision known as the "right to bear arms" as an individual right. This case specifically dealt with individuals possessing firearms in response to a law enacted in Washington, D.C., which effectively prohibited citizens from acquiring and retaining firearms within their residences.

The legislative framework pertaining to guns inside the United States is unquestionably a vital element in the ongoing discussion regarding gun-related incidents in educational institutions. The impact of state regulations on the possession, acquisition, and utilization of weapons indubitably affects firearm-related incidents in schools. Reeping et al. (2022) conducted a time-series analysis to assess the correlation between

the permissiveness of state firearm laws and state gun ownership rates with the occurrence of K-12 school shootings and active shootings. After accounting for important confounding factors, a positive correlation was seen between more lenient firearm regulations, increased rates of gun ownership, and more occurrences of both school shootings and active school shootings.

The mental wellness of children in educational settings is also of utmost importance, given the acknowledgment that emotional and psychological well-being significantly impacts a student's academic achievements and overall well-being (United States Department of Education, 2022). In the present setting, quality mental health care delivery by state agencies is important. Integrating mental health services into schools is becoming increasingly prevalent and is a critical component of developing support networks for students. More than 25% of school districts collaborate with external organizations, while over 33% employ personnel to deliver these services (Foster et al. 2005). The *Now Is the Time* project, which then-President Obama started, aimed to make mental health services more accessible by doing numerous things, such as making it easier to get help early on, training for teachers, stopping violence, and giving professionals chances to grow (The White House, 2013). Federal entities such as the President's New Freedom Commission on Mental Health, the Department of Health and Human Services, and the Institute of Medicine emphasized that educational institutions must enhance their early detection efforts of students needing mental health care.

The issue of school violence has several dimensions and requires a thorough comprehension in order to develop successful solutions for prevention. In this context, socio-demographic variables at the state level play a crucial role in shaping the incidence

and characteristics of school violence, including the frequency of school shootings. By examining the intricate dynamics between variables such as population density and economic indicators, this study sheds light on the extensive influence of these factors on the safety of educational institutions. Examining both provides a comprehensive picture of points requiring careful examination and focused intervention. The economic theory of crime, initially posited by Becker in 1968 and then built upon by Ehrlich in 1973, discusses the intricate interplay between criminal behavior and economic factors such as unemployment, income inequality, consumer price index, economic growth, and wage/salary. The theoretical framework posits that criminal behavior is a rational decision influenced by uncertainty, but empirical research has shown inconclusive findings about the relationship between economic activity and crime (Habibullah & Baharom, 2009).

According to Pah et al. (2017), there has been a rise in gun violence in the US throughout time. They also added that there was a strong association between growing unemployment rates and an increase in shooting incidents. Additionally, their study revealed a noteworthy association between economic adversity and a heightened incidence of gun violence, specifically within K-12 and post-secondary educational settings. This implies that the lack of assurance during the transition from academic institutions to the labor market or other contexts might be a contributing factor to the incidence of school shootings.

Families and communities may hold unrealistic expectations concerning the serenity and safety of primary and secondary educational institutions in the United States. Shootings or other acts of violence in public areas, particularly schools, elicit moral panic

within the general population (Mallett, 2016). In response, zero-tolerance rules implemented to ensure safety, are a highly harsh policy measure (Madfis, 2016). Rather than effectively improving security, these stringent rules tend to exacerbate discrimination against minority groups and impose limitations on the civil liberties of all individuals (Triplett et al., 2014). The presence of law enforcement in schools has long been a contentious subject, given the net widening effect of more referrals to the justice system. Further, School Resource Officers (SROs) have also been associated with exacerbating racial inequities by perpetuating the school-to-prison pipeline phenomenon (Goldstein, 2020). Nevertheless, the effectiveness of SROs in preventing school shootings remains uncertain.

A threat assessment conducted on school shooters by the FBI pointed out that even though there were no means to discern individuals' motivations, knowing why they did what they did is essential when assessing their level of danger. A person's mental and emotional state at the time of making a threat will be reflected in the threat. However, a person's psychological state can be significantly affected in the short term by substances like alcohol or drugs or by a precipitating incident like a relationship breakup, poor performance in school, or a disagreement with a parent.

A person's willingness to follow through on a violent threat may decrease after that person has taken some time to cool down after experiencing a mental setback or after the effects of alcohol or drugs have worn off (FBI, n.d.). Analyzing the motives and actions of the perpetrators of these shootings enables the development of theory. The exposure of individuals to violent experiences in their past and current social environments can also be a significant factor in perpetuating these types of crimes. Males

who perceive challenges to their social status are frequently more aware of social disparities in their exterior environment, that is, how their immediate circle of peers perceives them. An intense sense of threat to a male's social status has been found to be related to violence, especially when alcohol is involved (Luckenbill, 1977).

Preventing school shootings requires exploring the efficacy of prevention and intervention strategies. Cornell and Maeng (2021) noted that Virginia law requires K-12 schools to conduct threat assessments. Schools have implemented threat assessment protocols and other measures to prevent school shootings from occurring, but there is little evidence that these programs are effective. With the proliferation of social media and other digital platforms, effectively monitoring online activity for violent behavior with artificial intelligence is possible. The first and most widely covered case of social media surveillance took place in the Glendale School District in California in 2013, where the suicide of a student prompted the district to contract an external company to monitor and analyze students' social media accounts. Since then, many schools and school districts have hired companies to provide social media surveillance services but their effectiveness is unclear (Burke & Bloss, 2020). More research is needed on the accuracy and reliability of these services and the ethical implications of using them to identify and intervene with at-risk students. Overall, given the dearth of information pertaining to school shootings at both the macro and micro levels, the primary objective of this study is to identify and analyze micro and macro contextual factors that contribute to the occurrences of school shootings toward a comprehensive, effective prevention strategy.

Problem Statement

Even though researchers have made progress in understanding school shootings and warning signs, much remains unknown, and shootings continue. The problem is how to effectively prevent gun violence in schools given the current United States context that includes a deficit in mental health services for youths, the availability of firearms, and the question about the ability of School Resource Officers to stop a school shooting. This study's approach was to understand macro and micro level factors such as the role of state gun laws, state economic factors, access to mental health care, state demographics, and the timing of the incidents of school shootings toward informed, comprehensive preventive efforts.

Purpose of the Study

The purpose of this study was to investigate, identify, and assess school shootings in the U.S. to obtain a more comprehensive understanding of the frequency, characteristics, and effects of school shootings. It offers details on specific variables and their relevance in preventing school violence. The results may inform policy and prevention efforts to reduce the occurrence of school shootings and foster the safety and well-being of students, teachers, and communities.

Research Questions

To extend the literature, the following questions on school shootings were examined:

The micro-level research questions:

Q1) To what extent are school characteristics, that is, type, level, size, and location, related to the number of school shooting causalities?

Ha1: There is a statistical significance between the school type, public schools and private schools, and the number of casualties in school shooting incidents.

Ha2: There is a statistical significance between the school level and the number of casualties in school shooting incidents.

Ha3: There is a statistical significance between the school size and the number of casualties in school shooting incidents.

Ha4: There is a statistical significance between the type of locations in which the incident happens and the number of casualties in school shooting incidents.

Q2) To what extent does the time of day, day of the week, and quarter of the year affect the number of school shooting causalities?

Q3) To what extent does the presence of a school resource officer in schools predict the number of school shooting causalities?

Q4) To what extent does the type of school shootings predict the number of school shooting causalities?

The macro-level research questions:

Q5) What is the correlation between state-level economic indicators, such as unemployment and poverty rates, and the incidence of school shootings for five years?

Q6) What is the correlation between the degree of strictness of gun laws at the state level and the prevalence of school shootings for five years?

Q7) What is the relationship between demographic variables at the state level and the likelihood of school shootings for five years?

Q8) How much does the accessibility of mental health services and the prevalence of mental illness at the state level affect the number of separate school shooting incidents?

Theoretical Framework

Levin and Madifs (2009) developed a Five-Stage Sequential Model to explain deviant behavior among school children, such as school shootings. Notably, one stage the authors described is the chronic strain stage, which is from the General Strain theory by Robert Agnew. As Agnew (1992) pointed out, individuals face strains, and there are different ways of coping with these strains, including showing anger and taking revenge. One way of developing strain can be due to interpersonal relationships at school. Agnew (1992) mentioned that students who fail to achieve positive goals had vast differences between the actual goals that they achieved versus their expectations, which can reflect strain. Often, these students measured their success based on their popularity among their peers, and many of these students felt bullied or threatened within the schools (Vossekuil et al., 2002). Levin and Madifs (2009) proposed that the strain experience of individuals might develop into a chronic or ongoing strain, which is a noteworthy contributing factor in events like school shootings. Chronic strain may manifest in several contexts, including home and educational settings.

Additionally, broader societal concerns such as parental unemployment or poverty might contribute to the development of chronic strain. Chronic strain at school may be seen as the outcome of chronic rejection, leading to school shootings and domestic disputes with parents. They can all involve emotional experiences that impact children (Leary et al., 2003).

Routine activity theory (RAT) can also be used to explain school shootings based on three factors: motivated offenders, suitable targets, and the absence of guardians (Silva & Greene-Colozzi, 2020). The application of RAT is commonly observed in cases of

property crime, but it has also demonstrated efficacy in addressing homicide incidents (Messner & Tardiff, 1985). The approach may be valuable in comprehending the correlation between individuals who engage in shooting incidents, the individuals they target, and the circumstances that provide opportunities for criminal activities.

Given that many mass murderers target specific locations and events, the Routine Activities Theory is a powerful predictor of targeted school killings (Silver et al. 2019). The use of RAT in school shooting incidents has been studied recently (Joseph et al., 2023). Joseph et al. (2023) found that to decrease the number of victims in school shootings, policy development should prioritize the motivated offender and target the suitability component of the Routine Activities Theory (RAT). This includes implementing measures such as restricting the availability of weapons, fostering an inclusive and supportive atmosphere for students, and imposing restrictions on using specific categories of firearms. General Strain Theory and RAT constituted a basic conceptual framework for understanding crime in general, yet neither provided a clear explanation of what triggers school shootings. Integrating these theories, however, while examining the school shootings data should help have an improved understanding of how to stop these tragedies.

Definitions of Terms

***School shooting*.** Perhaps the main obstacle in researching school shootings, particularly when determining their frequency, is the lack of a clear definition. There is little agreement on the most appropriate way to define these events for research. Specifically, various agencies and organizations have proposed several definitions, all of which have limitations. A report published jointly by the United States Department of Education

(2004) defined school shootings as: "Any incident where (i) a current student or recent former student attacked someone at his or her school with lethal means (e.g., a gun or knife); and (ii) where the student attacker purposefully chose his or her school as the location of the attack".

Operational Definition

"School shooting" for this study is: "any incident in which a firearm is discharged on the premises of a school immediately before, during or just after classes." - (Cox et al., 2018). This study has excluded instances that occurred outside of regular hours, unintentional discharges resulting in no injuries to anyone other than the gun handler, and suicides that took place in private settings or did not constitute a danger to other children.

Significance of the Study

There are many unique and complex causes of school violence. Multiple variables, including personal, social, environmental, and motivational factors, can influence the emergence of violent behavior. Identifying these variables and developing effective prevention and response strategies to reduce school violence and create a safe and supportive learning environment is essential. This study aimed to contribute to understanding school shootings in the United States by looking at micro and macro variables. It sought to explore practical strategies for preventing and identifying school shootings, including an assessment of characteristics of schools that may aid in identifying potential school shooting incidents and the examination of macro-level factors that can influence the occurrence of such incidents. The results of this study have the potential to provide valuable insights for policymakers and preventative initiatives aimed

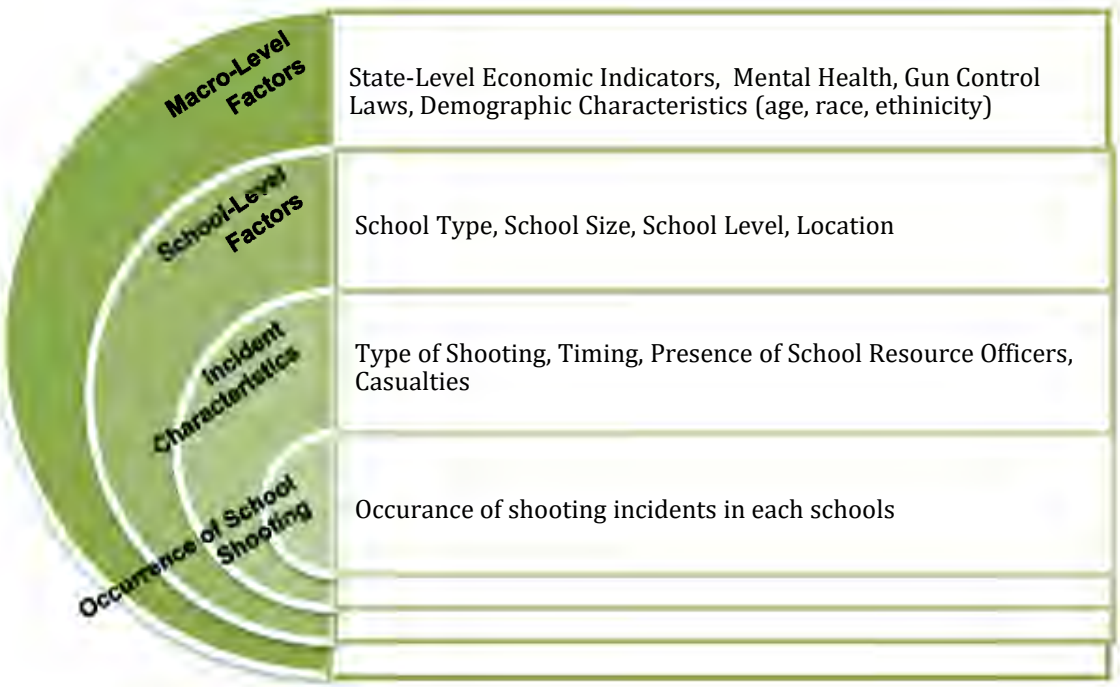
at decreasing the frequency and effects of school shootings while also fostering the safety and overall welfare of students, staff, and communities.

Organization of the Study

Chapter I described the importance of the problem. Chapter II presents the state of the literature on school shootings. Chapter III describes the research design, including the datasets and planned analyses. Chapter IV presents the study's findings, and Chapter V offers a discussion and conclusion of the merits of the work, its relevance to the tenets of strain theory and routine activities theory, the limitations of the study, and suggestions for future research.

Figure 1

An Ecological Model for a Comprehensive Approach to Preventing Schools Shootings



Notes: This figure demonstrates different levels of variables that contributes to incidences of school shootings**.**

CHAPTER II

LITERATURE REVIEW

The literature review mainly focuses on school shootings and their impact. Educators, parents, and officials have grown increasingly concerned about juvenile school violence in recent years. Many researchers have tried to find micro-level characteristics such as the propensity for guns, threats, and a violent past that could effectively identify potential shooters. The Secret Service and the United States Department of Education in the United States conducted one of the most extensive studies on warning signs. The 1999 Safe Schools Initiative was a joint project involving the two agencies to update the Secret Service's threat assessment procedure. It led to the creation of a guide. According to the guide, most school shootings were premeditated events rather than impulsive acts, and almost all were preceded by warning signs (Vossekuil et al., 2002).

In this light, threat assessment becomes imperative when identifying acts of violence among school students. Cornell and Sheras (2006) studied the effectiveness of threat assessment as a technique for decreasing school violence. The researchers used a four-year analysis of the state's Annual School Safety Audit assessments, secondary school students and staff questionnaires, and selective interviews with school officials. The authors found that the state could successfully reduce school violence through a thorough threat assessment program incorporating warning signs, student interviews, and a multidisciplinary team approach.

Robers et al. (2014), in their report on indicators of school crime which was studied using a range of distinct data sources, such as national surveys conducted among

students, teachers, and principals, as well as comprehensive data collections from federal departments and agencies like the Bureau of Justice Statistics (BJS), National Center for Education Statistics (NCES), the Federal Bureau of Investigations (FBI), and the Centers for Disease Control (CDC) has pointed out that warning signs of probable school violence, such as a history of bullying, depression, social isolation, and substance addiction can be identified.

School violence includes actions that are against the law and can happen at school or on the way to or from school (About School Violence, 2024). It can include bullying, physical fights, sexual violence, and even school shootings. Violence can also happen because of peer pressure, consumption of aggressive media, or playing violent video games (Boxer, 2019). The Youth Risk Behavior Survey pointed out that more than 20% of high school students were bullied and that about eight percent of students were involved in multiple physical altercations at school. Another interesting result of the poll was that about seven percent of high school students were threatened with weapons like guns and knives while they were at school (About School Violence, 2024).

Violence in schools has also been linked to having low self-esteem, trouble with impulse control, and a history of violence (Slee, 2017). Poverty, lack of funds for the schools, and lack of parental monitoring have also been linked to school violence (Hirschfield & Simon, 2018). Zimmerman and Schunk's (2015) study found that children who lacked motivation and interest were more likely to act violently. Deci and Ryan (2017) also found that children who felt constrained by their teachers and friends and did not have enough freedom were more likely to act aggressively. Grolnick et al. (2018)

found that students who felt helpless and inadequate at school were more likely to behave angrily.

History of Gun Politics

Gun control is a politically significant and controversial topic in the United States (Charles, 2024). For more than 50 years, this matter has been a continuous subject of political discussions, presidential elections, public addresses, legislative proposals, and legal proceedings (Wilson, 2016). Even though people have been talking about firearm-related issues, an alarming aspect of the firearms issue involves the apparent lack of government responsiveness to popular sentiment. Despite enduring widespread support for more stringent gun restrictions, the country's gun regulations remain remarkably lenient. The discrepancy between popular sentiment and national gun legislation is alarming as it seems to undermine fundamental democratic values (Goss, 2010). In the US, gun politics revolves around two main conflicting ideas about private firearm possession: gun control and gun rights. Gun control proponents push for stricter gun ownership regulations, whereas gun rights advocates reject further restrictions and promote gun ownership liberalization (Laschever & Meyer, 2021). The constant conflict between these two groups ie gun control and gun rights groups have led to many changes in gun regulations and laws which either favours or affect both groups. One such law was the federal legislation known as the Brady Bill. It was one of the first gun laws that imposed restrictions on firearms. Before this bill, federal laws prohibited certain individuals from possessing firearms. This included those with a prior record of substance abuse, individuals under the legal age, and individuals with a criminal

background. These data were not centralized for these background checks (Brady Law, 2021). The Brady Bill was a legislative measure that included many modifications throughout its early enactment. An assassination attempt on President Ronald Reagan prompted the proposal of this law. The primary emphasis was conducting background checks on potential gun consumers using either the FBI or local agencies' information.

Subsequently, the legislation established the National Instant Criminal Background Check System (NICS) to facilitate and expedite this procedure (Brownlee, 2023). Even though the bill has been in use for almost 30 years, the number of gun-related incidents has significantly risen. This may mostly be attributed to the low rejection rates of one and a half percent in background checks through the Brady Bill (Brooks, 2023).

School Shooting and the Timing of the Incident

Any act that causes students, teachers, or other members of the school community physical or psychological harm is considered a kind of school violence. Bullying, assault, and harassment are examples of school violence. However, there are other causes of school violence, including cultural, personal, and educational issues.

One crucial factor that is frequently disregarded is the timing of episodes of school violence. The timing of occurrences of school violence and the elements that influence their occurrence have not been thoroughly analyzed. The lack of scholarly literature and empirical research demand a stronger emphasis on the significance of timing factors in the context of school shootings within this study.

The timing can vary from the moment of the day to the part of the academic year. Understanding the timing should indicate patterns that are informative for safety

planning. For instance, a report points out that 41% of the attacks occurred during the initial week after students returned to school following a period of absence, such as a suspension, school holiday, or being absent due to sickness or truancy (Trauma Coverage, n.d.).

Typically, the frequency of violent crimes committed by adults rises steadily from 6 a.m. to the afternoon and evening hours, reaches its highest point around 9 p.m., and then declines to a minimum at 5 a.m. Conversely, acts of violence perpetrated by young individuals reach their highest point in the afternoon, specifically between 3 p.m. and 4 p.m., which coincides with the conclusion of the school day. Between the hours of midday and 5 p.m., adolescents are responsible for committing 37% of all violent crimes. By contrast, adults are responsible for 30% of all violent crimes that take place between 6 p.m. and 11 p.m. (OJJDP, 2022). The legislative framework pertaining to guns inside the United States is unquestionably a vital element in the ongoing discussion regarding gun-related incidents in educational institutions. The impact of state regulations on the possession, acquisition, and utilization of weapons as well. indubitably affects firearm-related incidents in schools.

The timing of episodes of school violence could offer predictive insights. Schools and governments may create effective prevention and response plans by understanding the patterns of school violence because research findings indicate the incidents of school violence often occur within specific time periods, notably around lunchtime and the transition between classes (Borum et al., 2010). A National Center for Education Statistics (NCES, n.d.) study indicated that 11:00 a.m. and 12:00 p.m. had the most significant percentage of violent incidents. Several causes might have contributed to this

tendency, such as the availability of possible targets, the absence of supervision during these hours, and the possibility of tension resulting from student interactions. The timing of school shootings can significantly affect the number of fatalities and the response of law enforcement and emergency services (United States Secret Service, 2020).

Depending on the day of the week, the timing of incidences of school violence also changes. According to research by the National School Safety and Security Services (2018), school violence incidents more frequently occur on Mondays and Fridays. According to the study, Friday occurrences may be related to students' excitement for the weekend, and Monday instances may be linked to students' unwillingness to return to school after the weekend.

The timing of school violence incidents also varies by the time of year. According to a National Institute of Justice survey (2016), the months of April, May, and June saw the most significant number of cases of school violence. This pattern can be ascribed to several factors, such as the anxiety that could develop during final examinations, the pressure of the school year's conclusion, and the eagerness for summer vacation. Kleck and Gertz (2018) pointed out that school shootings during class times were more dangerous than those that were not. This might be because more people—including students and teachers—are present during class hours, and they might have less room to run or hide during an attack. Also, classes occur when many students are around, including during lunch or passing periods, which could lead to more possible targets.

School shootings in the morning are more likely to end in fatalities than in the afternoon. The observations imply that this might be because students and teachers are less observant and prepared for an attack in the morning than in the afternoon, when they

may have had time to establish a routine and be more watchful (Densley et al. 2019). While the timing of school shootings can seriously affect the number of casualties, it can also influence how emergency crews and police react. According to research over a decade ago by Borum et al. (2010), situations during the school day were more likely to prompt a swift reply from law enforcement. This is probably because more people, including School Resource Officers and other law enforcement officials who might be able to react quickly, were on campus during the day. On the other hand, shootings after school hours may be more likely to be reported by members of the public who are not on school property; however, this does not necessarily imply that law enforcement responds more slowly to such instances.

Even though additional research is needed to understand the connection between timing and school shootings, current data indicate that morning and during-class time shootings may be especially lethal (Office of Juvenile Justice and Delinquency Prevention NIJ, 2022). For school administrators, these details are important when creating safety plans and procedures. However, interventions must be customized to meet the unique needs of each school and student because the variables causing school violence events are complicated. More study is required to comprehend the timing of school violence occurrences completely and to create evidence-based prevention methods.

School Characteristics

School characteristics play a significant role in understanding incidents, including school violence or school shootings. The literature described the characteristics of school systems, particularly in relation to the prevalence of incidents of violence within schools.

A specific emphasis on the cultural and contextual aspects of different schools showed that there was a correlation between the size of a school and the prevalence of violence, with smaller schools in high-crime regions exhibiting lower rates of violence in comparison to more prominent schools (Chen, 2008). According to Jennings et al. (2011), there exists a correlation between gangs and bullying concerning the occurrence of school violence. Student interest significantly impacted violence levels, with schools in high crime and urban environments experiencing higher victimization rates. High schools were more likely to report significant infractions, and larger schools often exhibited higher levels of violence (Crawford & Burns, 2015). This study also examined school characteristics such as the Presence of School Resource Officers (SROs), School Location, School Type, and Level to extend the literature on school shootings.

School Resource Officers (SRO)

The School Resource Officer Program was created to aid in the handling of the rising rate of school violence and to create a secure and engaging learning environment for students (Carvino & Davis, 1994). However, it is not a simple process for schools to incorporate SROs. Police officers in unpredictable settings tend to try to impose order by asserting their authority over the situation (Bittner, 1990). According to a study by Heise and Nance (2021) there is a positive correlation between the presence of SROs and police in schools and the possibility that the school will report student actions to law enforcement. This finding lends credence to the idea that having law enforcement in schools can enhance the risk of a school to jail pipeline. The issue here is that educators need to have ample opportunity to organize lessons and extracurriculars in accordance with the best practices in education. However, police might hinder an open and accessible

learning atmosphere because of their emphasis on security, thereby displacing the teacher's position as counselor and educator with an authoritarian presence (Jackson, 2002). Johnson (1999) conducted one of the initial research projects to examine the effectiveness of a School Resource Officer (SRO) program, in which uniformed police officers were stationed in lower and middle schools to ensure the safety of students and staff. The researcher pointed out that the prevalent presence of uniformed police officers was believed to deter and prevent incidents involving handguns and other forms of violence in urban schools. The researcher also discovered that having police officers present in city high schools and middle schools was an effective deterrent against challenges such as bullying, theft, substance abuse, and weapon usage. In addition to reducing crime, the SRO offered counseling services, assistance for school administrators and teachers, and additional services (Johnson, 1999).

Recent research by Theriot (2016) on the effects of engaging with a school resource officer (SRO) in schools indicated that interactions favorably influenced students' perceptions about SROs but were linked to lower levels of school connection. Students who said they interacted with SROs the most during the school year seemed more susceptible to this effect. Compared to children with fewer or no SRO interactions, those with five or more reported higher positivity toward SROs. Similarly, Flexon et al. (2009) found that children with greater enthusiasm and attachment to their school and teachers therein were likely to believe that the local police force cared about the community. These youths also had a higher probability of thinking that the police could be trusted.

On the other hand, in an earlier study, Jackson (2002) examined data from three schools, one with an SRO and two without using a mixed model analysis of variance. The researcher pointed out that School Resource Officers (SROs) had no impact on children's views of law enforcement officers or offending. Unfavorable interactions between young people and the police and their SRO may contribute very little influence.

School Resource Officers can effectively prevent shootings and other acts of violence if they establish positive connections with students and faculty. Stallings and Hall (2019) conducted a study on averted targeted school killings by collecting data from newspaper articles and performing a content analysis. They pointed out that students' reporting prevented 61% of potential school shootings. Of the students who reported a possible school shooting, 11% reported it to School Resource Officers, 28% reported it to school administrators or instructors, and 17% reported it to regular law enforcement.

School Level

The United States educational system has a structure of preschool, elementary, middle, and high school, followed by post-secondary. Even though schools are often secure havens for children, they are not immune to acts of violence and criminality. In the 2007-2008 school year, 94% of secondary and 65% of primary schools experienced at least one violent instance in the US (Robers et al., 2010). What tends to make a difference is the school's collective efficacy which may depend, at least in part, on the institution's level. The development of collective efficacy is often fostered in primary schools due to the higher rates of family engagement and smaller student-to-teacher ratios, while it can be hindered in high schools due to a minor degree of parental engagement and greater student-to-teacher ratios (Willits et al., 2013).

The prevalent research propensity to concentrate on high schools alone further complicates the implications of current studies on schools and crime (Willits et al., 2013). Sebring et al. (1995) pointed out that primary and high school environments differ vastly. Regarding who commits offenses, between the ages of 12 and 20, young individuals carry out their initial significant acts of violence at a rate 2.5 times higher than those older than 20 (Office of the Surgeon General, 2001). Willits et al. (2013) examined the risk factors of crime and neighborhood by conducting a regression. They concluded that aggravated assaults, theft, and drug-related crimes tended to increase in correlation with a high school in the neighborhood and increases in drug charges may correlate with enrollment at the middle schools.

Regarding specific crimes, Nylund et al. (2007) conducted a study in which they used a latent class analysis (LCA) in order to empirically identify distinct groups of individuals who experienced victimization throughout their middle school years. They noted that bullying tended to peak in middle school and decline throughout high school, with the transition from young children to adolescents often coinciding with the start of secondary school. High schools usually have more students than elementary and middle schools (Willits et al., 2013). Students in middle school were more likely to report bullying incidents to teachers if they had gotten help previously, a pattern that may continue throughout high school (Boulton et al., 2013). Further, they noted that high school teachers could be less inclined to investigate allegations of bullying if they believed that the students were mature enough to handle challenging circumstances independently. Boulton et al. (2013) added that new social interactions with teachers, parents, and peers may influence high school children's perceptions of bullying.

School Type

The type of school has been a significant topic in understanding different aspects of schools. Traditionally, violence rates in private secondary schools were often lower than those in public secondary schools (Bastian & Taylor, 1991). This claim was substantiated by a study published in 1991, which drew on data from the National Crime Victimization Survey conducted in 1989. In 1989, the percentage of private secondary students who experienced property or violent crime was seven percent, but the percentage of public secondary students was nine percent. In addition, a lower percentage of private secondary students (13%) expressed fear of being assaulted in comparison to public secondary students (22%). It is possible that these disparities in levels of violence and crime were present more than two decades ago (Bastian & Taylor, 1991). In addition, the U.S. Department of Education (1997) found that students enrolled in designated public schools were more susceptible to experiencing firsthand victimization than those attending private schools.

Similarly, recent research has shown that a higher percentage of public-school students, as opposed to private school students, reported avoiding certain areas inside their school given concerns of being assaulted or harmed. Specifically, five percent of public-school students expressed avoidance, whereas just two percent of private school students did so (National Center for Education Statistics, 2022). The incidence of bullying, physical assault, or robbery among students in grades 6-12 was notably higher at public schools, compared to private schools. The present study examined the impact of school type, namely private and public schools, on the incidence of casualties in school shootings.

Location Type

The literature on the location of school shootings is limited. For shootings in general, the Federal Bureau of Investigation (FBI) established 11 key location categories for occurrences. These categories encompass a range of settings, such as commercial locations, educational environments, open spaces, government buildings, residences, houses of worship, and healthcare institutions (Blair & Schweit, 2014). The public faced the most significant risk when events unfolded in multiple places. Within educational facilities, it was observed that a majority of shootings, 51.9%, took place in classrooms and corridors. However, a limited number of occurrences were carried out outside the premises, with two instances involving shooters situated within automobiles (Blair & Schweit, 2014).

Multiple scholarly investigations have extensively recorded school violence's tendency to concentrate within specific locations (Fisher & Nasar, 1992; Goldstein, 1994). However, this research has thus far neglected to explore the underlying factors contributing to the existence of these zones inside educational institutions that are prone to violence. Astor et al. (1999) examined the application of this idea within the context of schools and found that incidents of school violence were more likely to occur in places that lacked clear boundaries and had less adult monitoring or supervision.

Irwin et al. (2022) examined the indicators for school offending and safety for the annual report for BJS [2022] and discussed the student's fear and avoidance. NCES (2022) questioned the school children about locations they avoided inside the school out of concern that they might be attacked or hurt. These areas were entrances into the school, corridors or staircases within rather than inside the structure of the school

building. However, the data also revealed that incidents occurring within the school building tended to result in higher fatality rates compared to those occurring outside. Shootings stemming from arguments were more the school, certain sections of the school cafeteria and, any bathroom facilities within the school, and other designated areas within the school.

The findings of an analysis conducted by the United States Government Accountability Office on school shootings (2020) found that school shootings were more often reported to occur outside the school premises often seen in outdoor settings, whereas incidents involving accidents and specifically targeting schools were more prevalent inside the confines of school buildings.

School Size

The size of the school is an essential consideration in examining the number of casualties in school shooting incidents. Juvonen (2001) found that violence was widespread in large schools, particularly affecting middle school children, who were the primary targets. Larger urban middle and high schools frequently employ metal detectors and conduct inspections of lockers and book bags. Schools with a student population of 600 or more have a higher likelihood of experiencing incidents of bullying, physical assaults, or theft compared to schools with less than 300 children.

A more significant proportion of children in schools with 600 or more students reported having knowledge of crime or threats at school and observing criminal activities (U.S. Department of Education, 1993). Baird et al. (2017) conducted a study on mass shootings, which indicated that schools that had mass shootings had larger student populations compared to schools that were within the average range for the state. Students who carried out such shootings were more likely to have enrolled in a smaller

educational institution with a reduced student-teacher ratio. This implies that smaller educational institutions are less prone to encountering incidents of large-scale violence.

Type of School Shooting

The type of school shooting is classified based on the type of victim selected, that is, whether the victim was targeted or randomly selected, or it was both random and targeted. Targeted violence refers to the deliberate act of an attacker selecting a certain individual as their victim based on a specific motivation. The planning of a school shooting is a crucial indicator of an impending attack. Vossekuil et al. (2002) noted that the plotting of an attack is a defining feature of targeted violence in general and, thus, of targeted school violence in particular.

Fatal shootings at colleges and schools are often characterized as random incidents in which the shooter attacks several individuals without any particular dispute or connection. These occurrences have a resemblance to *rampage* shootings, in which the perpetrator murders several others without any previous connection or cooperation (Newman et al. 2004). Since 1966, a total of 38 lethal, random attacks have been documented in educational institutions in America (Densley et al., 2022). In contrast, targeted shootings refer to cases when a perpetrator specifically selects an individual victim whom they have a particular grudge against. There have been 96 reported occurrences of targeted shootings in schools.

A report by The National Threat Assessment Center (2019) pointed out that in about 73% of incidents, the perpetrator specifically targeted the victim. Out of a total of six assaults, which accounted for 15% of the incidents, a certain group of students were singled out, but only one individual within that group was injured. Five (12%) incidents

resulted in collateral bystander injuries, such as when an unexpected student was shot, whereas 17 attacks (41%) targeted random victims involuntarily or opportunistically.

In another report by the Government Accountability Office (2020), schools located in suburban and rural areas, characterized by greater socioeconomic status and lower minority populations, exhibited elevated rates of suicides and incidents of school-targeted shootings. Of the total 166 deaths, more than half were a result of school-targeted shootings. The incidents of shootings occurred with greater frequency outside school premises, but a higher fatality rate characterized the ones that took place within. Disputes and mishaps were more prevalent in areas around school premises, but incidents of gunfire specifically targeting schools happened with greater frequency inside. These numbers show the importance of knowing what type of shooting incidents are and how they can be used to create new policies and programs. Moreover, Shultz et al. (2013) discussed that middle or high schools have a lower probability of random shootings compared to targeted ones, but college campuses have a 20-fold higher likelihood of random shootings compared to targeted ones, according to research.

State-Level Factors and School Shootings

The prevalence of school shootings and the role of state-level variables have not been studied in depth. However, studies have focused on certain variables such as State economy, states crime rates etc. have been looked in individually. It is important to investigate various factors contributing to the incidence of school shootings, including gun legislation, state-level economic conditions, and demographic characteristics, are less explored by researchers.

State Gun Laws and School Shooting

Gun regulations exhibit significant variation, influencing the availability and utilization of weapons. Research has indicated that the implementation of gun control policies, including the assault weapons prohibition, has had a statistically significant impact on reducing the number of victims in school shooting incidents. During the period when the assault weapons prohibition was in effect from 1994 to 2004, whether at the state or federal level, was implemented, there was a reduction of 54.4% in the number of victims of school shootings compared to when the ban was not in effect (Gius, 2017). Reeping et al. (2022) examined the correlation between the acceptance of state firearm regulations and state gun ownership with incidents of K-12 school shootings and active shootings. After accounting for crucial confounding variables, there was a positive correlation between more lenient firearm regulations, increased rates of gun ownership, and greater occurrences of school shootings, including active school shootings.

The Second Amendment of the United States Constitution guarantees a right to bear arms. The Supreme Court's landmark case, *District of Columbia v. Heller* (2007), affirmed the Second Amendment's guarantee of individuals' freedom to own and carry firearms for legal reasons. The case originated from legislation in Washington, D.C., which restricted individuals' ability to acquire and possess weapons within their premises.

Over the years, the approach toward gun laws has changed. The judiciary's endorsement of the right to bear arms has posed challenges for the federal government, states, and local authorities in enacting firearm regulations. These measures include proposed policies for universal background checks, prohibiting military-style firearms like the AR-15, imposing restrictions on magazine capacity, and establishing age criteria

for gun possession (Santhanam, 2023). The literature indicates that the implementation of universal background checks, permit requirements, *may issue* laws, that is, laws permitting local authorities to grant gun licenses, and laws prohibiting individuals with violent misdemeanor convictions from using firearms have demonstrated a substantial capacity to effectively decrease the occurrence of gun-related fatalities (Colarossi & Mcalpine, 2019).

Federal regulations also were implemented to address the issues related to gun violence in schools. During the latter part of the 1980s, the United States Congress developed a growing apprehension over the presence of armed juveniles and the issue of violence within educational institutions. The enactment of the Gun-Free School Zones Act in 1990 rendered the possession of firearms near educational institutions unlawful. The Gun-Free Schools Act mandated that states receiving federal education grant funds must enforce the expulsion of children reported to have a handgun while on school premises (United States Department of Justice Archive ,2004). The Youth Handgun Safety Act legislation was enacted in 1994, effectively prohibiting anyone under 18 from possessing handguns and banning adults from passing such firearms to minors (Bureau of Alcohol, Tobacco, Firearms and Explosives, n d). Before the implementation of this amendment, there were no federal regulations restricting ownership or transfer of handguns by juveniles.

Lee et al.'s (2017) study explored the role of firearm regulations in reducing homicide rates in the US. They did a systematic review and found a correlation between the implementation of firearm legislation, such as background checks and permit-to-purchase requirements, and a decrease in firearm-related murder rates. However, no

correlation was found between legislation targeting firearm trafficking, child safety, or prohibiting military-style assault weapons. They found a lack of consensus on the effectiveness of legislation limiting firearms in public spaces and promoting gun tolerance.

In recent years, several states, like Texas, decided to remove the requirements for obtaining a handgun permit. Following the elementary school mass shooting in Uvalde, Texas, supporters of gun control advocated for an increase in the minimum age requirement for purchasing firearms. Following the Supreme Court's ruling that overturned New York's stringent licensing system, a federal court in Texas subsequently determined that a state statute prohibiting those under the age of 21 from possessing a firearm violated the Constitution (Goodman, 2022).

State Economy and School Shootings

Gun violence in the United States claims the lives of around 40,000 individuals each year while causing injuries to a much larger number. Moreover, this pervasive issue carries a substantial economic impact, amounting to an estimated $557 billion (U.S. Department of Education, 2023). The profound effect of gun violence on human lives is undeniably substantial, as it leaves a lasting and irreversible effect on both the victims and the individuals who manage to survive such traumatic experiences (Everytown Research & Policy, 2022). The amount of $557 billion is a value that is fivefold the allocated budget of the Department of Education, which is responsible for financing educational programs spanning from preschool to college, catering to a substantial number of individuals within the United States population.

However, economic factors that may affect school shooting occurrences are rarely examined by scholars. The occurrence of gun violence within communities is frequently associated with social and economic disparities, further intensified by discriminatory laws and an insufficient allocation of resources to local areas. These communities are confronted with economic difficulties, including inadequate availability of nutritious food, unaffordable housing options, poor educational resources, and restricted prospects for advancement (Jacoby et al., 2018).

Communities characterized by high levels of poverty frequently exhibit elevated unemployment rates, accompanied by a substantial disparity in net worth compared to communities with low poverty rates. On average, households residing in high-poverty areas own a net worth that is 40 times lower than their counterparts in low-poverty districts (Pew Trusts, 2016). Educational institutions suffer from persistent financial insufficiency, wherein Black, Hispanic/Latino, and American Indian students encounter notable disparities in budget allocation (Morgan & Amerikaner, 2020).

Consequently, the presence of teachers lacking sufficient qualifications, obsolete curricula, and deteriorating facilities has a detrimental effect on the growth of students. A significant proportion of individuals residing in high-poverty areas, including over 25%, do not possess a high school diploma, while a mere 14% have attained a bachelor's degree (Benzow & Fikri, 2020). Structural disadvantages, in conjunction with the widespread availability of firearms, contribute to the emergence of circumstances conducive to communal gun violence.

A study has revealed a correlation between income inequality in the United States and elevated firearm homicide rates among individuals aged 14 to 39 years (Rowhani-

Rahbar et al., 2019). The Gini Index, as evaluated in 1990 and 2000, had a positive correlation with elevated levels of murder rates across various racial and ethnic groups, with a particularly pronounced effect observed among African Americans (Sommeiller, 2016). The study posited that implementing measures aimed at mitigating wealth inequality should be considered as a potential strategy for diminishing firearm murder rates. Integrating income disparity into socioeconomic indicators can enhance public health outcomes and advance clinical research on firearm violence prevention (Rowhani-Rahbar et al., 2019). Theoretically, these economic circumstances could be indicators of individual strains that manifest in violence when routine contextual factors allow.

State Demographic Factors and School Shooting

The current study explored the significance of socio-demographic factors at the state level in understanding the occurrences of school violence. It explored the interactions between the variables, such as the total population of each state, age, race/ethnicity, and population distribution of children by race/ethnicity, highlighting any correction with school shootings. The relationship between age distribution and crime has been less explored by researchers. The age crime curve demonstrates a persistent trend of increased delinquency with longer youth (Nevin, 2022). Understanding and addressing these data points contributes to an improved awareness of adolescent vulnerability and targeted initiatives' effects on social and individual outcomes (Hein & Monk, 2017).

Population and crime rate are key variables studied while trying to understand the role of demographic variables and crime. Fischer (1995) pointed out that the expansion of populations has the potential to increase the quantity, variety, and intensification of

subcultures, resulting in higher criminal activity levels. On the contrary, decreasing populations have the effect of reducing these subcultures, hence leading to a decrease in crime rates.

The premise that crime, especially violent crime, is a predictable byproduct of human interaction proposes a positive correlation between population fluctuations and crime rates. According to Mayhew and Levinger (1976), a positive relationship exists between the frequency of human interactions and the likelihood of individuals experiencing offense, emotional harm, or exploitation. The authors suggested that an increase in population size was associated with a corresponding rise in the incidence of criminal activities, whereas a decrease in population size is linked to a fall in crime rates. The findings of this demographic study indicated a small positive correlation between changes in population and crime rates.

Population by age provides insight into the potential relationship between age and the prediction of criminal behavior. The age of adolescence is commonly acknowledged as a crucial phase of growth in which individuals have the potential to exhibit aggressive and unlawful behavior (Farrington, 2013). Property-related offenses peak sooner than violent crimes, with behavior culminating around the age of 17. The age-crime curve has been produced by analyzing empirical data, including various racial groups, national origins, and historical periods (Piquero, 2007). The current research aimed to investigate the relationship between the percentage of youth in each state and the occurrence of school shootings.

Relatedly, multiple studies have repeatedly shown a positive correlation between racial diversity and crime, indicating that regions characterized by greater diversity tend

to exhibit higher levels of criminal activity (Wenger, 2018). In their study, Sun et al. (2004) observed a positive correlation between racial diversity at the community level and self-reported robbery incidents and the perceived probability of assault. Furthermore, in their study, Wenger (2018) revealed a correlation between racial diversity in urban areas and the incidence of criminal activities within specific neighborhoods.

Not enough research has been conducted on the racial composition in selected states and their correlation with incidents of school shootings inside the United States. There are, however, studies of crime rates, in general, examining disproportionate confinements by race and ethnicity that support the racial threat hypothesis (Blalock, 1967). This hypothesis asserts that in places where persons of different races compete for the same resources if the minority becomes a threat to the majority, the latter will utilize laws against the minority. This maneuver is to sustain the racial power status quo. It may be these dynamics play out in school contexts and even in the response to school violence incidents. Building on the literature, this study examined these broader contextual points toward prescribing how to reduce school shootings.

Mental Health Services and School Shooting

Twenty percent of young children require mental health assistance, according to a Centers for Disease Control and Prevention report, but the majority have no access to it (Kann et al., 2016). In more recent times, one report of US public schools revealed that while 55% of public schools offered some mental health screening access, less than 42% facilitated treatment access (Institute of Education Sciences 2023). Nevertheless, studies revealed a complicated network of variables, including mental health issues that are linked to school shootings. Many students have dealt with bullying, rejection, and failure

to take medications related to psychological problems (Paolini, 2015). Paolini (2015) found that 61% of school attacks are carried out to "get revenge," and 81% involved a grievance against someone else at the time of the attack; the majority were planned.

The presence of mental health disorders in children has significant negative consequences on both individual and socioeconomic domains, hindering the seamless transition into adulthood. When youth leave home, there is a discernible increase in the incidence of mental health disorders manifestation (Whitney & Peterson, 2019). The World Health Organization (WHO) has prioritized global and national initiatives to advance policies that pertain to the mental health of children, implement actions that prioritize prevention and early intervention for young individuals during transitional periods, and minimize disparities in access to mental health services.

Whitney and Peterson (2019) found that over half of the 7.7 million children in the United States who suffered from mental health disorders did not receive the necessary therapy from a certified mental health practitioner. Additionally, it was noted that the incidence of this phenomenon exhibited variation among several geographical regions. Alabama, Mississippi, Oklahoma, and Utah have been recognized as having a significant prevalence of young individuals affected by mental health disorders while facing challenges in accessing necessary therapeutic services (Black & Schiller 2016). Other states like Texas also have access challenges.

As indicated by the implementation of mental health services by over 33% of school districts using in-house staff and by over 25% of communities through partnerships with external organizations, the integration of mental health services within educational institutions has become a critical component of student support systems

(Foster et al., 2005). Numerous federal entities, including the President's New Freedom Commission on Mental Health, the Department of Health and Human Services, and the Institute of Medicine, have emphasized the importance of educational institutions improving their early identification strategies to adequately assess and establish relationships with students in need of mental health assistance (Green et al., 2013).

Mental illness significantly influences the functioning and academic success of approximately one in six school-aged adolescents (Bitsko et al., 2013). The prevalence of mental illness among students seems to rise with advancing age. Educational institutions are very conducive environments for identifying mental health issues. Proactively addressing these problems at an early stage can serve as a preventive measure against the development or advancement of mental illness, given that indicators of declining mental well-being can be discernible before its manifestation (Lasalvia et al., 2020). A number of school shooters have had mental health issues.

Chapter Summary

This chapter offered a review of the recent literature on school shootings in the United States. It described the history of school shootings followed by what is known about related variables. This included micro-level variables regarding the school and macro-level variables such as state economics, gun laws, and access to mental health care.

CHAPTER III

METHOD

Research Design

This quantitative study attempted to offer a comprehensive analysis of the circumstances of school shootings in the United States. This included a description of school factors and the broader context of state indicators. Preventing school shootings requires being able to identify potential shooters. Nevertheless, the intensity and complexities involved in these incidents makes it difficult to discover effective measures to maintain school safety and avoid significant acts of violence (Cornell, 2006). Using scientific findings to direct a comprehensive, school-wide approach is likely the best to serve America's long-term interests in school safety and decrease school shootings (Dwyer & Osher, 2000). Understanding the nature and scale of school shootings in the United States is necessary for educational administrators and institutions to map out a successful and sustainable strategy.

This study sought to contribute to the scholarly literature by analyzing both macro and micro data to prevent school shootings. A quantitative approach was used to explore the correlation between school shootings and variables such as school characteristics, state-level economic indicators, state demographics, the accessibility of mental health services, and the timing of the incident (time of the day, week, and quarter of the year that the incident occurred) and state gun laws.

Research Questions

The micro-level research questions:

Q1) To what extent are school characteristics related to the number of school shooting causalities?

Ha1: There is a statistical significance between the school type (public schools and private schools) and the number of casualties in school shooting incidents.

Ha2: There is a statistical significance between the school level and the number of casualties in school shooting incidents.

Ha3: There is a statistical significance between the school size and the number of casualties in school statistical significance between the type of locations in which the incident happens and the number of casualties in school shooting incidents.

Q2) To what extent does the time of day, day of the week, and quarter of the year affect the number of school shooting causalities?

Q3) To what extent does the presence of a school resource officer in schools predict the number of school shooting causalities?

Q4) To what extent does the type of school shooting predict the number of school shooting causalities?

The macro-level research questions:

Q5) What is the correlation between state-level economic indicators, such as unemployment and poverty rates, and the incidence of school shootings for five years?

Q6) What is the correlation between the degree of strictness of gun laws at the state level and the prevalence of school shootings for five years?

Q7) What is the relationship between demographic variables at the state level and the likelihood of school shootings for five years?

Q8) How much does the accessibility of mental health services and the prevalence of mental health at the state level affect the number of separate school shooting incidents?

The Data

No one source of data can explain phenomena in comprehensive detail. It is preferable to rely on multiple sources on related topics and integrate them based on the requirements of what is being researched to attain the best possible output for a researcher's attempts. Data for the study were collected from five sets of secondary data: the Washington Post (WP), the K-12 School Shooting Data Base (K-12 SSDB), the Giffords Law Center, the KFF Database and The State of Mental Health in America Report. Each data source is publicly available, and each contains a wide range of information on school shootings, demographic information of the offenders, and school characteristics (Riedman 2022; Washington Post, 2023) and state-level data on Number of Residents, Population Distribution by Age, Sex, and Race/Ethnicity, Poverty Rate by Race/Ethnicity, Total State Expenditures, Total residents, Deaths Due to Injury by Firearms, and Deaths Due to Firearms by Age (Kaiser Family Foundation, 2023).

The Washington Post (WP) and K-12 School Shooting Data Base (K-12 SSDB) have focused on shooting incidents in school settings or places related to school and have provided news links on respective school shooting incidents. The data on gun violence was collected from the Gifford's Law Center to Prevent Gun Violence. It ranked the gun laws into five categories, that is, A, B, C, D, and F. Merging these five datasets allowed

the researcher to examine comprehensive details about each school shooting from 2017 to 2022.

The Washington Post

The Washington Post has collected data on school shootings since the Columbine school shooting in 1999. The information comes from different sources, including Nexis, news articles, and police reports. It includes more than 1,000 cases that occurred within the school campus immediately before, during, and after school hours.

This study utilized the variables: (1) the Day of Week that the incident took place; (2) school type, public or private; (3) enrollment, that is total number of students enrolled; (4) staffing which is ratio of staff to students; (5) presence of a School Resource Officer, which was measured on a nominal scale, that is, yes 0 and no =1; and (6) casualties which is the number of people who were injured and number of people who were killed.

K-12 School Shooting Data Base

The second data set used in this study is the K-12 School Shooting Data Base (K-12 SSDB). This dataset has more than 1,300 cases of school shootings in grades K-12 that have been documented from 1970 to most recent incident in 2023 up to the time of publishing. Updates were made when new events occurred and have been filtered, deconflicted, and cross-referenced in the final product. The K-12 SSDB provides in-depth details on each occurrence and offers a reliability score that measures the material's dependability and the verified primary source citation(s) such as a newspaper story, court records, interviews, or police reports. These data include much more in-depth information on each incident than the other three datasets.

For the current study, the variables were: (1) quarter of the year that the incident occurred. The quarters were summer, fall, spring, and winter, coded nominally; (2) school level with categories: 6-12, Elementary, High, Junior High, K-8, K- 12, Middle, and Others. This is recorded in Elementary School (elementary), Middle School (K-8, Junior High, Middle), High School (6-12, High), and Others, (3) location type including Indoor Locations, Outdoor Locations, Mixed Indoor/Outdoor Locations, and Uncategorized/Other Locations. Indoor Locations included Bathroom, Cafeteria, Classroom, Gym Hallway, and Office. Outdoor Locations included Basketball Courts, Beside Buildings, Courtyards, Fields (General), a Football Field/Track, the Front of the School, and Playground.

Mixed Indoor/Outdoor Locations consisted of combinations of different locations such as the Cafeteria, Parking Lot, Classroom, Beside Building Classroom, Field, Entryway, Hallway, Beside Building, Inside School Building, Outside on School Property, and Parking Lot. Uncategorized/Other Locations included Off School Property and Other. The time of the incent occurred was coded as Morning: 6:00 am to 12:00 pm, Afternoon: 12:00 pm to 5:00 pm, Evening: 5:00 pm to 10:00 pm, Night:10:00 pm to 6:00 am, and Unknown.

KFF Data

KFF is an independent health policy research, polling, and journalism organization that provides nonpartisan information for policymakers, the media, the health policy community, and the public. It operates four major program areas: KFF Policy, KFF Polling, KFF Health News, and KFF Social Impact Media, which conducts specialized public health information campaigns.

KFF gathers information from various government sources on topics including unemployment and poverty rates in comparison to each state, the poverty rate by race and ethnicity, total state spending, the total number of residents, and population distribution by age, population distribution by race and ethnicity, and the population distribution of children by race and ethnicity. From this database, this study utilized information on variables such as the unemployment rate by state, [each state's unemployment rate, in months, for each state's annual unemployment rate, the monthly rates were added, the average was taken, and this variable was measured on a ratio scale], the percentage of poverty in each state is another variable measured in the ratio scale the rate of Poverty by age is also calculated on a ratio scale, the age group is divided into three groups: (1) children between 0 to 18, (2) adults 19 to 64, and (3) 65+. The percentage of poverty by race and ethnicity at the state level was also measured on a ratio scale.

Race and ethnicity were divided into six categories: White, Black, Hispanic, Asian/Native Hawaiian and Pacific Islander, American Indian/Alaska Native, and Multiple Races. Total State Expenditure, which is given in ratio scale, Total Residents in Each State, measured in ratio scal), Population Distribution by Age, divided into five categories, age 0- 18, age 19- 25, age 26- 34, age 35- 54, age 55- 64) and age 65+. Population Distribution by Sex had two categories, male and female, a nominal measure. Population Distribution of Children by Race/Ethnicity is a variable of information on children based on their race and ethnicity. This was divided into six categories: White, Black, Hispanic, Asian/Native Hawaiian and Pacific Islander, American Indian/Alaska Native, and Multiple Races. Total State Expenditure is another measure of the total

amount of money spent by each state for five years, and this variable was measured on a ratio scale.

Gifford's Law Center

Gifford's Law Center performs comprehensive evaluations of gun policies in 50 states, assessing and grading them via meticulous examination of the existing laws. The state laws are classified into five grades, ranging from Grade A to Grade F. Each state system can potentially accumulate a maximum of 122 points for the year 2017. This grading system is similar for all four years, with some changes given new policies or programs in any of the states. The grade reflects 10 points, which are (1) Background Checks and Access to Firearms, (2) Gun Owner Accountability, (3) Other Regulations of Sales and Transfers, (4) Firearms in Public Places, (5) Classes of Weapons and Ammunition/Magazines, (6) Consumer and Child Safety, (7) Investigating Gun Crimes, (8) Urban Gun Violence Initiatives, (9) Local Authority to Regulate, and (10) Others.

Each category has different policies that fit the category. For example, Background Checks and Access to Firearms included regulations about Background Checks, which had 11 points given by the researchers if they are implemented in the state. The background checks primarily targeted laws that governed the sale of firearms by individuals who are not licensed by the federal government. According to federal law, only licensed dealers are obligated to conduct background checks and keep records of sales.

Additionally, this category included Mental Health Reporting, which consisted of two points that address laws mandating the submission of relevant mental health records

to the F.B.I. for background checks on firearm purchasers. Categories of Prohibited People indicated whether there was legislation that defined certain groups of individuals as too risky to be allowed to buy or own weapons. It focused on six key aspects related to this affair. In total, 36 policies were used to assess the effectiveness of each state's gun regulation. The states have been evaluated based on the scores assigned to each policy.

State of Mental Health in America Report

The State of Mental Health in America Report from Mental Health America (MHA) was used to analyze the relationship between school shooting incidents and mental health variables for five years in each state. The primary objective of MHA is to enhance the mental health and overall well-being of individuals residing in the United States. This is achieved via many means, such as public education, research, advocacy, and public policy, as well as direct assistance. To achieve these goals, it tracks different factors regarding the mental health of both adults and youths. These include the prevalence or percentage of various types of mental health issues (State of Mental Health in America Report, 2017).

This study looked at specific aspects of mental health: how common mental health problems are among adolescents and adults, as well as how accessible it is for youths to get mental health care. The current study used a five-year average to assess the frequency of mental health factors and the availability of mental health services. The prevalence of mental health among adults was measured by the presence of any mental illness (AMI) among adults. AMI covers mental, behavioral, or emotional illnesses that can be identified, but not developmental or drug abuse disorders (State of Mental Health in America Report, 2022).

The number of youth with at least one major depressive episode (MDE) in the past year was used to determine how common mental health problems were among youth. This criterion defined a period of at least two weeks during which an individual experienced a depressed mood or a loss of interest or pleasure in daily activities, along with a majority of specified symptoms of depression (American Psychiatric Association, 2013). The last factor was the accessibility of mental health services for youths with MDE who did not get any mental health assistance (National Survey on Drug Use and Health , 2019).

For this study, the details about the shooting incidents were from two different data sets: The Washington Post School Shooting Dataset and the K-12 School Shooting Database. Both data sets rely on various sources, including government agencies and multiple publicly available sources. For this study, these datasets were merged. The Washington Post data examined more than 1,000 alleged incidents before, during, or after classes.

Events that happened after hours of operation, accidental discharges, private suicides, and shootings at colleges and universities were not included. News stories, open-source databases, police records, school websites, and phone calls to schools and police offices were used with Nexis to gather information (The Washington Post, 2023). The K–12 SSDB data offered comprehensive details, a reliability score indicating the use of a verified source citation(s) and whether open-source data from news stories found online and in print were used. A reliability score from 1 to 5 was used to rate the accuracy of each report based on its source and the number of reports it had (K-12 SSB, 2023). The reliability score for the K-12 SSB indicated data credibility.

Sampling

To describe macro and micro influences on the likelihood of a state having school shootings with casualties, incidents from 2017 to 2022 (excluding 2020) were examined.

Research Questions and Variables

Q1) To what extent are school characteristics related to the number of school shooting causalities?

Dependent Variable. *The number of school shooting causalities* (continuous measure).

Independent Variables

i) *School Type,* that is, private or public school, is measured on a nominal scale. For analysis, the variable was recoded into "0" as public schools and "1" as private schools.

ii) *Enrollment:* Total number of children enrolled in each school where the incident occurred. For analysis, the variable was recoded into very small (< 300 students) as 1, small (300-599 students) as 2, medium (600-899 students) as 3, large (900-1,999 students) as 4, and very large (2,000 or more students) as 5.

iii) *School level* was measured on a nominal scale. For analysis, the variable was recoded into Elementary as 1, K-8, Middle, and Junior High as 2, High and K-12 as 3, Others as 4, and Unknown as 5. Where grade levels overlap within categories such as K-8 and K-12, the coding was according to the highest level at the school. These combined-level schools are more likely classifications for private schools and small public school districts where levels are combined on the same site.

iv) *Location type*, that is, the type of location where the incident took place, which was measured on a nominal scale. The data were categorized into four groups based on location type: Indoor Locations, Outdoor Locations, Mixed Indoor/Outdoor Locations, and Uncategorized/Other Locations. Indoor Locations include Bathroom, Cafeteria, Classroom, Gym Hallway, and Office. Outdoor Locations include Basketball Courts, Beside Buildings, Courtyards, Fields (General), a Football Field / Track, the Front of the School, and Playground. Mixed Indoor/Outdoor Locations consist of combinations of different locations such as the Cafeteria, Parking Lot, Classroom, Beside Building Classroom, Field, Entryway, Hallway, Beside Building, Inside School Building, Outside on School Property, and Parking Lot. Uncategorized/Other Locations include Off School Property and Other. For analysis, the variable was recoded into Indoor Location as 1, Outdoor Location as 2, Mixed Location as 3, Others as 4, and Unknown as 5. Location type is measured on a nominal scale.

Q2) To what extent does the time of day, day of the week, and quarter of the year affect the number of school shooting causalities?

Dependent Variable. *The number of school shooting causalities* (continuous measure).

Independent Variables

i) *Time of the Day*- This looked into the timing of the incident on each day. For analysis, the variable was recorded into Morning: 6:00 am to 12:00 pm, Afternoon: 12:00 pm to 5:00 pm, Evening: 5:00 pm to 10:00 pm, Night:10:00 pm to 6:00 am, and Unknown. It was measured on a nominal scale.

ii) *Day of Week* (M, T, W…) that is on which day the incident occurred. For analysis, the variable was recoded into Monday as 1, Tuesday as 2, Wednesday as 3, Thursday as 4, Friday as 5, Saturday as 6 and Sunday as 7. Variable were measured on a nominal scale.

iii) *Quarter* that is, in which Quarter of the year the incident occurred. For analysis, the variable was recoded into categories, that is, summer as 1, fall as 2, spring as 3, and winter as 4. *The Quarter* is measured on a nominal scale.

Q3) To what extent does the presence of a school resource officer in schools predict the number of school shooting causalities?

Dependent Variable. *The number of school shooting causalities* (continuous measure).

Independent Variables

i) *The presence of a School Resource Officer* is measured on a nominal scale. The variable was recoded as yes =1 and no =0 for analysis.

Q4) To what extent does the type of school shootings predict the number of school shooting causalities?

Dependent Variable. *The number of school shooting causalities* (continuous measure).

Independent Variables

The type of school shootings is categorized based on the victim selection. It is classified into five categories: Victim Targeted, Random Shooting, Both, Neither, and N/A. For analysis, it was recorded as Victim Targeted as 1, Random Shooting as 2, Both as 3, Neither as 4, and N/A as 5. The Type of School Shooting is measured on a nominal scale.

Macro-Level

Q5) What is the correlation between state-level economic indicators, such as unemployment and poverty rates, and the incidence of school shootings?

Dependent Variable. *The Number of School Shooting* incidents at the state level from 2017 to 2022 is measured on a ratio scale.

Independent Variables

i) *Unemployment Rate f*rom 2017 to 2022 by state – Each state's unemployment rate was given in rates. The average of the five years was calculated in Excel for each state's unemployment rate. This variable is measured in ratio scale.

ii) *The Percentage of Poverty* in each state *f*rom 2017 to 2022 is measured on a ratio scale. The average of the five years was calculated in Excel for each state.

iii) *The Percentage of Poverty by Age* in each state *f*rom 2017 to 2022 is measured on a ratio scale. The average of the five years was calculated in Excel for each state. The age group is divided into i) Children between 0 to 18, ii) Adults 19 to 64, and iii) 65+.

iv) *The Percentage of Poverty by Race and Ethnicity* in each state from 2017 to 2022 is measured on a ratio scale. The average of the five years was calculated in Excel for each state. Race and ethnicity are divided into six categories: White, Black, Hispanic, Asian/Native Hawaiian and Pacific Islander, American Indian/Alaska Native, and Multiple Races.

Q6) What is the correlation between the degree of strictness of gun laws at the state level and the prevalence of school shootings?

Dependent Variable. *The Number of School Shooting* incidents in each state during the last five years is measured on a ratio scale.

Independent Variables. The data on gun laws were rank-ordered per five possible options A (most favorable), B, C, D, and F (least favorable), based on the strictness of the laws. These rankings were coded as A = 1, B = 2, C=3, D=4, and F = 5.

Q7) What is the relationship between specific demographic variables at the state level and the likelihood of school shootings in 2017, 2018, 2019, 2021, and 2022?

Dependent Variable. *The Number of School Shooting* incidents at the state level in 2017, 2018, 2019, 2021, and 2022 is measured on a ratio scale.

Independent Variables

i) *Population Distribution by Age* is the age category from 2017 to 2022 (excluding 2020 because of COVID-19), that is, divided into five categories for each year: age 0-18, age 19-25, age 26-34, age 35-54, age 55-64 and age 65+. The variable is measured on a ratio scale.

ii) *Population Distribution by Race and Ethnicity is measured for five years, from* 2017 to 2022 (excluding 2020 because of COVID-19). Each year, it is divided into six categories: White, Black, Hispanic, Asian/Native Hawaiian and Pacific Islander, American Indian/Alaska Native, and Multiple Races. The variable is measured using a ratio scale.

iii) *Population Distribution of Children by Race/Ethnicity* is measured for five years, that is, 2017 to 2022 (excluding 2020 because of COVID-19), and it was divided

into six categories for each year: White, Black, Hispanic, Asian/Native Hawaiian and Pacific Islander, American Indian/Alaska Native, and Multiple Races. The variable is measured using a ratio scale.

Q8) How much does the accessibility to mental health services and the prevalence of mental illness at the state level affect the number of separate school shooting incidents?

Dependent Variable. *The Number of School Shooting* incidents at the state level in 2017, 2018, 2019, 2021, and 2022 is measured on a ratio scale.

Independent Variables

i) *Prevalence of Mental Illness* among adults is measured for five years, that is, 2017 to 2022 (excluding 2020 because of COVID-19), and each state has a percentage based on the number of adults who have any mental disorder that includes mental, behavioral, or emotional illnesses that can be identified. The variable is measured using a ratio scale.

ii) *Prevalence of Mental Illness* among youths is measured for five years, that is, 2017 to 2022 (excluding 2020 because of COVID-19), and each state has been given a percentage based on the number of youths with at least one major depressive episode (MDE) in the past year to determine out how common mental health problems are among youth. The variable is measured using a ratio scale.

iii) *Access to Mental Health Services* for youths with MDE is measured for five years, that is, from 2017 to 2022 (excluding 2020 because of COVID-19). This variable specifically looks into the percentage of youths who did not get

any mental health assistance (National Survey on Drug Use and Health, 2019). The variable is measured using a ratio scale.

Analyses

In this quantitative study, the role of school characteristics and their impact on the outcome of school shootings were examined using an independent *t*-test and One-way ANOVA:

Research Question 1 examined the relationship between the number of casualties in school shooting incidents and multiple school characteristics, including the Type of School, School Level, School Size, and Location of the Incident. Its Hypothesis 1A is that *there is a statistically significant relationship between the type of school (public or private) and the number of casualties in school shooting incidents.* An independent t-test was carried out. Given that the dependent variable was continuous and the independent variable was bivariate, it was optimal to do an independent t-test. The assumptions for the t-test were checked before running the analysis to make sure that the results were accurate. The assumptions included normality, homogeneity of variance, random sampling, and independence.

To examine HA2, which states that *there is a statistical significance between the level of school and the number of casualties in school shooting incidents,* a One-way ANOVA test was conducted. The normality and homogeneity of variance assumptions were assessed to determine the suitability of using a one-way ANOVA. The assumptions for One-way ANOVA were checked before running the analysis to make sure that the results were accurate. The assumptions included normality, equal variance, and independence.

To test the HA3 that *there is a statistical significance between the School Size and the number of Casualties in School Shooting Incidents*, a One-way ANOVA was used. The assumptions for One-way ANOVA were checked before running the analysis to make sure that the results were accurate. The assumptions included normality, equal variance, and independence.

To test HA4 that *there is a statistical significance between the type of locations in which the incident happens and the number of casualties in school shooting incidents*, a One-way ANOVA was used for the analysis. The assumptions for one-way ANOVA were checked before running the analysis to make sure that the results were accurate, including normality, equal variance, and independence.

Research Question 2: To what extent does the time of day, day of the week, and quarter of the year affect the number of school shooting causalities? Required a factorial ANOVA. A factorial ANOVA is used when there is more than one independent variable and only one dependent variable. The assumptions for Factorial ANOVA were checked before running the analysis to make sure that the results were accurate. The assumptions include the type of data required, normality, homoscedasticity, and no multicollinearity.

Research Question 3 was To what extent does the presence of a school resource officer in schools predict the number of school shooting casualties? Given that the dependent variable was continuous and the independent variable was bivariate, it was optimal to do an independent *t*-test. The assumptions for the t-test were checked before running the analysis to make sure that the results were accurate. The assumptions included normality, homogeneity of variance, random sampling, and independence.

Research Question 4 was To what extent does the type of school shootings predict the number of school shooting casualties? It required a One-way ANOVA. The assumptions for one-way ANOVA were checked before running the analysis to make sure that the results are accurate, including normality, equal variance, and independence.

Research Question 5 was What is the effect of the degree of strictness of gun laws at the state level and the prevalence of school shootings? This effect was assessed using a one-way ANOVA. The assumptions for one-way ANOVA were checked before running the analysis to make sure that the results would be accurate, including normality, equal variance, and independence.

Research Question 6 was: What is the relationship between demographic variables at the state level and the likelihood of school shootings in 2017, 2018, 2019, 2021, and 2022? Multiple regression analysis was used to answer this question. Multiple regression is used to estimate the relationship between two or more independent variables and one dependent variable. The assumptions for multiple regression were checked before running the analysis to make sure that the results were accurate. The assumptions included linear relationship, no multicollinearity, homoscedasticity, and multivariate normality.

Research Question 7 was The effect of state-level economic indicators, such as unemployment and poverty rates, on the number of school shooting incidents used state economic indicators for five years, 2017 to 2022 (excluding 2020, given the COVID-19 pandemic). A multiple regression analysis was performed to examine economic factors' effect on school shooting incidents frequency. The assumptions for multiple regression were checked before running the analysis to make sure that the results were accurate. The

assumptions included linear relationship, no multicollinearity, homoscedasticity, and multivariate normality.

Research Question 8 was The accessibility of mental health services, the prevalence of mental health at the state level, and the number of school shooting incidents in each state for five years, 2017 to 2022 (excluding 2020, given the COVID-19 pandemic). A multiple regression analysis was performed to examine the role of mental health services and the prevalence of mental health effects on school shooting incidents frequency. Multiple regression was used to understand the relationship between the number of school shooting incidents and mental health variables. The assumptions for multiple regression were checked before running the analysis to make sure that the results were accurate. The assumptions included linear relationship, no multicollinearity, homoscedasticity, and multivariate normality.

Chapter Summary

This chapter described the research design given the eight research questions. It offered a discussion of the five datasets that were merged for analyses and the operationalization of the study variables. The chapter ended with a description of the analytical approaches used to answer each research question.

CHAPTER IV

RESULTS

This study analyzed data from five sources: The Washington Post (WP), the K-12 School Shooting Data Base (K-12 SSDB), the Gifford's Law Center to Prevent Gun Violence Gun Law Database, the KFF Database and the State of Mental Health in America Report. Each data source was publicly available, and each contained a wide range of information on school shootings, demographic information on the offenders, school characteristics (Riedman 2022, Washington Post, 2023), and state-level data such as population distribution by age, sex, and race/ethnicity, poverty rate by race/ethnicity (KFF 2023). Washington Post (WP) and K-12 School Shooting Data Base (K-12 SSDB) focused on shooting incidents in school settings or school-related places. A total of 387 school shooting incidents were identified from the WP database and used in this study for analysis. Research questions on macro-level variables were measured for five years, that is, 2017, 2018, 2019, 2021, and 2022. The five-year average for each variable was used for the analysis. The data on gun violence was collected from the Gifford's Law Center to Prevent Gun Violence.

The dependent variable for this study was the number of casualties and total number of school shooting incidents in each state. The number of casualties was measured by adding the number of people who got injured and killed in each incident. The number of school shooting incidents was added for all states in the US for five years, 2017, 2018, 2019, 2021, and 2022, excluding 2020, given the COVID-19 pandemic. The independent variables for the study were school characteristics such as school type and school size, location in which the incident took place, school level, poverty rate,

population, unemployment, gun law ranking, the timing of the incidents, which included the time of the day that the incident occurred and, which day of the week, and quarter of the year.

Descriptive Statistics

Casualties

Understanding the degrees and distribution of casualties is important in understanding the gravity and consequences of school shootings. Casualty includes both the number of individuals who were injured as well as who were killed during the incidents. The mean value of causality was 1.62, indicating approximately 1.62 casualties per school shooting incident (Table 1). The standard deviation of 3.84 showed that the number of casualties varied widely. The distribution skewness was more toward the right, which showed that there were relatively few school shooting incidents with a high number of casualties. The frequency gave an idea of how many casualties per incident. The numbers showed that the most common number of casualties was 1 in 178 school shooting incidents all across the US. This amounted to 46% of total school shooting incidents. This was followed by zero casualties in 32% of incidents or 124 incidents of school shootings. Ninety-six percent of casualties were between 0 and 6 persons harmed or killed.

Table 1

Descriptive Statistics of Casualties

	N	Minimum	Maximum	Mean	Std. Deviation
Casualties	387	0	34	1.62	3.848

School Characteristics - Location

The descriptive statistics for school characteristics gave a better understanding of the distribution of each variable, including the location of the school where the incident occurred. The mean value of incidents per location was 1.63, indicating that more incidents happened in one area compared to other locations. The frequency of incidents in each location showed that indoor and outdoor locations had similar frequency; indoor locations, including classrooms, gym, and hallway, had 182 incidents out of 387, and outdoor locations, such as the front of the school and parking lot, had 187 incidents from 387 school shooting incidents. These two accounted for 95% of the total location.

Regarding frequency in specific locations, the highest number of shootings took place in a parking lot, with 71 incidents, and in classrooms and hallways, with 57 and 52 incidents each. Another location in which a significant number of incidents took place was in front of the school, with 41 reported incidents. On the other hand, locations like bathrooms, courtyards, or office areas had the lowest number of incidents recorded (see Table 2). Overall, these data indicate which locations should be monitored carefully to prevent school shootings and ensure the well-being of students and staff.

Table 2

Descriptive Statistics of Location Type

Location Type	Frequency	Percent
Indoor Location	182	47.0
Outdoor Location	187	48.3
Mixed Locations (Indoor/Outdoor)	4	1.0

Others	7	1.8
Unknown	7	1.8
Total	387	100.0

School Characteristics – School Size

School size is another school-level characteristic used to understand different aspects of school shooting incidents. From 387 schools, the mean school size was 3.13, which indicated larger schools had more incidents compared to smaller schools (Table 3). In total, 138 incidents occurred in large schools, which had around 900 to 1999 students in each school.

Table 3

Descriptive Statistics of School Size

School Size	Frequency	Percent
Very Small (< 300 students)	59	15.2
Small (300-599 students)	75	19.4
Medium (600-899 students)	63	16.3
Large (900-1,999 students)	138	35.7
Very Large (2,000 or more students)	52	13.4
Total	387	100.0

School Characteristics – School Type

There were approximately 98,577 public schools and 30,492 private schools in the United States (NCES, 2022). Three hundred and sixty-three school shootings occurred in public schools (94%), compared to 24 school shooting incidents in private schools (6%) (Table 4). Thus, public schools were especially vulnerable to school shootings.

Table 4

Descriptive Statistics of School Type

School Types	Frequency	Percent
Public Schools	363	93.8
Private Schools	24	6.2
Total	387	100.0

School Characteristics – School Level

Typically, middle school students display more social and disciplinary issues than those in earlier grade levels. With more varied and challenging classes as well as new peer dominance orders, students have more potential for conflict and confusion (Burr, 2024). Understanding the level of schools that are more vulnerable to school violence is important for policymakers and other officials in adopting prevention strategies. The descriptive statistics showed that most incidents occurred in high schools, accounting for 69% of incidents. Other school levels, such as elementary and middle schools, had around 15% each of school shootings. Table 5 illustrates the need for attention to high school gun violence compared to other levels of schools.

Table 5

Descriptive Statistics of School-Level

School level	Frequency	Percent
Elementary	55	14.2
Middle School, K-8, Junior High	58	15.0
High School, K-12	265	68.5
Others	6	1.6
Unknown	3	.8
Total	*387*	*100.0*

Temporal Pattern – Day

The timing of the incident is another important variable used in the study. The day of the week the incident occurred and its frequency can provide valuable insights for policymakers and other stakeholders to implement more targeted interventions. The descriptive analysis showed that the mean value for days was 2.81. All incidents happened during the five working days, with the first three days having a similar number of shooting incidents, 85 incidents on Mondays, 91 on Tuesdays, and 82 on Wednesdays. The first three days accounted for around 66% of school shootings. Compared to the first three days, Thursday and Friday had fewer incidents, that is, 67 and 62.

Table 6

Descriptive Statistics of Temporal Pattern – Day

Day	Frequency	Percent
Monday	85	22.0
Tuesday	91	23.5
Wednesday	82	21.2
Thursday	67	17.3
Friday	62	16.0
Total	387	100.0

Temporal Pattern – Quarter

Similar to the day in which the school shootings occurred, it is important to know the frequency of incidents in each quarter of the year. This is toward understanding when persons are more vulnerable to school shootings. The four quarters are summer, fall, spring, and winter. The descriptive statistics showed the mean for quarters was 2.88. The mean suggested that the number of school shooting incidents was evenly distributed, slightly skewed toward the later part of the quarters. The frequency also showed that the incidents were evenly distributed in most of the quartile, with no single quarter dominating. Except for summer, when most schools are closed, all other quartiles showed similar incidents. Winter had the highest number of school shooting incidents, with 126 cases, and summer the least, with 27 incidents or 7% of the total number of school shooting incidents (Table 7).

Table 7

Descriptive Statistics of Temporal Pattern – Quarter

Quarter	Frequency	Percent
Summer	27	7.0
Fall	118	30.5
Spring	116	30.0
Winter	126	32.6
Total	387	100.0

Temporal Pattern – Time of the Day

The timing of the incidents was another key variable in the study. It was expected to provide a pattern of the time of the school day that incidents tended to occur. This can be useful in identifying temporal patterns and implementing strategies that can help prevent school violence. The mean value for the time variable was 1.72. This showed that the number of school shooting incidents was more likely to happen in the morning hours, followed by the afternoon hours. The frequency distribution (see Table 8) showed that the majority of school shooting incidents occurred during morning hours, which was between 6 am and 12 pm. A total of 174 incidents occurred, accounting for 45% of total school shooting incidents, which might suggest that the shooter came to school with negative intentions that morning. The afternoon hours also showed a significant number of school shooting incidents, 126 cases.

Table 8

Descriptive Statistics of Temporal Pattern – Time

Time		Frequency	Percent
Morning:	6:00 am to 12:00 pm.	174	45.0
Afternoon:	12:00 pm to 5:00 pm.	126	32.6
Evening:	5:00 pm to 10:00 pm.	68	17.6
Night:	10:00 pm to 6:00 am	8	2.1
Unknown		10	2.6
Total		387	100

School Resource Officers (SROs)

School Resource Officers (SROs) are more often utilized in educational institutions to promptly address school violence and effectively manage safety concerns among students and staff (Eklund et al., 2017). There are significant ramifications for students when sworn police officers are included in a school's routine behavioral management processes. Students attending schools with a School Resource Officer (SRO) are five times more prone to being arrested for disorderly conduct (Bleakley & Bleakley, 2018). Understanding the impact of School Resource Officers in school shooting incidents is important. The mean value of .27 showed that SROs were absent in most schools where the incident occurred. The frequency distribution showed that in 282 school shooting incidents, that is, 73% of schools that reported school shooting incidents there were no School Resource Officers (see Table 9).

Table 9

Descriptive Statistics of School Resource Officer

Presence of SROs	Frequency	Percent
No	282	72.9
Yes	105	27.1
Total	387	100.0

Type of School Shooting

The descriptive statistics for school shooting type render insights into these incidents. The type of school shooting was categorized based on the kind of target involved in each incident. One category was victims targeted, in which the offender knew whom the offender was targeting. This group had 210, accounting for 54% of the total school shooting incidents. The second group was random shootings, in which the offender randomly shot persons without specific pre-meditated targets. There were 78, or 20% of the total school shooting incidents. The third group was both types, in which the offender shot targeted victims as well as randomly shot victims. This was 48 incidents, or 12% of school shootings. The last two groups were Neither or NA, in which the offender shooting was neither targeted nor random, or NA, that is, Not Available. A total of 51 incidents (13%) were neither targeted nor random or NA.

Table 10

Descriptive Statistics of Type of School Shootings

Types of school shootings	Frequency	Percent
Victim Targeted	210	54.3
Random Shooting	78	20.2
Both	48	12.4
Neither	38	9.8
NA	13	3.4
Total	387	100.0

Number of School Shootings by State

This study looked at macro-level and micro-level variables to understand school shooting incidents, given variables such as poverty and unemployment at the state level. This required examining school shooting incidents at the state level as well. The interest was in understanding patterns according to regional trends and dynamics, as some states may experience more school shootings compared to others.

Through understanding these regional variations, law enforcement and policymakers may effectively strategize to reduce school shootings. Examining school shooting incidents for each state for five years, that is 2017, 2018, 2019, 2021, 2022, the average number of incidents was 3.12 for five years. This suggested that around 3.12 incidents occurred in each state during the five years, but it is important to note that some states had zero incidents, and some had a high number of incidents. It is crucial to

acknowledge that the mean measures central tendency but may not accurately represent the distribution of incidents, particularly when certain states had no incidents.

Table 11 provides information about the number of incidents at the state level. A total of 159 school shooting incidents occurred in the US during the five-year period under study. Twenty-four percent of states reported no school shooting incidents in those five years. In 20% of states, for example, South Dakota, Utah, and Maine, there was one reported incident in the five years, while states like Florida, Michigan, and New York reported more than five incidents. North Carolina and Illinois reported nine incidents, and California reported 15, which was the highest among all states in these five years. To some extent, these numbers reflect differences in state population numbers.

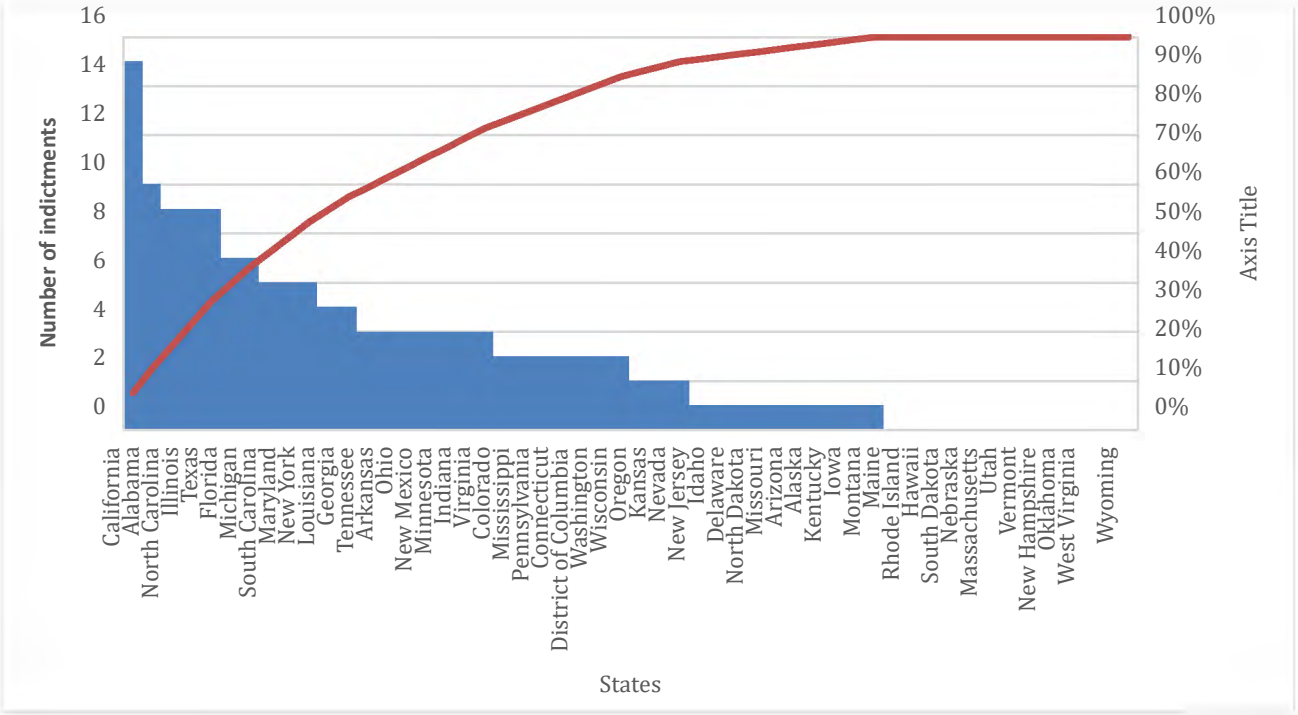
Table 11

Descriptive Statistics of the Number of Incidents in State Level

No. of Incidents	Frequency	Percent
0	12	23.5
1	10	19.6
2	3	5.9
3	7	13.7
4	7	13.7
5	2	3.9
6	3	5.9
7	2	3.9
9	3	5.9
10	1	2.0
15	1	2.0
Total	51	100.0

Figure 2

Number of School Shooting Incidents in State-Level for Five Years (2017, 2018, 2019, 2021, 2022)



Socioeconomic Factors

Studying macro-level indicators over five years can provide a comprehensive understanding of school shooting incidents. Socioeconomic indicators such as the unemployment rate and poverty rate for each state were used to understand their relation with school shooting incidents by state. The descriptive statistics showed that the average unemployment rate ranged from 3% to 6%, with a mean rate of 4.14 and comparatively low standard deviations. Similarly, the average poverty rate ranged from 7% to 20%, with an average rate of 12% and a standard deviation of 2.8. The poverty rate was further broken down based on age groups and race. Poverty was most affected by the age group

of 0 to 18 with an average of 16%, followed by adults, that is, between the age group of 19 to 64 with 12%. The poverty rates varied significantly while looking at different race groups. Blacks, with an average of 20%, and Hispanics, with an average of 19% of the population, experienced higher rates of poverty compared to other groups such as Whites and Asians.

Table 12

Descriptive Statistics of Socioeconomic Indicators

Socioeconomic Indicators (5year average)	Minimum	Maximum	Mean	Std. Deviation
Unemployment	3	6	4.14	.958
Poverty	7%	20%	12.61%	2.793%
Poverty Average Age 0-18	9%	27%	16.35%	4.467%
Poverty Average Age 19-64	7%	18%	12.08%	2.513%
Poverty Average Age 65+	6%	15%	9.45%	1.836%
White Poverty Average	6%	17%	9.55%	2.292%
Black Poverty Average	0%	34%	19.84%	8.427%
Hispanic Poverty Average	9%	28%	18.18%	4.524%
Asian/Native Hawaiian And Pacific Islander Poverty Average	0%	16%	9.76%	4.097%
American Indian/Alaska Native Poverty Average	0%	47%	17.96%	9.853%
Multiple Races' Poverty Average	4%	29%	15.04%	4.903%

State Gun Laws

Gun laws are an important study variable and a major topic when it comes to gun violence. About six in 10 US adults (58%) favor stricter gun laws. Another 26% say that US gun laws are about right, and 15% favor less strict gun laws (Schaeffer, 2023). In this study, the data on gun laws were graded by the Giffords Law Center into one of five categories, A, B, C, D, and F, based on the strictness of the laws. Grade A indicated the strictest laws and Grade F indicated the least strict laws. These grades were given to each state based on the availability of different laws and gun-related violence. The descriptive statistics showed that 16% of states, that is, eight states, had A grades, which means that these states had stricter laws than other states. These states included California, Hawaii, Illinois, Maryland, and New York. Forty-four percent of states had weak gun laws, which amounted to 22 states. States such as Alabama, Texas, and Georgia were graded as the least strict states on gun laws.

Table 13

Descriptive Statistics of State Gun Law Grades

Gun Law Grades	Frequency	Percent
A	8	16.0
B	3	6.0
C	10	20.0
D	7	14.0
F	22	44.0
Total	50	100.0

Demographic Variables

Examining demographic data can greatly enhance the understanding of shooting participants and circumstances. Hence, this study considered the state population by age groups, races, and races of children, given the school focus. This revealed that 23% of the population was between the age group of 0 to 18. The age group 35 to 54 had the highest mean percentage of 25%, and the age 19 to 25 had the lowest mean percentage from the population. The descriptive statistics on racial distribution showed Whites as the dominant US race with a mean percent 67% with a standard deviation of 16%; Hispanics were second with a mean percentage of 12%. The lowest mean percentage was among American Indians, Asians, and Native Hawaiians, which, in total, was 7%. Children's race showed similar patterns, with a mean percentage of 58% for Whites, 18% for Hispanics, and 12% for Blacks (see Table 14).

Table 14

Descriptive Statistics of Demographic Variables

Demographic Variables (5year average)	Minimum	Maximum	Mean	Std. Deviation
Population by Age 0 to 18	19%	31%	23.53%	2.157%
Population by Age 19 to 25	7%	11%	8.69%	0.678%
Population by Age 26 to 34	10%	21%	12.25%	1.521%
Population by Age 35 to 54	23%	27%	25.31%	0.990%
Population by Age 55 to 64	10%	16%	13.37%	1.216%
Population by Age 66 and above	11%	21%	16.90%	2.013%
Race White	20%	92%	66.96%	16.308%

Race Black	0%	44%	10.71%	10.370%
Race Hispanic	2%	50%	12.35%	10.533%
Race Asian	1%	38%	4.35%	5.581%
Race American Indian	0%	14%	1.22%	2.752%
Race NativeHawai	0%	10%	0.29%	1.432%
Race Multi	2%	21%	4.02%	2.709%
Race White child	13%	88%	57.55%	17.841%
Race Black child	0%	52%	12.00%	11.756%
Race Hispanic child	2%	61%	17.78%	13.229%
Race Asian Native child	0%	35%	3.92%	5.130%
Race American Indian child	0%	18%	1.69%	3.690%
Race Multiple child	3%	32%	6.98%	4.067%

Mental Health

Analyzing mental health issues may provide a more comprehensive understanding of the underlying causes of school violence. The descriptive data indicated that the lowest percentage of individuals who encountered mental, behavioral, or emotional illnesses was 16%, while the maximum was 23% during a span of five years. States such as Texas, New Jersey, and Maryland reported the lowest prevalence of mental illnesses among adults, in contrast to states like Oregon and Utah, where the percentage of individuals reporting mental health difficulties was 23%. Regarding youth prevalence, states such as New Jersey, Georgia, and Louisiana reported the lowest percentage of youths who had at least one major depressive episode (MDE) in the last year, with an average percentage of

10%. In contrast, states like Oregon, Idaho, and Indiana recorded a prevalence rate of about 15%. Access to mental health services for youths was also measured, and the data showed that states like Maine, with a rate of 45%, and Connecticut, with a rate of 49%, had some of the lowest percentages of students who did not receive access to mental health services. In contrast, states like Texas had a much higher rate, with approximately three-quarters of youths with major mental health issues not receiving any services.

Table 15

Descriptive Statistics of Mental Health Variables

Mental Health Variables	Minimum	Maximum	Mean	Std. Deviation
Average adult prevalence	16%	23%	19.26	1.601
Average youth prevalence	10%	16%	12.91	1.160
Avg Acces to MH Youth	45%	70%	60.07	5.559

School Shootings and Micro-level Variables

Research Question 1

Research Question 1 was: To what extent are school characteristics related to the number of school shooting casualties? This examined the relationship between school shooting incidents and school characteristics such as school type, school level, enrollment/school size, and location of the incident. Four research hypotheses under the research question demonstrated that school characteristics had an impact on school shooting incidents in the US. Given that the dependent variable, school shooting casualties, was positively skewed, the distribution was skewed toward the higher values. This skewness can violate the assumption of normality required by independent *t*-tests.

To address this issue, a log transformation was done to make the distribution somewhat normal. Through this, the assumptions for the independent *t*-test were met.

To test HA1 that there was a significant relationship between the school type (public schools and private schools) and the number of casualties in school shooting incidents, an independent t-test was performed. Given that the dependent variable was continuous and the independent variable had two groups, it was ideal to use an independent t-test. The mean value of casualty for public schools (M = 0.286) and private schools (M = 0.267) indicated a slightly higher number of casualties for public schools than private schools. Levene's *F* test, $F = .97$, $p = .325$, showed that the assumption of equal variance was not violated, which allowed for the interpretation of results from the t-test. The t-test for Equality of Means, $t = 0.32$, $p = 0.743$, showed there was little difference in the mean number. This means that the difference between public and private school casualties was insignificant.

To test the HA2 that there was a significant relationship between the school level and the number of casualties in school shooting incidents, a one-way ANOVA was used. The assumptions of normality and homogeneity of variance were checked to see whether the one-way ANOVA could be used. The independent variable had five groups; the dependent variable was continuous and normally distributed. The tests of homogeneity of variance show the results of Levene's test that variances of casualties are equal in different levels of schooling. The p-value in Levene's test was greater than 0.05, which indicated no significant difference in variance. Therefore, the assumption of homogeneity of variance was met. Table 15 provides the output on whether there was any statistical relation between the means of the number of casualties across different levels of schools.

The F-statistics showed that the p-value is 0.518. Since the significance is below the level of 0.05 and the p-value in this analysis is greater than the significance level, there was no significant difference in the means of casualties across the school levels.

Table 16

ANOVA for the Relationship between School Level and Number of Casualties

Casualties	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.248	4	.062	.811	.518
Within Groups	29.208	382	.076		
Total	29.456	386			

To test HA3 that there was a significant relationship between the school size and the number of casualties in school shooting incidents, a one-way ANOVA was used. The assumptions of normality and homogeneity of variance were checked to see if the one-way ANOVA could be used. The independent variable had five groups; the dependent variable was continuous and normally distributed. The tests of homogeneity of variance showed the results of Levene's test that variances of casualties were equal in different school sizes. The p-value was greater than 0.05, which indicated that there was no significant difference in variance. Therefore, the assumption of homogeneity of variance was met. Table 16 provides the output on whether there was any statistical relation between the means of the number of casualties across different levels of schools. The F-statistics showed that the p-value was 0.399. Given that the p-value was greater than the significance level, it indicated that there was no significant difference in the means of school shooting casualties across the different school size categories.

Table 17

ANOVA for the Relationship between School Size and Number of Casualties in School Shooting Incidents

Casualties	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.310	4	.077	1.015	.399
Within Groups	29.147	382	.076		
Total	29.456	386			

To test Ha4 that there was a significant relationship between the type of locations in which the incident happened and the number of casualties in school shooting incidents, a one-way ANOVA was used. The independent variable had five groups; the dependent variable was continuous and normally distributed. The assumptions of normality and homogeneity of variance were checked to see if the one-way ANOVA could be used. The tests of homogeneity of variance showed the results of Levene's test that variances of casualties were equal for different school sizes. The p-values had a mean value of 0.006, median value of 0.009, and median with adjusted df - 0.010 in the Levene's test was statistically significant, indicating that assumptions of homogeneity of variance were violated. Thus, an alternative approach, Welch's ANOVA, was used. It does not assume equal variances across the locations (Tomarken & Serlin, 1986). The results from Welch's ANOVA using the Games-Howell method indicated a statistical significance ($p = 0.002$) (see Table 17). This showed a significant difference in the mean number of

school shooting casualties among different locations in which the school shootings took place. The post hoc test, Games-Howell, compared the mean differences between the groups. The results indicated that casualties between indoor and outdoor locations had significant mean differences ($p = 0.008$), as indoor locations had more casualties than outdoor locations.

Table 18

ANOVA for the Relationship between Type of Location and Number of Casualties in School Shooting Incidents

Casualties	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.321	4	.330	4.484	.001
Within Groups	28.135	382	.074		
Total	29.456	386			

Table 19

Robust Tests of Equality of Means (Welch-ANOVA)

	Statistic[a]	df1	df2	Sig.
Welch	8.106	4	12.514	.002

Research Question 2

Research Question 2: To what extent does the time of day, day of the week, and quarter of the year affect the number of school shooting causalities? To answer the research question, the researcher examined the relationship between school shooting casualties and time variables such as Day, Time, and Quarters. Day was which day of the week the school shooting occurred, the time of the incident indicated what time during

the school day. Quarter refers to the academic quarter of the school year in which the incident occurred.

A factorial ANOVA was used to analyze this research question. A factorial ANOVA is used when there is more than one independent variable and only one dependent variable. The assumption is unimportant for minor violations, and equal variance is required for all groups. The Levene's test was conducted to check for homogeneity of variance. The result showed no significant difference in variance across the groups, which indicated that variances were homogeneous. The factorial ANOVA was performed to examine the effects of time, day, and quarter of the incidents on the number of casualties in school shootings. The findings showed that none of the independent variables, such as Day ($F(4,316) = .976$, $p = .421$), Time ($F(4,316) = .095$, $p = .984$), and the Quarter ($F(3,316) = 1.563$, $p = .198$) in which the incidents occurred had any statistical effect on the dependent variable, that is, casualties. These findings from the analysis suggest that neither Time, Day, nor Quarter has significantly predicted the number of casualties in school shooting incidents (see Table 19).

Table 20

Factorial ANOVA Results for Predicting School Shooting Casualties Based on Time, Day, and Quarter of Incident.

Source	*SS*	*df*	*MS*	*F*	*p*
Day	3.256	4	0.814	0.976	0.421
Quarter	3.911	3	1.304	1.563	0.198
Time of Incident	0.316	4	0.079	0.095	0.984
Day * Quarter	8.564	12	0.714	0.855	0.593

Day * Time of Incident	9.425	14	0.673	0.807	0.662
Quarter * Time of Incident	5.502	10	0.550	0.659	0.762
Day * Quarter * Time	14.148	22	0.643	0.771	0.761
Error	263.648	316	0.834		
Total	628.000				

Research Question 3

Research Question 3 was To what extent does the presence of a school resource officer in schools predict the number of school shooting casualties? The assumptions of normality and homogeneity of variance were checked to see if the independent *t*-test could be used for this research question. Levene's Test for Equality of Variance ($F(15,874) = 0.957$, $p = .329$) indicated that the assumption of equal variances between the two groups was met. The results from the independent sample *t*-test show a significant difference in the mean number of casualties between the presence of a school resource officer and the absence of a school resource officer. School shooting incidents with a higher mean number of casualties had the presence of SROs compared to incidents without SROs (with SROs M = 2.50 and without SROs M = 1.30). The analysis revealed a statistical significance with a *t*-value of -2.745 and a p-value of .003 when assuming equal variance and with a *t*-value of -2.100 and a p-value of .038 when not assuming equal variance. The findings suggested that the presence of SROs may be associated with higher casualties in school shooting incidents. A likely explanation is that more troubled schools, ones with more disciplinary issues, were more likely to have SROs.

Table 21

T-test Results for School Shooting Casualties With and Without School Resource Officers

	t-value	*df*	*p-value*
Equal variances assumed	-2.745	385	.006
Equal variances not assumed	-2.100	125.827	.038

Research Question 4

For Research Question 4, To what extent does the type of school shootings predict the number of school shooting casualties? The assumptions of normality and homogeneity of variance were checked to see if a one-way ANOVA would be appropriate. The independent variable had five groups, and the dependent variable was continuous and normally distributed. The tests of homogeneity of variance showed significant differences in variances across groups. Therefore, the assumption of homogeneity of variance was violated. Welch's ANOVA addressed this violation, allowing unequal variance across groups. The ANOVA results showed that there was a statistically significant difference in the number of casualties across the independent variable, that is, types of school shootings ($F(4,382) = 12.107$, $p = <.001$). Results from Welch's ANOVA confirmed the significant difference (Welch's $F(4,69.276) = 14.449$, $p <. 001$). A post-hoc test was done to understand which particular groups were significantly different from each other. Tukey's honesty significant difference (HSD) was

used in a post-hoc test, and the results indicated that there was a significant mean difference between Victim Targeted and Random Shooting (p <.001), Victim Targeted, and Both (p <.001), Random Shooting and Neither (p <.001), Random Shooting and NA (p = .021), Both and Neither (p = .002), Both and NA (p = .055), and Neither and NA (p = 1.00). These outcomes indicated that Random Shootings and Both categories had more casualties than Victims Targeted.

Table 22

ANOVA for the Relationship between Target Category and Number of Casualties in School Shooting Incidents

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	642.996	4	160.749	12.107	<.001
Within Groups	5071.924	382	13.277		
Total	5714.920	386			

Table 23

Robust Tests of Equality of Means (Welch- ANOVA)

	Statistics	df1	df2	Sig.
Welch	14.449	4	69.276	<.001

Table 24

Post Hoc Tests

Comparison	Mean Difference (I-J)	Std. Error	Sig.	95% CI Lower	95% CI Higher
Victim Targeted vs Random Shooting	-2.718*	.483	<.001	-4.04	-1.39
Victim Targeted vs. Both	-2.479*	.583	<.001	-4.08	-.88
Victim Targeted vs. Neither	.465	.642	.951	-1.30	2.23
Victim Targeted vs. NA	.603	1.041	.978	-2.25	3.46
Random Shooting vs Victim Targeted	2.718*	.483	<.001	1.39	4.04
Random Shooting vs Both	.239	.668	.997	-1.59	2.07
Random Shooting vs Neither	3.183*	.721	<.001	1.21	5.16
Random Shooting vs. NA	3.321*	1.092	.021	.33	6.31
Both vs. Victim Targeted	2.479*	.583	<.001	.88	4.08
Both vs. Random Shooting	-.239	.668	.997	-2.07	1.59
Both vs. Nither	2.944*	.791	.002	.78	5.11
Both vs. NA	3.082	1.139	.055	-.04	6.20
Neither vs. Victim Targeted	-.465	.642	.951	-2.23	1.30
Neither vs. Random Shooting	-3.183*	.721	<.001	-5.16	-1.21
Neither vs. Both	-2.944*	.791	.002	-5.11	-.78
Neither vs. NA	.138	1.171	1.000	-3.07	3.35

Table 24 Continued

NA vs. Victim Targeted	-.603	1.041	.978	-3.46	2.25
NA vs. Random Shooting	-3.321*	1.092	.021	-6.31	-.33
NA vs. Both	-3.082	1.139	.055	-6.20	.04
NA vs. Neither	-.138	1.171	1.000	-3.35	3.07

Research Question 5

Research Question 5: What is the effect of the degree of strictness of gun laws at the state level and the prevalence of school shootings? examined the relationship between the number of school shootings in each state and the strictness of gun laws in each state. The effect was measured using a one-way ANOVA. The assumptions of normality and homogeneity of variance were checked to see if the one-way ANOVA could be used. The Levene's was conducted to see if the variance of school shooting incidents by state was equal across the groups. The test indicated that the p-values were greater than 0.05, which means that there was no statistical significance, and this indicated that assumptions of homogeneity of variance were not violated. The one-way ANOVA was conducted to see if there was any effect on the number of incidents in each state due to the strictness of gun laws. The results showed that the p-value was 0.270, more than the significant level of 0.05. Hence, the conclusion was that there were no statistically significant differences in the mean number of incidents across the categories of strictness.

Table 25

ANOVA for the Relationship Between the Degree of Strictness of Gun Laws and Prevalence of School Shootings

Gun Laws	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	55.912	4	13.978	1.340	.270
Within Groups	469.368	45	10.430		
Total	525.280	49			

Research Question 6

Research Question 6: What is the relationship between demographic variables at the state level and the likelihood of school shootings for five years? (excluding 2020, given the pandemic) was answered using multiple regression. The adjusted R^2-square value 0.283 indicated that 28% of the variance in school shooting incidents in each state could be accounted for by the independent variables in the model, a moderate level of predictability. The ANOVA results revealed a statistical significance in the regression model ($F(19,31) = 2.037$, $p = 0.038$). This showed that independent variables collectively affected the dependent variables. The results of the multiple regression revealed that age groups of the population or different race demographics had no statistical significance with the number of school shootings in each state. The coefficient for race, such as Blacks ($p = 0.662$) and Hispanics ($p = 0.646$), suggested a positive relation with the number of incidents, but none of these were statistically significant at the 0.05 alpha level.

Research Question 7

Research Question 7: What is the effect of state-level economic indicators, such as unemployment and poverty rates, on the number of school shooting incidents? This was answered with five years of data, 2017 to 2022, excluding 2020 given the pandemic. A multiple regression was conducted to understand the effect of economic indicators on the number of school shooting incidents. The model summary showed that the overall model was statistically significant $F(11,39) = 2.556$, $p = 0.015$), proving that economic variables collectively predicted the number of school shooting incidents. The coefficients Table indicated that more incidents tended to happen in states where the average percentage of poverty among the age group of 0-18 increased. Hence, it was proven that there was a positive and statistically significant coefficient ($B = 1.026$, $p = 0.034$).

Similarly, as Table 26 indicates, fewer incidents happened in states where the average percentage of poverty among the age group of 19- 64 increased. Hence, there was a negative and statistically significant coefficient ($B = -2.447$, $p = 0.009$). However, other economic indicators, such as unemployment or poverty in general and poverty by different age groups or races, showed no statistical significance in the number of incidents in each state. These findings did not support Pah et al. (2017) who found a positive relationship between economic adversity and increased gun violence.

Table 26

Results of Regression Analysis Examining the Effect of State-Level Economic Indicators on School Shootings

Independent Variables	B	Std. Error	Beta	t	Sig.
Unemployement_Iv1	-.026	.455	-.008	-.057	.955
5 Year-Average Poverty	.488	1.090	.421	.448	.657
Children 0-18 5yr Avg	1.026	.466	1.414	2.203	.034**
Adults 19-64 5yr Avg	-2.447	.894	-1.897	-2.738	.009*
65+ 5yr Avg	.374	.481	.212	.777	.442
White	.167	.405	.118	.412	.682
Black	.164	.100	.426	1.638	.110
Hispanic	.018	.143	.024	.122	.903
Asian/Native Hawaiian and Pacific Islander	-.317	.188	-.400	-1.681	.101
American Indian/Alaska Native	.068	.048	.206	1.397	.170
Multiple Races	-.053	.189	-.080	-.281	.780

Dependent Variable: Number of Incidents
Note. SE = Standard Error; B = Unstandardized Coefficient; Beta = Standardized Coefficient.
*p < .05. **p < .01.

Research Question 8

Research Question 8: How much does the accessibility of mental health services and the prevalence of mental illness at the state level affect the number of separate school shooting incidents? Using five years data, 2017 to 2022, excluding 2020 given the pandemic, a multiple regression was conducted to understand the effect of mental health variables on the number of school shooting incidents in each state. The model summary showed that the overall model was statistically significant $F = 4.814$, $p = 0.005$, proving that mental health variables collectively predicted the number of school shooting incidents. The coefficients Table indicates that there was a statistically significant relationship between the prevalence of mental illnesses among adults and the number of school shooting incidents. The coefficient (B) is -0.688, and the p-value is 0.035. This suggested that there was a negative association between the percentage of adults experiencing mental illness and the occurrence of school shootings. In other words, states with a higher percentage of adults with mental health difficulties were likely to have fewer incidences of school shootings. However, the prevalence of mental health issues among youths did not show statistical significance, suggesting that there is no relationship between the prevalence of mental health issues among youths and school shooting incidents. However, there was a statistically significant relationship between the access to mental health services for youths in each state and the frequency of school shootings ($B = 0.188$, $p = 0.020$). This implied that states with limited access to mental health services for youths were likely to have a higher frequency of school shooting occurrences.

Table 27

Results of Regression Analysis of the Effect of Mental Health Variables on School Shootings

Independent Variables	B	Std. Error	Beta	t	Sig.
Average adults prevalence	-.688	.316	-.340	-2.175	.035*
Average youth prevalence	.179	.447	.064	.401	.691
Avg Acces to MH Youth	.188	.078	.323	2.405	.020*

Dependent Variable: Number of Incidents, Note. SE = Standard Error; B = Unstandardized Coefficient; Beta = Standardized Coefficient. *p < .05.

Overall, the findings showed that public schools had more school shooting incidents and larger schools had more incidents compared to small schools like middle schools or elementary schools. These findings were not statistically significant when measured with the number of casualties. However, the location of the incident was statistically significant. Indoor locations like classrooms, gyms, and cafeterias had more chances of having more casualties compared to outdoor locations. In addition, the presence of School Resource Officers was related to more casualties, which could mean that more dangerous schools were more likely to have these officers and, or there is a need to examine SRO effectiveness, including who these persons are and their readiness for active shooter emergencies. At the macro level, state law, demographics, that is, the distribution of age or racial composition, and socio-economics were examined as these were often linked with gun violence; nevertheless, this study did not find any statistical significance with school shooting incidents at the state level using five years of data in

different states for five years. This supports the current literature, which indicates that a focus on the shooters and access to firearms are likely to be the most effective direction in strategizing to reduce school shooting harm (Turanovic & Siennick, 2022).

Chapter Summary

Utilizing descriptive statistics, t-tests, ANOVA, *post hoc* tests, and regression analyses, patterns were identified in the data, but most of the variables were not significant predictors of school shootings with casualties. Regarding the micro variables, large public high schools, especially ones with SROs were the most dangerous schools. Shootings were more common during the first half of the day, plus the first half of the week, and during the cooler months of the year. Lesser monitored places in the school were also the more vulnerable spaces. Regarding the macro variables, significant youth poverty in a state and inadequate access to youth mental health treatments presented heightened school casualty risks from gun violence.

CHAPTER V

DISCUSSION

The ramifications of gun violence in the United States go beyond the physical harm inflicted on individuals who are injured or lose their lives. Families, communities, and people who have indirectly encountered gun violence are also survivors. According to a survey, 59% of Americans experienced gun violence themselves or know someone close to them who has (Gun Violence Survivors in America, 2023). Approximately 42% of persons in the United States possess at least one firearm (The Statistics Portal, 2023).

When contemplating strategies to avoid future violence in schools and the policies that promote preventive measures, it is essential to understand the role of both macro-level and micro-level variables regarding school shootings. This study was an effort to describe the impact of micro-level elements such as the features of the school, the presence of the school resource officer, and the timing of the occurrences to the number of casualties. In a similar vein, it was equally important to consider macro-level influences such as state economics, demographics, and state gun regulations concerning the number of school shooting occurrences over the past five years.

Review of Study Findings

Regarding micro-level school characteristics such as locations where school violence occurs, school type, school size, and school students, the parents, school administrators, law enforcement agencies, and policymakers must understand them to make well-informed decisions. Every year, substantial money is allocated to fund programs and infrastructure to ensure school safety. By comprehending the school

attributes that are associated with school shootings, these funds may be allocated more efficiently and strategically based on specific needs and requirements (BJS, 2008).

School Type

Crime is prevalent in public and private schools. however, public schools have been seen a lot more crimes than public schools in past many decades. (U.S. Department of Education, 1997). Studies have shown that the proportion of students who indicated avoiding one or more locations in school due to fear of assault or harm was greater among public school students compared to private school students, five percent versus two percent (National Center for Education Statistics, 2022). The prevalence of children in grades 6-12 who were aware of, witnessed, or concerned about being subjected to bullying, physical assault, or robbery was significantly higher at both public schools that were assigned to them and public schools that they picked, compared to private schools. Furthermore, children attending designated public schools were more prone to directly experiencing victimization compared to those in private schools (U.S. Department of Education, 1997). The current study classified school types as private or public.

The results from the analysis showed that from 2017-2022, excluding 2020, a total of 363 school shooting incidents occurred in public schools, that is 94%, compared to 24 school shooting incidents in private schools, which is 6%. This indicated that public schools were more vulnerable to school shootings compared to private schools. The mean value of causalities for public schools ($M = 0.286$) and private schools ($M = 0.267$) indicated a slightly higher number of casualties for public schools than private schools. However, by conducting a t-test, the Equality of Means, $t = 0.32$, $p = 0.743$, showed that from 2017-2022, excluding 2020, there was not much difference in the mean number.

This meant that the difference between casualties in public versus private schools was not significant. This demonstrated that while there may be a greater number of school shootings in public schools, it did not necessarily imply that public schools had a higher likelihood of seeing more casualties compared to private schools.

School Level

The prevailing study's inclination to focus exclusively on high schools exacerbates the complexities associated with the findings of current studies on schools and crime (Willits et al., 2013). According to the Office of the Surgeon General (2001), persons between the ages of 12 and 20 were more likely to conduct severe acts of violence at a rate 2.5 times greater than those who are older than 20. Willits et al. (2013) highlighted that there has been a positive association between the presence of a high school in the area and an increase in aggravated assaults, theft, and drug-related offenses. There may be a correlation between the increase in drug charges and the number of students enrolling in middle schools. Similarly, understanding school shootings and the school level is also essential. To develop effective preventative initiatives, policymakers and authorities must determine which school level is most susceptible to school violence.

The current study focused on the school level, that is, high school, middle school, and elementary, and its role in the number of causalities in school shootings. The descriptive statistics indicated that most school shootings occurred in high schools, which was similar to findings from different studies on school violence (Nylund et al., 2007; Willits et al., 2013). There was a total of 265 school shootings in high schools, which accounted for 69% of all incidents. At the school level, elementary and middle schools each accounted for around 15% of school shootings. It is evident that prioritizing

attention to gun violence in high schools is more crucial than in other levels of schools. However, when analyzing the relation between school level and the number of casualties through a one-way ANOVA, there was no statistically significant variation in the means of casualties among various school levels. This was supported by the F-statistics, which had a p-value of 0.518, below the significance level of 0.05, suggesting no significant difference in casualties.

School Size

School size was an essential consideration in predicting the number of casualties in school shooting incidents. Juvonen (2001) stated that violence was widespread in large schools, particularly affecting middle school children, who were the primary targets. Larger urban middle and high schools frequently employ metal detectors and conduct inspections of lockers and book bags. Baird et al. (2017) conducted a study on mass shootings, which indicated that schools that had mass shootings had larger student populations compared to schools that were within the average range for the state. Students who carried out such shootings were more likely to have enrolled in a smaller educational institution with a reduced student-teacher ratio. This implies that smaller educational institutions have been less prone to encountering incidents of large-scale violence. Turanovic and Siennick (2022), however, concluded from a systematic review of the literature that school size was not related to occurrences of school shootings.

The current study focused on school size, using Very Small (< 300 students), Small (300-599 students), Medium (600-899 students), Large (900-1,999 students), Very Large (2,000 or more students), and its role in the number of causalities in school shootings. The descriptive statistics showed that out of 387 school shooting incidents in

the study period, the larger schools tended to have more shootings compared to smaller schools. Most shootings (138) happened at Large Schools, with 900 to 1999 students. The association between the size of a school and the number of victims in occurrences of school shootings was measured using one-way ANOVA, and the results show that there was no statistical difference with a p-value of 0.399. This is consistent with the finding of Turanovic and Siennek (2022) regarding the pre-COVID-19 years and indicated that even though previous studies, such as by Baird et al. (2017) and Juvonen (2001) suggested that large schools had more chances of violence, including school shootings, this did not mean that large schools would have more casualties in school shooting incidents compared to small schools.

Location

Identifying the locations where incidents occurred more often might assist policymakers or school administrators in implementing targeted crime prevention strategies. The Federal Bureau of Investigation (FBI) identified 11 key location categories for shooting incidents, including commercial locations, educational environments, open spaces, government buildings, residences, houses of worship, and healthcare institutions. School violence tends to concentrate within these locations, but research has not explored the underlying factors contributing to these zones. Astor et al. (1999) found that incidents of school violence were more likely to occur in areas with unclear boundaries and less adult supervision, highlighting the need for further investigation into these zones within educational institutions.

The current study focused on the type of location, that is, Indoor Location, Outdoor location, Mixed Locations (Indoor/Outdoor), Others, and Unknown, and its role

in the number of causalities in school shootings. The study revealed that indoor and outdoor school shooting incidents were similar, with indoor locations having 182 incidents out of 387 and outdoor locations having 187 incidents. These two accounted for 95% of the total location. The highest number of shootings occurred in parking lots, with 71 incidents, and in classrooms and hallways, with 57 and 52 incidents each. Welch's ANOVA using the Games-Howell method showed a statistical significance ($p = 0.002$), indicating a significant difference in the mean number of school shooting casualties among different locations. The post hoc test (Games-Howell) also showed significant mean differences between indoor and outdoor locations, indicating more casualties in indoor locations compared to outdoor locations. The findings aligned with prior research indicating that some places were more susceptible to school violence, such as school shootings (Astor et al., 1999; Irwin et al., 2022). The findings may be used to develop strategies aimed at mitigating the frequency and severity of casualties in school shooting occurrences.

Regarding the characteristics of schools and their effect on the number of casualties, descriptive statistics revealed that public schools had a higher number of school shooting incidents compared to private schools. Additionally, it was found that almost 50% of school shooting incidents occurred in large and very large schools. Furthermore, high schools experienced the highest number of school shootings, in contrast to elementary and middle schools. However, it has been shown that factors such as school size, school level, or school type do not have any statistical relevance when compared to the number of casualties in school shooting occurrences. However, there was a statistically significant association between the location of school shooting

occurrences and the number of casualties. More casualties occur in indoor areas, such as classrooms, corridors, cafeterias, or gyms, compared to outdoor or mixed environments.

The Timing and Number of Causalities

It is crucial to analyze the timing of the events as offenders typically consider this. School violence events often exhibit temporal patterns, occurring at specified periods of the day, week, and year. The National Center for Education Statistics (NCES, n.d.) reported that the majority of violent occurrences took place throughout the time frame of 11 am to 12 pm. The occurrence of violent crimes committed by adolescent's peaks in the afternoon, particularly between 3 pm and 4 pm, which aligns with the end of the school day (OJJDP, 2019). Approximately 37% of violent crimes committed by young person's take place during a five-hour timeframe, starting at noon and ending at 5 pm (OJJDP, 2022). The temporal occurrence of the episodes might be used to devise strategies to prevent crimes or mitigate their impacts, particularly when examining instances of school violence, such as cases involving school shootings.

The timing variable included the time of the day, the day of the week, and the quarter of the year the incidents occurred. The descriptive statistics showed that school shooting incidents happened only during five working days, with the first three days accounting for around 66% of incidents. The frequency of incidents was also important, as it helped with identifying which semester or term was more vulnerable. The four quarters were summer, fall, spring, and winter. The mean value of 2.88 suggested an uneven distribution with a slightly skewed trend towards the later part of the quarters. The mean value for the time variable was 1.72, indicating that most school shooting incidents occurred during the morning, 6 am to 12 pm, accounting for 45% of total

incidents. The afternoon hours also showed a significant number of incidents, with 126 cases. However, a Factorial ANOVA was used to see if there was any statistical significance between these variables and the number of casualties. The results showed that none of the independent variables, such as day, time, or quarter, had a statistically significant effect on the dependent variable, casualties. Therefore, it was concluded that Time, Day, and Quarter did not significantly predict the casualty number in school shooting incidents.

School Resource Officer Presence and Number of Causalities

School Resource Officers (SROs) play a vital role in ensuring school safety. They deter criminal activity, foster connections with students and staff, and disseminate legal knowledge (Fisher et al., 2022). Crimes are said to happen according to routine activity theory when individuals motivated to commit crimes find a suitable target, and there is a lack of capable guardians to prevent the crime (Cohen & Felson, 1979). School Resource Officers (SROs) have the ability to function as effective guardians, eliminating the essential factors that contribute to the occurrence of crime (Fisher et al., 2022). Deterrence theories propose that individuals considering committing a crime are less inclined to do so when they strongly believe that their actions will be discovered and penalized (Becker, 1968). School Resource Officers (SROs) may enhance the reliability of identifying undesirable conduct, which may decrease student involvement. Jackson (2002) found that Student Resource Officers (SROs) did not significantly influence children's perceptions of law enforcement officers or offending. Unfavorable interactions between young people and the police and their SRO may contribute little influence. Wilson (1989) suggested that law enforcement administrators and educational settings

must find common ground to integrate security and education successfully. Similarly, it is important to see if the presence of SROs can reduce the impact of any offenses within the schools, given the previous research showed mixed outcomes on the effectiveness of SROs (Fisher et al., 2022; Jackson, 2002; Wilson,1989), or weak effectiveness (Turanovic & Siennick, 2022)

Understanding the impact of SROs on school shooting incidents is essential, as they can help address these issues effectively. This research study examined the presence and absence of SROs within schools during the incidents and their effect on the number of casualties. From the descriptive statistics, the mean value of .27 shows that SROs were not present in most schools where the incident occurred. Seventy-three percent of 282 school shooting incidents had no SROs, indicating that SROs were not present in most schools where incidents occur.

The research question aimed to determine the relationship between school shooting casualties and the presence of School Resource Officers (SROs).
The independent sample *t*-test showed a significant difference in the mean number of casualties between the presence of an SRO and the absence of one. School shooting incidents with higher mean casualties had SROs compared to incidents without SROs. The analysis showed statistical significance with a t-value of -2.745 and a p-value of.003 when assuming equal variance and -2.100 and a p-value of.038 when not assuming equal variance.

The findings suggested that SROs may be associated with higher casualties in school shooting incidents. The findings indicated that the presence of SROs did not have

any impact on lowering the number of casualties. Indeed, SRO schools had more casualties.

Possible explanations for this include a false sense of safety or a significant school history of violence that led to the SROs placement initially. The primary function of School Resource Officers (SROs) is to deter criminal activities and foster positive relationships with students to have a sense of security inside the school (Bowers et al., 2022). However, literature has shown that a sense of safety is often not attained and the SROs may even be detrimental fostering a sense of distrust among students (Dukes & Hughes, 2004; Juvonen, 2001; Theriot & Orme, 2014).

Moreover, historical evidence indicates that schools often employ School Resource Officers (SROs) in response to a specific event or a series of episodes inside the school or school district. The School Resource Officer (SRO) program was established in 1993 by a high school principal, a president of a Parent Teacher Association (PTA) and a chief of police after a school shooting in a nearby town (Finn et al., 2005). Adding SROs might increase identified criminal activities. Gottfredson et al. (2020) highlighted that an increase in SRO led to an instantaneous rise in weapon- and drug-related crimes. This indicates that regardless of the presence of School Resource Officers (SROs), certain schools tend to have a higher incidence of crime in comparison to other schools.

Type of School Shooting and Number of Causalities

School shootings are classified based on the type of victim selected, whether targeted, randomly selected, or both. Targeted violence refers to the deliberate act of an attacker selecting a specific individual as their victim based on a particular motivation. A report by NTAC (2019) found that 73% of incidents target the targeted victim. In

suburban and rural areas, schools with greater socioeconomic status and lower minority populations have elevated rates of suicides and school-targeted shootings. Of the 166 deaths, more than half were a result of school-targeted shootings. Shootings occurred with greater frequency outside school premises, but within incidents had a higher fatality rate (Government Accountability Office, 2020). Disputes and mishaps were more prevalent in areas around school premises, but incidents of gunfire specifically targeting schools happened with greater frequency inside (NTAC, 2019). These numbers emphasize the importance of understanding shooting incidents and using them in creating new policies and programs.

This study examined the type of school shooting incidents and their effect on the number of casualties. The types were categorized based on the target involved. There were five groups: Targeted Victims, Random Shooting, Both Targeted Victims, and Neither or N.A. Targeted victims were those the offender knew and was targeting, accounting for 54% of incidents. Random shooting occurred when the offender started shooting without knowing who they are targeting, accounting for 20% of incidents. Both targets are those the offender shoots both randomly and target victims, accounting for 12% of incidents. Neither nor N.A. refers to the offender's shooting being neither targeted nor random, accounting for 13% of incidents.

The study aimed to examine the relationship between the type of school shootings and the number of casualties, focusing on the extent to which the type of school shootings predicts the number of causalities, as most victims are targeted and the offender knows them before the incident. The ANOVA results showed a statistically significant difference in the number of casualties across the independent variable, that is, types of

school shootings. A post-hoc test revealed a significant difference between Victim Targeted and Random Shooting, Victim Targeted and Both, Random Shooting and Neither, Random Shooting and NA, Both and Neither, Both and N.A., and Neither and N.A. The most important finding is that Random Shootings had a greater number of casualties followed by Victims Targeted, which is consistent with the literature (Government Accountability Office, 2020; NTAC, 2019; Shultz et al., 2013).

Macro level

State Gun Laws and School Shooting Incidents

Establishing a comprehensive understanding of the effects of gun laws in the United States is critical, particularly due to the increasing incidence of gun violence. Given the divergent approaches of the state and federal systems in implementing regulations and laws, it is important to assess whether these regulations have been impactful. Laws include anything from restricting types of guns to background checks.

From 1994 to 2004, the assault weapons prohibition reduced the number of school shooting victims by 54.4% (Gius, 2017). A study by Reeping et al. (2022) found a positive correlation between lenient firearm regulations, increased gun ownership, and higher numbers of school shootings. This suggests that lenient gun regulations are related to more gun violence. The US Supreme Court's interpretation of the Second Amendment in 2008 as an individual right to bear arms has posed challenges for federal, state, and local authorities in enacting firearm regulations (Santhanam, 2023). Measures such as universal background checks, prohibition of military-style firearms, magazine capacity restrictions, and age criteria for gun possession have shown significant capacity to

decrease gun-related fatalities (Colarossi & Mcalpine, 2019), hence, the thought that laws have had an impact on the number of school shooting incidents over the last five years.

Thus, this study examined the level of gun regulations in each state and the number of incidents in each state for the last five years. States were ranked from A, which represented the highest grade, to F, which represented the lowest rating. The descriptive statistics showed that 16% of states, including California, Hawaii, Illinois, Maryland, and New York, had stricter laws than others. About 44% had weak gun laws, with states like Alabama, Texas, and Georgia ranked among the least restrictive.

To see whether this ranking had any significance in the number of school shooting incidents in each state, a one-way ANOVA was done. The results showed no significant differences in the mean number of incidents across strictness categories, indicating no significant impact on the number of incidents. The findings suggested that school shootings may happen regardless of the stringency of firearm legislation and controls in certain states, which contradicts common assumptions.

State Economy and School Shootings

The prevalence of gun violence in the United States leads to around 40,000 fatalities per year, as well as a greater number of injuries (Everytown Research & Policy, 2022). The expected economic cost of gun violence amounts to $557 billion (U.S. Department of Education, 2023). The problem is often associated with social and economic inequalities, such as discriminatory legislation, and an inadequate distribution of resources. These communities have challenges such as insufficient food availability, housing that is not cheap, inadequate educational resources, and restricted prospects for progress (Jacoby et al., 2018). Similarly, high-poverty areas often have higher

unemployment rates and a significant disparity in net worth compared to low-poverty areas.

In some school settings, students face financial inadequacy, with Black, Hispanic/Latino, and American Indian students seeing notable differences in budget distributions, which may lead to strain and stress among minorities (Morgan & Amerikaner, 2020). Lobonţ et al. (2017) examined the correlation between criminal activity and socioeconomic variables in Romania from 1990-2014. The observation indicated a positive correlation between inequality of wealth and crime rates and that urban density played a crucial role in crime. They concluded that the location of a person's residence was of utmost importance, plus economic disparities in the community on the crime rate.

The research question examined different economic factors at the state level and the number of incidents in each state for the last five years. The macro-level indicators like unemployment and poverty rates in each state aimed to understand the relationship between these factors and school shooting incidents. The descriptive statistics showed that the average unemployment rate ranged from 3% to 6%, with a mean of 4.14 and low standard deviations. The average poverty rate was 7% to 20%, with an average rate of 12% and a standard deviation of 2.8. The poverty rate was most affected by the age group of 0 to 18, with an average of 16%, followed by adults aged 19 to 64, with 12%. The poverty rates varied significantly among different race groups, with Blacks and Hispanics experiencing higher rates compared to Whites and Asians.

A multiple regression to understand the impact of economic indicators on school shooting incidents showed that economic variables collectively predicted the number of

incidents. More incidents occurred in states with an increase in poverty among the 0-18 age group, while fewer incidents occurred in states with an increase in poverty among the 19-64 age group. However, other economic indicators like unemployment and poverty by age group or race showed no statistical significance in the number of incidents in each state.

State Demographic Variables and School Shootings

To accurately assess crime in a jurisdiction, it is crucial to consider geographic and demographic factors. The U.S. Census Bureau has population composition data on transience, race, ethnicity, age, gender, education levels, and family structures. These factors may inform violence prevention (FBI, 2012). For instance, a report by OJJDP (2022) stated that males made up 80% of adolescent violence arrests in 2020, including 88% of robbery and 92% of murder arrests. Individuals between the ages of 16 and 17 constituted 55% of the total number of arrests, with 76% of these arrests were specifically for murder. White adolescents comprised 49% of the total number of arrests and were responsible for 57% of the cases involving serious violence. Therefore, it is crucial to determine if demographic characteristics had any statistical importance in school shooting instances in each state, just as in any other crime.

The demographic data showed that 23% of the population was aged 0-18, with the highest percentages in the 35-54 age group and the lowest in the 19-25 age group. The racial distribution showed Whites as the dominant race, followed by Hispanics at 12%. The lowest racial composition percentages were found among American Indians, Asians, and Native Hawaiians at seven percent. Children's races also showed similar patterns.

The ANOVA results showed statistical significance in the regression model, indicating that independent variables collectively affected dependent variables. Multiple regression results showed no statistical significance for age groups or different race demographics with school shootings in each state. However, the coefficient for race, such as Blacks and Hispanics, showed a positive relation with incidents, but none were statistically significant at the 0.05 alpha level. Previous research has shown that demographic variables may serve as predictors of crime. However, in this particular example, there was no statistically significant relationship found between the demographic variables and school shootings.

It is very important to know how mental health is connected to crime in schools. Coker et al.'s (2014) study on *Crime and Psychiatric Disorders Among Youth* revealed that youths who had mental disorders in the past were much more likely to commit crimes, even dangerous ones, than teens who did not have any disorders. Youth with three or more mental illnesses made up 16.0% of all people arrested for serious crimes or 54.1% of those arrested. When youths with Conduct Disorder were controlled for, 85.8% of crimes committed by adolescents with at least one condition dropped to 67.9%.

The results of this study were in line with previous research that clearly showed youth mental health could have a big effect on the number of school shootings. According to the descriptive statistics, the lowest percentage of youths who were not able to get mental health services was 45%, while the highest percentage in the state was 72%. This indicated that youths reporting mental health problems were not being properly addressed, which may have contributed to severe outcomes like school shootings. However, there is a negative relationship between the number of adults with

mental health problems and the number of school shootings. This means that the more adults with mental health problems, the fewer school shootings. One reason for this connection could be that most school shootings involved youths as offenders, and adults were not usually seen as offenders in school shooting incidents. For instance, the majority of school shooting offenders are below the age of 21, which accounts for 55% of the total number of school shooting incidents (Dumitriu, 2013).

Ecological Model

It is evident that several macro and micro factors both aggravate and contribute to the consequences of school shooting incidents. High rates of poverty among children between the ages of 0 and 18 and the lack of mental health services for youth are strongly correlated with an increase in school shootings in the affected states. Moreover, poverty has a negative effect on communities and families, leading to a rise in crime rates that particularly affect educational institutions (Zhu & Lee, 2008). Given this, schools often use School Resource Officers (SROs) to deal with this problem; yet, compared to schools without SROs, their presence may mean higher casualty rates. Incidents involving random victims also demonstrate that the presence of School Resource Officers (SROs) might provoke shooters to act impulsively and target victims randomly, resulting in a higher number of deaths, which is consistent with the literature.

For instance, Gottfredson et al. (2020) highlighted that an increase in SROs was related to a prompt rise in weapon- and drug-related crimes. Furthermore, the effects of school shootings may be more by the placement of schools in neighborhoods characterized by lower socioeconomic status, which often have a larger student body. In these circumstances, teachers and students can be compelled to remain inside, say in

classrooms or halls, where there is a higher risk of fatalities than outdoors. These connected findings emphasize the significance of taking into account the ecological elements that influence school shooting occurrences and their contributing causes. These variables include both generalized economic conditions and particular dynamics within educational environments.

Limitations of the Study

Researchers have questioned the reliability and accuracy of the information provided when using data sources accumulated from the mass media (Gelfert, 2018; Majerczak & Strzelecki, 2022). The problem is that a complete picture of the incident is difficult to garner. Government agencies such as the US Secret Service, FBI, and US Department of Education provide explanations for school shootings but lack a comprehensive list of incidents. Reports in the media give more information on incidents, but the reliability of that information has been questioned (Cerf, 2016). Blogs and websites that receive content from individuals possess long lists with no sources. A lack of a standard way to collect data means that each data source is limited in accuracy and usefulness. Different sources may have conflicting criteria for including or excluding (School Shooting Data Base, 2023).

Nevertheless, media sources provide more comprehensive information regarding specific instances than the Supplementary Homicide Reports (SHR) or the National Incident-Based Reporting System (NIBRS). The contents include the names of both offenders and victims, important information regarding their backgrounds, the outcome of the incident, where it occurred, the actions of law enforcement authorities, a timeline of events, and statements from local sources, survivors, and witnesses (Huff-Corzine et

al., 2013). A further concern about the decision not to use government databases is their limited coverage, as they encompass data from states and jurisdictions that have implemented the NIBRS in more recent times. Before 2020, all states did not need to adhere to the procedural guidelines outlined by the National Incident-Based Reporting System (FBI: UCR, 2020). Nevertheless, the NIBRS data about perpetrators and victims does not exhibit substantial disparities compared to the SHR data, which encompasses a considerable portion of the United States population (Huff-Corzine et al., 2013).

Finally, 2020 was excluded because of the COVID-19 pandemic, as many datasets purposely excluded this year. This is because including 2020 in the data might skew the results when studying data from many years. Further, the overlapping school levels of K-8 and K-12 could have a confounding effect in these data analyses. Additionally, the Giffords Law Center's data did not include information from the District of Columbia and was limited to the 50 states. Due to the lack of data on the District of Columbia, this research is unable to make a finding on gun laws and school shootings in the District of Columbia.

Suggestions for Future Study

In light of this study's findings that school features and state demographics are not as impactful as many assume on school shootings and their tragedies, it is important to invest more in identifying potential shooters in strategies for safety. Regarding place, this study indicated support for implementing additional safety measures in places such as the cafeteria, gym, and classrooms. Given that SROs' presence is related to more casualties, it suggests a need to re-examine their effectiveness. Given the dynamic nature of crimes, particularly with changing laws and an increasing array of methods for committing

crimes, it is crucial to persist in studying school shootings and evaluating the effectiveness of different approaches. More qualitative research on the topic could reveal the reality of schools, families, and security personnel when it comes to their experiences of existing efforts at preventing and addressing school shootings.

Moreover, analyzing other factors such as mental health, social media use, video game consumption, and economic indicators like family income may provide a more comprehensive understanding of school shooting occurrences. Furthermore, examining the offender in further detail might provide a more comprehensive understanding of the weapons used, the targets, previous incidents, and other relevant factors for future study.

Policy Implications

Addressing the circumstances of how the individual who is a potential threat becomes deadly likely requires looking at micro and macro systems and structures other than those covered here in terms of what leads to individuals and families *falling through the cracks*. Hence, gun policies could prioritize addressing the needs of institutions relevant to youth well-being. A second priority could be examining the functions of School Resource Officers (SROs), given the higher number of casualties associated with the presence of School Resource Officers (SROs). It is imperative to enhance SROs' effectiveness.

Policymakers have the capacity to implement more progressive gun regulations that might reduce violence by restricting the availability of firearms. One potential policy outcome could be focusing on reducing poverty among children. The findings have shown that there is a statistically significant relationship between poverty among those

aged 0-18 and school shooting events. This suggests that addressing poverty may influence reducing such instances.

Greater attention should also be directed towards certain locations where the occurrences are more likely to occur. Instead of allocating the resources to spread to new places, using strategies on specific locations, like targeted hardening strategies, might have a favorable influence on the result. The mental well-being of youths should be provided with the same level of importance as any other policy or initiative. The absence of services catering to the needs of school children, particularly mental health care, may have a detrimental impact on the well-being of these youngsters. In order to prevent this, it is necessary to place more emphasis on mental health services within educational settings.

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APPENDIX A

IRB APPROVAL

PRAIRIE VIEW A&M UNIVERSITY
A Member of the Texas A&M University System

To: **Camille Gibson, Ph.D.**, Principal Investigator
Vineeth Vijayan, Co-Investigator

From: Marco L. Robinson, M.A.Ed.
Director, Research Regulatory Compliance
Office of Research Compliance

Date: January 4, 2024

Re: IRB Protocol #2023-129
School Shootings in the United States: An Analysis of Micro and Macro Level Variables.

After review of your application, it has been determined the proposed activities described do not meet the definition of research with human subjects according to federal regulations and IRB approval is not needed.

Thank you for the time and effort put into preparing and submitting your application. If you have any further questions, please call the Office of Research Compliance at (936) 261-1553.

DocuSigned by:
Marco Robinson
ABCC397634014EC...

Marco L. Robinson, M.A.Ed.
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EDUCATION

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· M. Sc. Criminology and Criminal Justice Science, University of Madras, Chennai, Tamil Nadu, India
· B. Sc. Forensic Science, Amity University, Noida – NCR, India

TEACHING EXPERIENCE

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Position: Instructor, Fall 2023-Spring 2024
Taught CRIJ 1307 Crime in America

Department of Justice Studies, Prairie View A&M University
Position: Graduate Research Assistant, Jan 2021 – May 2023

PUBLICATIONS

Vijayan, V. Preventing mass shootings in schools: An empirically-informed prescription for what to do next (accepted for 2024). *Contemporary Issues in Juvenile Justice.*

Russell, K. N., Ash-Houchen, W., Motley, S., & Vijayan, V (2023) The juvenile justice system's role in the persistence of mass incarceration in America. In A. Conyers, V. Lynn, and M. Leigey (eds.) *Mass Incarceration in the 21st Century: Realities and reflections*, Routledge: Taylor & Francis Group.

PRESENTATIONS

Vijayan, V., Marsh, S., & Evans, W. (2022). Understanding collateral consequences experienced by partners of sex offense registrants: Testing a model of courtesy stigma. Paper presented at American Society of Criminology, Atlanta, GA.

Vijayan, V. (2022). Justice and mental health professionals' perspectives on the pros and cons of sex offense registration of youth: Findings from a thematic analysis. Presented at Conference for Interdisciplinary Student Research, Prairie View A&M University.

PROFESSIONAL SERVICE

Journal of Ethnicity in Criminal Justice (Reviewer, 2021) and
Juvenile Justice in African and Western Criminal Justice Systems (Reviewer, 2023)
Technical report for the Texas Juvenile Crime Prevention Center at Prairie View A&M University - writer.