SCHOOL ACTIVE SHOOTER PREVENTION MEASUREMENTS

by

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I dedicate this to every podcast, person, and pet that kept me sane while writing.

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GLOSSARY

Active shooter incidents - planned or unplanned attacks in which the primary weapon of attack is a gun of any type.

Active shooter prevention - the action schools and school districts take to prevent a threatened or actual incident from occurring.

Mass murder- killing four or more people during an event with no cooling off period

Person-made occurrence - includes any emergency created by a person(s) e.g. student disturbance, weapon on campus, weapon of mass destruction, contamination of water supply or air supply, hostage, kidnapping, bomb threat, active shooter, lockout, lockdown

Physical security - the protection of people using external protections in place or in addition to existing safety measures

School climate - the overall environment of a school in terms of how faculty, students, visitors, and staff interact with the infrastructure and each other.

Social-emotional security - a state of safety regarding human relationships in social interaction, emotional awareness, and self-regulation

Suicide- self-inflicted gunshot wound that results in intended death.

Small school populations - up to 500 students enrolled in a given state recognized school.

Medium school populations - 501 to 1000 students enrolled in a given state recognized school

Large school populations - 1001 and higher students enrolled in a given state recognized school

LIST OF ABBREVIATIONS

AAR   After Action Report

ASI   Active Shooter Incident

CDC   Centers for Disease Control and Prevention

CCTV   Closed Circuit Television

CPTED   Crime Prevention Through Environmental Design

DHS   Department of Homeland Security

FBI   Federal Bureau of Investigation

IDOE   Indiana Department of Education

IDHS   Indiana Department of Homeland Security

IRB   Internal Review Board

ITaP   Information Technology at Purdue

MCI   Mass Casualty Incidents

NYPD   New York Police Department

Pre-K   Pre-Kindergarten

REMS   Readiness and Emergency Management for Schools

SPSS   Statistical Package for Social Science

TA   Technical Assistance

USFA   United States Fire Administration

ABSTRACT

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This research investigated how to measure school active shooter safety against current policies in place regarding two different areas of school climate. Using the State of Indiana as a case study, 55 different schools from 38 different counties, various socioeconomic environments and school types (public, private, etc.) were surveyed. This collected data was used to represent a sample and representation of active shooter safety in K- 12 schools in Indiana. Research was conducted through a survey of approximately 40 questions posed to the principal of a school. The survey was anonymously distributed, and any identifiable information was assigned a numerical code. Anonymized demographics were considered and measured as well to determine how active shooter prevention is treated amongst them. After the study was conducted, the data shows how demographics, policies, and procedures affect school active shooter prevention. Analysis showed that school size may relate to lower social emotional security scores. Additionally, middle schools appear to score higher on social-emotional security than K-12 schools. Nonpublic schools also appear to score less on active shooter prevention than public schools. There is a moderate effect between the two. Schools and policymakers should account for this when developing active shooter safety plans.

CHAPTER 1.   INTRODUCTION

This chapter serves to introduce the problem statement and subsequent research questions for the following study. The scope, significance, assumption, limitations, and delimitations serve to provide context to the study and understanding of the research topic.

1.1   Background

Active shooter incidents (ASIs) has referred to planned or unplanned attacks in which the primary weapon of attack is a firearm of any type. Active shooter incidents can range from homicide (killing another person) to mass murder (killing four or more people during an event with no cooling off period) (FBI, 2018). Additionally, suicide can be considered an active shooter incident, if done with a firearm. In an New York Police Department Report comparing active shooter events from 1996-2016, schools were the second most common location for active shooter incidents (O'Neil, Miller, & Waters, 2016). Active shooter prevention is "the action schools and school districts take to prevent a threatened or actual incident from occurring" (Department of Homeland Security, 2018, p. 3).

1.2   Problem Statement

School active shooter safety and prevention has become a public health, security, and policy problem as prevalence increased. Schools have continued to be a target for both insider and outsider threat because they are large social gathering places. Policy regarding active shooter incidents has lacked measurement of the preparedness of schools because the focus has been more toward response as opposed to prevention. However, preventing active shooter incidents has resulted in saved lives and mitigated risk.

1.3   Research Questions

Do school demographics significantly impact school active shooter prevention? Where can the State of Indiana improve active shooter prevention in schools?

1.4   Scope

This research used data from 55 K-12 schools from the State of Indiana. The data was collected over the course of four months through voluntary disclosure. The information was catalogued and coded to be anonymous. Data collection occurred from February 2019-March 2019.

1.5   Significance

Active shooter incidents commonly occur in large social gathering places. Schools were particularly susceptible to this type of attack despite continuing to adopt firearm policies. For example, the 2018 Parkland school shooting occurred on school grounds despite having policies against firearms (Maher, 2018). By exploring active shooter school safety prevention against existing policies, schools could have determined which type of measurements were more effective than others. Thereby schools could have determined which policies may have been more valid than others.

1.6   Assumptions

The following assumptions were expected in the study:

- Trainings could have affected school performance regarding active shooter safety.
- Schools may have imposed additional policies that exclusively affect that area of safety.
- Active shooter incidents were random and may not have affected or could affect any of these schools in the future.
- Dependent variables have been considered equally effective at preventing active shooter incidents. Having the prevention measurement was considered more effective than not having the measurement at all.

1.7   Limitations

The following limitations are expected in the study:

- Data reflected a sample of the State of Indiana school system.

- Data may reflect the membership of the distribution channels.

- Data did not include higher education (above 12th grade) and below Kindergarten (Pre-K and daycare centers)

- Data collection was voluntary and may have been biased.

- School principals could have filled out the survey twice.

- Data was limited to the 2018-2019 school year and reflected current policies at that time.

1.8   Delimitations

The following delimitations are expected in this study:

- The schools were in the State of Indiana
- Incomplete data was removed.

- Data was checked to determine if each answer differed, signaling that each school was unique and did not answer twice.

- Data was collected so that identifiable data was coded, and the identity of a school could not be determined.

CHAPTER 2.   LITERATURE REVIEW

2.1   School Active Shooter Incidents

A directed active shooter incident (ASI) in a school has also been known as a school shooting. School shootings must have occurred on school grounds but can involve staff, faculty, or students. From 1840- present, school shootings have been recorded and recounted to others (Rosenwald, 2018). The schools have varied in structure, size, and number of students, but are often marked as institutions dedicated to education. They can be primary, secondary, or higher education institutions. They may house faculty, staff, and students of an encompassing age range. Demographics have varied from school to school, but most are primarily gun-free zones (Toppo, 2018). However, the U.S. Centers for Disease Control and Prevention (CDC), has conducted a study in which they determined that 135,000 guns were brought to various schools (Toppo, 2018). According to the CDC (2018), findings from this same study shows an overall drop in school-associated death from 1992-2015. However, this data may have changed for the present day as the CDC did not include data from 2015-2018. Despite a trend in school related deaths decreasing, the risk potential has not decreased. Per the CDC (2018), "homicide is the second leading cause of death among aged 5-18" (p. 1).

The first recorded incident of a school shooting occurred in 1840 between a professor and student and is cited as the inciting factor in the creation of the school's honor code. (*University of Virginia School of Law – Arthur J. Morris Law Library*, ca. 1840). This incident has supported how active shooter policy develops as the result of traumatic event rather than prior to it. However, the 1840 school shooting also has shown that the school shooting is a category with several different motives, outcomes, and perpetrators to consider. This review has concentrated on the most extreme and fatal category: mass school shootings.

2.1.1   Mass School Shootings

The most fatal school shootings are mass shootings. Though the American Medical Association notes that this type of gun violence is a smaller fraction of firearm-related deaths on a global scale, it is one of the most visible (Rivara, Studdert, & Wintermute, 2018). One of the categorically extreme school shootings has been that of Columbine High School. This example consisted of two internal minor perpetrators with inner knowledge of school procedures who

sought to cause chaos, destruction, and death using assault as their primary weapon. Per the U.S. Fire Administration (USFA) After Action Report (AAR) "The wanton violence associated with terrorist-style assaults is intended to inflict both physical and psychological injury, often indiscriminately" (U.S. Department of Homeland Security, 1999, pp. 3). In this AAR, they detail the incident that resulted in 15 fatal casualties (including shooters) and 22 non-fatal casualties. Many of the victims were high school students (13-18 years old). The school had a daily population of approximately 2,000 people. Additionally, the current emergency procedure plans were listed and did not include active shooter incidents (U.S. Department of Homeland Security, 1999). In total, the incident lasted approximately 30 minutes.

Additionally, mass shootings do result in the greatest loss of life as opposed to other types of school shootings. The most recent example of this type of active shooter school incident is the 2018 Parkland School Shooting. In recounting the event, official sources have recently published an AARs describing their and the school's response to the incident. Details were recorded in audio and video, including real-time data of the event. The Parkland shooting occurred in one building of 13 that made up Marjory Stoneman Douglas High School Campus (Hobbs, Zhu, & Chokey, 2018). In this event 15 fatal casualties occurred with approximately 16 non-fatal casualties. The perpetrator acted alone, was a former student, and planned his attack prior to committing it. As recounted in McMahon (2018), limitations to school security, policy, and procedure contributed to both successes and failures in this incident.

Figure 2.1. NYPD Recommendations Following Active Shooter Programs (O'Neill, Miller, & Waters, 2016).

In contrast to student active shooters, the perpetrator of the 2012 Sandy Hook Elementary School Shooting did not attend or work at the elementary school. In this event, a single perpetrator with a semi-automatic weapon and two pistols fatally shot 28 people. Most of the casualties were students ages 7-8 years old. This assailant was not an insider threat but did have ties to the institution through his mother. Comparing Columbine and Sandy Hook implies that active shooters are insider and outsider threats. This aligns with the 2016 NYPD active shooter study's findings that 66% of active shooters have a relationship to or with their victims (O'Neill, Miller, & Waters, 2016).

As seen in Figure 2.1, the next step in the NYPD recommendations is to institute procedures that align with those policies (O'Neill, Miller, & Waters, 2016). This study focuses on two areas that could prevent active shooter incidents: physical security and social-emotional security measurements. These two dimensions of school climate have corresponded to insider and outsider active shooter threats.

2.2   School Climate

School climate is a way of referring holistically to the environment of a school. However, these definitions differ across schools, definitions and placements. For example, school climate according to Readiness and Emergency Management for Schools (REMS) (2019), "describes a range of campus conditions" (p. 1). According to the National School Climate Center (2018), school climate is defined as "quality and character of school life" (https://www.schoolclimate.org). School climate is measured by six different categories with 13 dimensions. The six categories of school climate are safety, teaching and learning, interpersonal relationships, institutional environment, social media, and leadership and professional relationships. The last applies to staff only. These categories respond to Within these 13 dimensions are physical security and social-emotional security. Ultimately, this shows that school climate, though noted as an essential element in school ASIs, has not always been measured or defined in the same way.

2.3   Physical Security Measurements

With outsider active shooters, physical security, a dimension of school climate, has provided the best opportunity to prevent this type of shooter. Some commonly cited physical security measurements in schools have involved room layout, locks, resource officers, etc. As recounted in a McMahon (2018), limitations to school security, like policy and procedure, contributed to both successes and failures in the 2018 Parkland shooting. Regarding the physical active shooter safety, the Parkland shooter was successful through classroom and door design, lax security regarding visitors and school access, etc. (McMahon, 2018). Notably, the active shooter never entered classrooms, choosing instead to fire through windows inset in the doors. Due to smoke, fire evacuation procedures began, contributing to further victims (Hobbs, et al., 2018). However, policy requiring hurricane impact resistant windows prevented further casualties as the active shooter could not fire upon evacuating students (McMahon, 2018). This success shows how building design contributes to the physical security of a school.

The concept of Crime Prevention through Environmental Design (CPTED), relies on how physical building design features affect crime and behavior (Vagi, et al, 2018). CPTED does not fully define what types of crime can be prevented in schools, nor does it give specific guidelines for schools to follow. There are assessors that can determine a schools CPTED rating, but this

option may not be as cost effective as other measures. As CPTED is rooted in building design, evaluations and suggestions are customized per school. This approach may be useful for schools that can afford to or must remodel. However, it is not feasible to implement for most existing schools (Vagi, et al., 2018).

Additionally, surveillance cameras were in place prior to the Parkland shooting, but it is unclear if they were able to be monitored closely (Hobbs, et al., 2018). Additionally, a school resource officer was employed, but did have to monitor multiple buildings (14) at one time (Marjory Stoneman Douglas Public Safety Commission, 2019). These measurements can be added to a school after the school is developed. These additional resources range from procedure to equipment. As seen in Smith and Renfro (2016), additional physical security measurements found in schools include but are not limited to:

> visible signage, random guard patrols, adequate lighting of exterior parking and entrance areas, closed circuit television (CCTV) cameras, substantial exterior door locks, simple access control systems (turnstiles, badges, etc.), and secure locking doors to key areas or passageways (p.1).

This study also recounts alarms, access denial, laminated glass, and door angles could provide further protection and prevention in active shooter incidents (Smith & Renfro, 2016). Both interior and exterior security features are important to preventing active shooter school incidents. Policies regarding physical building security occur primarily through state guidelines (Department of Education, 2018). However, active shooter policy has occasionally referred to physical means like resource officers under school climate as opposed to physical building security (King, 2016). This may suggest that

Physical school security consistently evolves as the result of changing policy and standard. An example of this evolution would be "hard corners". As defined in the Marjory Stoneman Douglas (MSD) High School AAR (2019), hard corners constitute an area that cannot be accessed or seen from a window as to remain safe. In the same report, the Public Safety Commission (2019) noted that obstructed hard corners were rendered useless as there were not policies in place. Additionally, the classrooms were constructed of drywall and many areas were shot through, despite that the shooter specifically aiming through the windows. This has led to the creation of policy and products meant to fortify and reinforce hard corners.

2.4   Social-Emotional Security Measurements

When preventing schools from insider active shooter threats, one should measure the social-emotional security of a school, this is also referred to as a dimension of school climate (National School Climate Center, 2017). Measuring a school climate's role prior to an ASI is difficult, but essential as insider threats can be prevented by enhancing a school's social-emotional security. Insider threats can be prevented by reporting the active shooter's threatening behavior to an appropriate authority that may act. As mentioned in an FBI report studying pre-attack behaviors, Silver, Simons, and Craun (2018), noted:

> On average, each active shooter displayed 4 to 5 concerning behaviors over time that were observable to others around the shooter. The most frequently occurring concerning behaviors were related to the active shooter's mental health, problematic interpersonal interactions, and leakage of violent intent (p. 7).

School active shooter incidents are targeted attacks that are often planned with some sort of preparation associated with them (FBI, 2017). Thus, intervention can occur prior to the incident by monitoring and measuring pre-attack behavior (Silver, et al., 2018). Per the FBI's violence prevention guidelines, a threat assessment represents a social-emotional security measurement in which school officials have a viable and reasonable way to assess threatening student behavior. Via the FBI's stop bullying website, student reporting guidelines are also available (FBI, 2018). The validity of threat reporting and assessments are confirmed by Figure 2.2. Those people that noticed concerning behaviors in student active shooters incidents fall within these two groups (Silver, et al., 2018). In O'Neill, et al. (2016), foiled school shooting plots are mainly obstructed as the result of notifying law enforcement directly occasionally through school intervention.

Beside the need to report threats, the U.S Department of Education (2018b) also defines school climate as part of discipline. They provide climate surveys and measurements (Figure 2.3) for schools. The climate may include both subjective and measurable features. However, it does not fully define a social-emotional security considering it does not include reporting.

Who Noticed	Number	%
Schoolmate*	11	92
Spouse/domestic partner**	13	87
Teacher/school staff*	9	75
Family member	43	68
Friend	32	51
Co-worker	25	40
Other (e.g. neighbors)	23	37
Law enforcement	16	25
Online individual	6	10
Religious mentor	3	5

* Percentage calculated only with those active shooters who were students at the time of the offense
** Percentage calculated only with those active shooters who were in a relationship at the time of the offense

Figure 2.2. Measuring the Pre-Attack Behavior of Active Shooters (Silver, Simons, & Craun, 2018).

Measuring concerning behavior is best done through safe and proper reporting. Policies unassociated with active shooter incidents can be used to help identify behavior patterns prior to an incident. In a National Threat Assessment Center report (2018), school policy to promote reporting may not be directly associated with active shooter incidents but can influence whether behavior is reported. Asking questions related to reporting policies could show which procedures prevent active shooter incidents the best. To score a school environment in preventing active shooter incidents, threat assessments represent a real option to producing a measurable social-emotional security report. Threat assessments reveal concerning behaviors of potential insider threats and active shooter scenarios. In the New York Police Department's report (2016) they detail several foiled plots and their resolutions, many of which occurred via reporting from family, peers, and authority figures. These foiled plots show that active shooter prevention can occur via reporting efforts of others. A Department of Justice report (2013), illustrates that prevention of mass school shootings has shifted from a stigmatized mental health intervention to anonymously reporting threatening behaviors. Mental health is still a factor, but reporting concerning behaviors through threat assessments is a means to measure the social-emotional security of a school depending on how they comply with threat assessments of students through both teachers and students.

As mentioned, these two groups are most likely to see concerning behaviors as they occur (Silver, Simons, & Craun, 2018). Per the Department of Justice report (2013), a threat assessment can be composed of the processes outlined in Figure 2.5 and can prevent multiple casualty violence, like active shooter incidents. There are 5 different points to this process, identification, notification, evaluation, intervention, and documentation/dissemination.

Figure 2.3. Steps to Preventing Multiple Casualty Violence (Department of Justice, 2013).

The Marjory Stoneman Douglas (MSD) High School AAR thoroughly documents the prior behavior of the shooter and his social-emotional state. These sections reflect on how MSD High School reacted to concerning behaviors prior to the incident. The shooter admits to his plan (leakage) several times publicly before committing the crime. This concerning behavior, among others necessitated reporting and assessing the shooter that could have resulted in a foiled plot as opposed to a successful one (MSD Public Safety Commission, 2019). Witnesses to Cruz's behavior was made of many students that knew of his intentions. Coworkers, peers, and family members noticed extremely concerning behaviors, but the reports occurred after the incident. Reporting to authority figures (principals and possibly police officers) occurred, but procedure was not carried out. Notably, MSD High School had a three-part process to reporting concerning behaviors which involves reconnaissance, training, and eventual threat assessment. However, the report on the shooter was dismissed. This school policy failure may have significantly contributed to the shooter's intentions being carried out (MSD Public Safety Commission, 2019).

2.5   State of Indiana School Active Shooter Policy

Active shooter incidents are recognized global public health concerns. In an editorial by Rivara, Studdert, & Wintermute. (2018), the authors discuss and analyze firearm-related deaths from 195 countries and territories in 2016. The researchers note that firearm violence contributes to affecting school systems, stating "armed guards patrol some schools, and some politicians have advocated allowing teachers to carry guns" (pg.1). Thus, school policies are also affected by active shooter incidents. In the state of Indiana, policies representing active shooter incidents largely lie in trainings and procedure during an incident (Indiana Department of Education, 2018a). However additional policies that do not directly state active shooter policy are included in building plan corporations. In the Safety Plan Audit Checklist, the questions "Are threats of physical harm or violence investigated?" and "Are exterior doors locked, secured or monitored during the school day?" are related to active shooter prevention (Figure 2.3). However, they do not refer to it as active shooter policy and refer to lockdown or lockout procedures as "man-made occurrence drills" (Indiana Department of Education, 2018b). Notably, active shooter incidents may require different procedure than other man-made occurrences but is not treated as such by the State of Indiana (Indiana Department of Education, 2018b).

2.6   State of Indiana School Climate

Regarding school climate, the State of Indiana includes both culture and discipline in their measurement (Indiana Department of Education, 2018a). Additionally, the IDOE includes climate survey measurements in their resources, though they don't require a climate survey. Additionally, there are no guidelines on the proper reporting of school climate surveys. Though the surveys may only be meant for one group, this is not clear. The IDOE does appear to use it. Per Figure 2.4, school climate appears to include all facets of a school, many of which are subjective. School climate would require a scale to produce numerical, quantitative measurements.
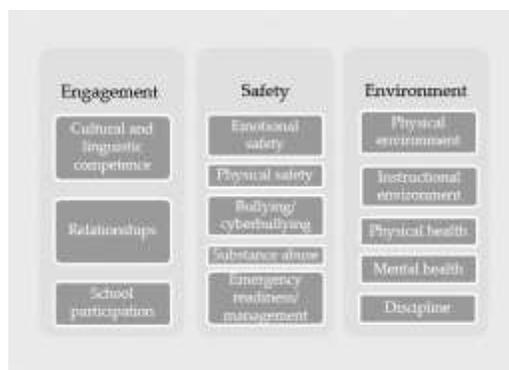
Figure 2.4 School Climate Model (National Center on Safe Supportive Learning Environments, 2018)

This is difficult to include in the proposed study as measurements are not quantitative, nor easily scaled. However, per the IDOE Compass, some of this data (bullying, emergency management, cultural and linguistic competence) are measured per school year. These quantitative measurements are typically collected in July after the school year is completed as opposed to midway through the school year. Though schools may choose to audit themselves regarding this data at that time, the State corresponds to the end of the school year (Indiana Department of Education, 2018a).

2.6.1   Indiana Physical Security Requirements

Regarding active shooter incidents (ASIs), they have not been mentioned explicitly as a drill in Indiana schools, instead they are referred to as a person-made occurrence. Though they are listed as a possible example, they are not treated as anything beyond their outcome (lockdown/lockout) which may illustrate a problem regarding policy to define ASIs. Additionally, lockdown/lockout drills are known as preventative measurements to outsider threats. As seen in a training study by Craig (2016), having more than one drill per every two months has shown increased retention in process knowledge.

However, the State of Indiana Department of Education (IDOE) regularly updates their resources regarding physical building security and includes school resource officers (SROs) in their emergency preparedness plans but does not mandate them by law (Indiana Department of Education, 2018c). Furthermore, building design is not mandated in the audit checklist beyond exterior door procedures (Indiana Department of Education, 2018b). Building design via Dorn et

al. (2014), addresses seven building design features that can increase safety in schools. Yet, a partner with the Indiana Department of Education (IDOE) suggests that school building design features do not include implementing SRO's, surveillance technology (cameras, CCTV, etc.), or metal detecting technology that schools may use in the prevention of active shooter incidents. However, they do supply information and statistics regarding the regulation of some of those resources (metal detectors, SROs, etc.) (Readiness and Emergency Management for Schools Technical Assistance Center, n.d.). By offering these resources, the IDOE suggests that these resources are being used to prevent outsider active shooters in schools. Therefore, one can assume that schools are incurring both personnel and equipment costs.

The State of Indiana has a unique advantage of having a certification process on school safety called the Indiana School Safety Specialist Academy. This is a free certification occurring over the course of five basic training days and two advanced training days (Indiana Department of Education, October 2018). The certification can be maintained through participating in advanced training annually. Thus, the cost for the program is not entirely financial, but primarily requires time and participation. The IDOE (October 2018) makes a point to state that public schools have 100% program participation opposed to nonpublic schools. There are approximately 2,340 Certified Indiana School Safety Specialists that may or may not be employed at a school or apply to multiple schools (Indiana Department of Education, October 2018).

2.6.2   Indiana Social-Emotional Security Requirements

The State of Indiana has policies in place measuring different levels of social-emotional security. Primarily bullying and arrest data is required to be reported to the Indiana Department of Education and be publicly accessible to all as an Excel file online (Indiana Department of Education, n.d.). Additional resources to reporting includes threat assessment teams and worksheets, cyberbullying, and [school] climate survey guidelines (Indiana Department of Education, 2018c). The social-emotional security of a school has been complex to measure in concrete terms other than reporting data (cyberbullying, threat assessments, and student surveys). Additionally, social-emotional security has shifting viewpoints as opinions of both faculty and students may differ despite operating in the same environment. Definitions also have differed on whether social-emotional security is a tangible focus or a learning ideology. Both are used in active shooter prevention measurements, however grant funding from the Indiana Secured Safety Grant

prohibits grant money from being applied to social-emotional services. This shows a potential discrepancy in how grant funding is approached in Indiana, though priority legislation attempts to rectify this in the future (Indiana Department of Education, October 2018). Thus, costs do exist regarding social-emotional security in terms of personnel and training.

<p style="text-align:center">2.7   <u>Statistical Analysis</u></p>

In correlational research, statistically significant data occurs at $p < 0.05$ (95%) or $p < 0.01$ (99%) where non-significant analysis occurs at $p > 0.05$ (Gilbert, 2018). Exploring the relationship should occur before determining a cause; these relationships do not imply causation (Brown, 2018; Ling, 1982),. Two reasons that correlations cannot imply causations: *tertium quid* or "third variable" and direction (of causality). *Tertium quid* implies that there may be a relationship between two variables, but a third variable possibly affects the causal relationship (Field, 2013).This value indicates that there may not be an interaction, prediction, or relationship between these variables. (Brown, 2018). According to Figueiredo Filho, et al. (2013), a *p*-value indicates highly significant relationships, marginally significant relationships, and not statistically significant at $p \leq 0.01$, $p \leq 0.05$ and $p > 0.10$, respectfully. The relationship between two variable's joint variability is correlational research. When observing a variable deviating from the mean, another may follow the same or opposite direction (Field, 2013). This variance describes a way of measuring the relationship between the two variables. However, exploring the relationship should occur before determining a cause; these relationships do not imply causation (Brown, 2018; Ling, 1982),. Two reasons that correlations cannot imply causations: *tertium quid* or "third variable" and direction (of causality). *Tertium quid* implies that there may be a relationship between two variables, but a third variable possibly affects the causal relationship (Field, 2013).

CHAPTER 3.   METHODOLOGY

This chapter states the methodology by which the researcher means to collect school active shooter incident prevention data. Names and identifying information from the participants will not be included to promote privacy of involved parties. Through measuring active shooter incident prevention in schools, the researcher believes schools will have improved understanding of their active shooter incident prevention.

3.1   Research Design

This research process occurred over the course of two months using a survey of 37 questions comprised of both quantitative and qualitative data. This was a voluntary convenience survey and distributed by external sources. Most responses were collected in the first two weeks, approximately 40 the first two days. The State of Indiana school system was selected to act as the population of school active shooter prevention. Thus, distribution occurred through the State of Indiana's Learning Connection page, and through the Indiana Association of School Principals' monthly newsletter. To prevent possible negative ramifications, names and identifying information from the participants were not included or collected. Additionally, further measures were taken to ensure that possible identifiers like location, county, and population were numerically coded. Questions were posed to principals, recorded, then analyzed using Statistical Package for the Social Science (SPSS) to determine standard statistically significant data. Incomplete data was removed before analysis. Data was checked to determine if each school differed and they did. Thus, this indicates that each school was unique and did not answer twice.

This research closely follows that of a traditional voluntary survey but can also be considered an audit as the questions are based on current policy and promotions that schools may adhere to. As per the State of Indiana Public School Code (2018), school officials do not have disclose security related data to the public as it could compromise the school.

3.2   Survey Flow and Scoring

The survey was composed of a potential of 37 questions dependent on answers. Dependent questions are signaled with a lowercase a after the question identifier. The first section is primarily

demographics, composed of seven main questions, with two follow-up questions. The second section is composed of questions related to physical security that fall into two categories. There are nine questions pertaining to using additional resources to bolster physical school security. Six of these questions were scored as the answers would positively improve the physical security of the school. The additional second questions were meant to provide demographics related to the question asked. The second component of physical school security is building design as promoted by the State of Indiana. This was composed of seven scorable questions from the six building design features. Finally, he social-emotional security section was composed of 10 scorable questions without any follow-up questions. A full list of the survey questions and potential answers are shown in Appendix A.
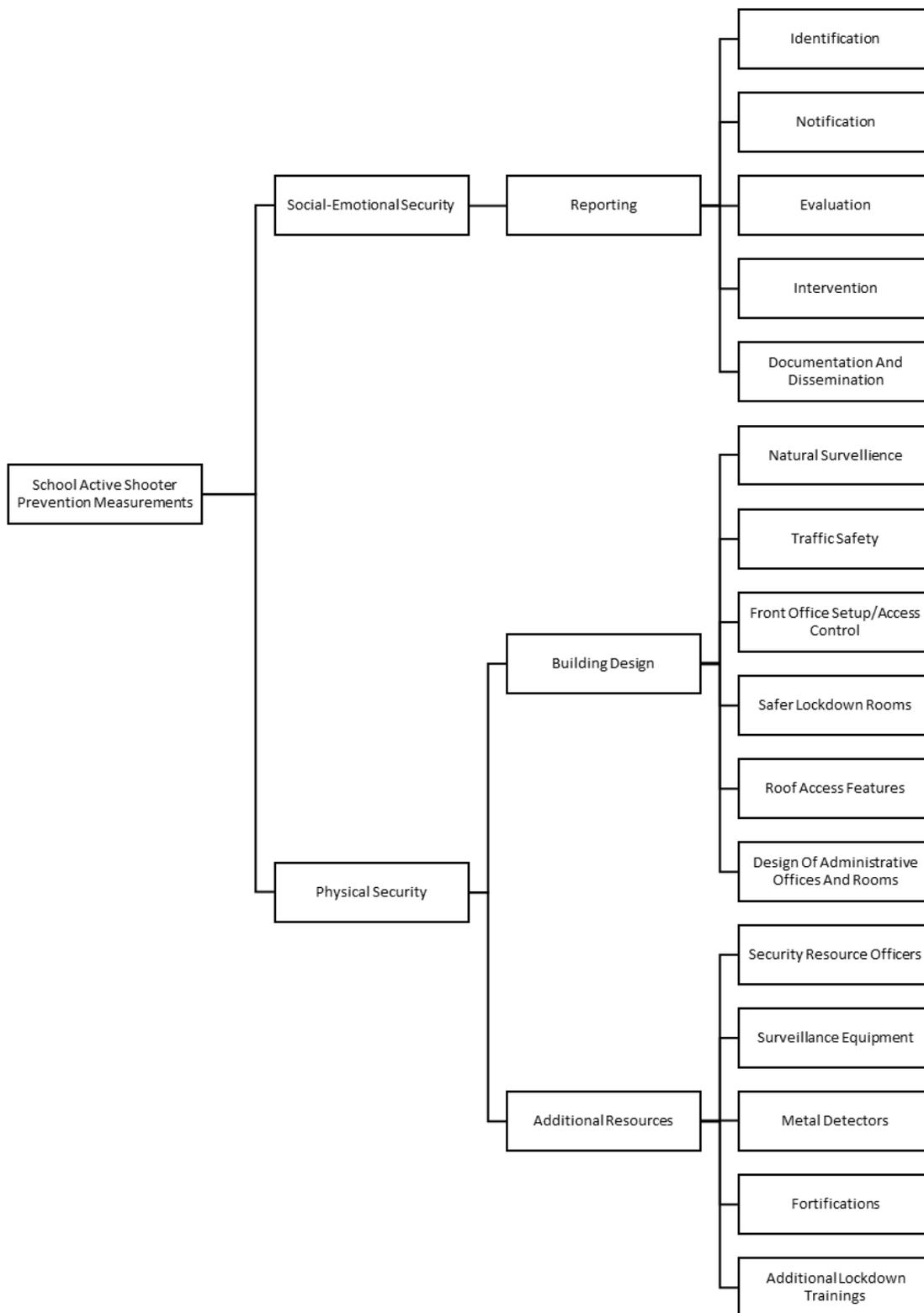
Figure 3.1 Survey Structure (Outcome Variables)

3.2.1 Physical Security Measurements Survey Methodology

In this study, physical security measurements corresponded to six of the seven building design features to enhance school safety per the Indiana Department of Education recommendations. The seventh building design feature (promotion) relies on a subjective area of physical building design as it relates to emotional response. Though the question could have been applied to social-emotional security, it was decided against as promotion referred to inspirational or encouraging messages. This feature cannot directly apply to active shooter prevention like reporting, or surveillance. This feature may be added in the future if promotion evolves to include training. A further five questions will relate to additional features that can improve school physical security as it relates to active shooter prevention. These questions will provide a small, but manageable basis to measure a school's physical security procedures. As the survey is experimental, the questions were modelled after security audit and survey questions that are available via the Indiana Department of Education (IDOE) but were created to uniquely reflect the physical security measurements of schools in Indiana.

3.2.2 Social-Emotional Security Measurements Survey Methodology

Prevention of mass school shootings has shifted from a stigmatized mental health intervention to anonymously reporting threatening behaviors (Department of Justice, 2013). This report suggests that mass school shooting prevention is composed of the identification, notification, evaluation, intervention, and documentation and dissemination of an active shooter prior to plan execution. Ten survey questions correspond to one of these components and will address both student and staff reporting. The study is meant to provide a basis on which to measure a school's social-emotional security procedures. As the survey is experimental, the questions correspond to the Department of Justice reporting guidelines. However, the report neglects to provide questions that could be applied to students and teachers. Framing the questions toward students and teachers was decided based on the 2018 FBI report on concerning behavior. These questions are based on literature but were created to measure social-emotional security in Indian schools.

<center>3.3   <u>Sampling</u></center>

According to publicly available school corporation data (2018-19), of the 433 school corporations oversee 1,913 public schools and 362 non-public schools. Non-public schools (religious/private institutions, etc.) may be overseen by the same or separate entities classified under the same corporation ID. This data does not include homeschools (an unaffected entity of school shootings as that could be construed as homicide). They have not been included in this report. This data (made accessible by the Indiana Department of Education) equates to approximately 2,275 schools.

Of the data collected, a sample was collected of approximately 55 different schools. Thus, the study surveyed 47 public and 8 nonpublic schools which is not in line with the attempted stratified survey. It is one public school more and one nonpublic school less than a stratified study. The State of Indiana has 92 counties and of the surveyed schools, 37 different counties were represented, one school chose not to disclose. One school reported two counties. This school was counted as a separate entity as it could not be determined if the school did not exist in two counties.

<center>3.4   <u>Hypotheses</u></center>

The hypotheses consisted of the following:

1. The researcher hypothesizes that public schools will score higher on active shooter prevention than nonpublic schools. The null hypothesis is that no scores are affected by school classification.
2. The researcher hypothesizes that schools with a mental health counselor or social worker will score higher in the social-emotional security area than those without. The null hypothesis is that no scores are affected by having these personnel or not.
3. The researcher hypothesizes that large schools will score higher in active shooter prevention than small and medium schools. The null hypothesis is that no scores are affected by population.
4. The null hypothesis is that no variables affect active shooter prevention.

<center>3.5   <u>Framework</u></center>

The frameworks used for this study are current policies and procedures associated with active shooter prevention as discussed in the literature. However, the literature also mentions how school active shooter prevention is a reactive process as opposed to a proactive process. Meaning, school active shooter prevention improves after an event, not prior. This concept aligns with diffusion of innovation theory in which innovation may slowly be adopted by a group or society (Dearing, 2009). The dissemination of this innovation may show gaps based on parameters like age, population, or socio-economic area (Zhang, Yu, Yan, & Ton A M Spil, 2015). This theory aligns with how active shooter prevention can be adopted by schools, despite proactive measures becoming more common. As stated by Kaminski (2011), the diffusion of innovation reveals how modifications occur to improve adoption of an idea. This theory corresponded to the hypotheses in which scores were thought to be affected by demographics like population, personnel, or classification. Thus, this theoretical framework supported school active shooter prevention measurements as they are an innovation of practices and procedures that are occasionally affected by demographics.

Data was gathered by asking a qualified party questions about the school over which they are employed and oversee faculty, personnel, and students. The subject of the research was the school over which the qualified party presides. It was assumed that the qualified party provided veritable information. The qualified party had the option to skip questions that they did not wish to complete. They were also given the opportunity to answer "I Don't Know" in place of "Yes" or "No" on scorable questions as opposed to not answering at all. The answer, "I Don't Know," was used based on conversations with the Director of School Safety. They expressed concern on whether principals would have knowledge of some features. The use of this option was not used as often with the physical security section of the survey but was used frequently with the social-emotional security. Additionally, the survey complied with standards set forth by Purdue University and the Computer Information Technology Department if they differ from that of federal standards. The survey gained approval from Purdue's Internal Review Board (IRB) on February 19[th,] 2019 under an exemption determination.

3.6 Threat to Validity

Prior to the survey creation and finalization, expertise on the survey questions and flow was sought by several professionals. To prevent contamination of the survey data, a principal from a nonpublic school in Illinois was used to pilot and provide comment on the potential survey questions. The principal was also used to determine if the survey did appropriately reflect information that a principal would know, could answer, and reflected measures in place for active shooter prevention. Additionally, a member of Indiana emergency services was given the survey to determine readability and identify whether the survey was lacking security measures that were in place for school districts that were not public knowledge. Also, the Director of School Building Security of Indiana was contacted and provided feedback regarding the questions regarding the areas chosen to reflect Indiana school active shooter prevention. Finally, the prototype questions were distributed to an Indiana superintendent for comment and to determine if Indiana principals could answer questions with impunity. From these communications, it was established that the survey was understandable, answerable, and reflective of active shooter prevention measurements of Indiana schools.

As with any voluntary survey, errors may have occurred. To account for error, questions were meant to be as clear as possible, ambiguous questions were provided with an opportunity to answer, "I Don't Know". Questions were anonymized and generalized to reduce biased reporting. Data validity requests have been provided at author and department discretion due to the sensitivity of the topic. Full directory data has not been provided under any circumstances except to the researcher and the researcher's committee.

3.7 Data Gathering Process

Data was gathered over the course of 4 months including the development of survey questions The questions outlined in the Appendix were distributed via anonymous link to K-12 serving, Indiana principals. Responses from principals who participated, but left incomplete answers, were deleted from the study. Data was dated to show the current policies in place at the time of its recording.

Table 3.1 Data Gathering Timeline

Data Process	Time (weeks)	Completion Date
Survey pilot creation	2-3	12/10/18
Survey pilot testing	4-5	1/7/19
Survey changes implemented	1-2	1/14/19
IRB approval waiting period	3-4	2/19/19
Survey distribution	4-8	3/11/19
Data entering and cleaning	1-2	3/11/19
Data analysis	1-2	3/22/19
Thesis defense	N/A	4/8/19

3.8   Data Gathering Methods

In terms of survey software, Purdue university has a partnership with Qualtrics a web-based device in which survey creation, collection, distribution and analysis can occur. Purdue's partnership with Qualtrics is provided free for students. According Information Technology at Purdue (ITaP) (2018), Qualtrics can be used for "targeted (panel) surveys" (pg. 1). This appears to closely mimic the proposed survey in the research design. Though there are other free web-based survey tools, Qualtrics offered all built-in tools as part of the Purdue subscription.

3.9   Original Proposed Analysis

Data from the survey will be voluntary but will be composed of qualitative demographics questions and quantitative questions. The questions are based on federal and state policies as they refer to current school procedures regarding active shooter incident prevention. The demographics questions will be qualitative and quantitative. They will be used to provide context to the data being surveyed. Demographics will be confirmed via the public State of Indiana directory information. Schools will be contacted using the same information.

- Public or Nonpublic (School type)
- Number of Attendees (School size)
- Faculty-Student Ratio (Faculty vs Student size)

The quantitative questions will correspond to both physical security measurements and social-emotional security measurements that can aid in the prevention of active shooter safety measurements. Data will be analyzed after all responses are secured (see Figure 3.1).

For the purposes of this study, the main components in physical security measurements are building design and alternative resources as seen in the literature provided by the Indiana Department of Education (2018a). In addition to physical security, social-emotional security as per and the National School Climate Center (2019) is represented by reporting for this survey (U.S. Department of Justice, 2013).

Given the survey structure, a factor analysis would measure the scale of how schools in Indiana compare to one another in active shooter prevention. This factor analysis would also allow comparisons between physical building security to social-emotional security in policy and current definitions. This analysis will also allow for comparisons in school policy regarding active shooter prevention and those that exceed or fall below those standards.

3.10 Analysis

Data from the survey was voluntary but was composed of qualitative questions and quantitative scored questions. The demographics questions were both qualitative and quantitative. They were used as subject variables to compare whether schools differed in their active shooter prevention measurements. The demographics questions were composed of the following:

- Area type (School location)
- Number of Attendees (School size)
- Grades Served (School type)
- Public or Nonpublic (School classification)
- County Area (School county)
- Mental Health Counselor/Social Worker or None (School personnel)
- Grant Applications (Grant funding)

Please see Appendix A for the full list of demographics questions. Chapter 4 will further explore and define these categories as they are listed here.

The quantitative questions will correspond to both physical security measurements and social-emotional security measurements that can aid in the prevention of active shooter safety measurements. Data was cleaned and analyzed after reporting concluded (see Figure 3.1). As mentioned in the original proposed analysis, the researcher intended to run a factor analysis to measure the scale of Indiana schools in active shooter prevention. This factor analysis was intended

to show comparisons between physical building security to social-emotional security in policy and current definitions. However, do to the scaling of the survey (1 = Yes, 2 = I Don't Know, and 3 = No), the researcher chose not to follow this analysis.

The research design allowed for comparisons in school policy regarding active shooter prevention and those that exceed or fall below those standards. Thus, several tests were run to compare scores to demographics data and ascertain significance as mentioned in the research questions. First, a multiple regression was run to determine if one could predict total score based on a few different factors (school location, school classification, school personnel, and school type). Two independent t-tests were run. One sought to determine if there were group mean differences between having a mental health counselor/social worker or not on social-emotional environment scores. The other was meant to determine if there was group mean differences between public and nonpublic schools. An Analysis of Variance (ANOVA) was run comparing school type and the total active shooter prevention score. Finally, correlations were run to determine if there was a relationship between population and score.

3.11 Summary

Active shooter prevention in physical security and social-emotional security measurements have varied based on the state guidelines. Policies that influence these procedures are often treated as equal ways to measure prevention but have lacked measuring in what schools find useful. These procedures may have also ignored measurements when it comes to their active shooter incident policy. By surveying different schools in a single state, Indiana K-12 schools could have become better educated in where they stand regarding active shooter safety. Using IDOE reference information regarding firearm possession, school safety, cyberbullying, non-public accredited schools, etc. the survey has represented how policy shapes these procedures. The state could have used these policies to measure how well schools prevent active shooter incidents as a result. Thus, a truncated survey focusing on two areas of active shooter prevention has been created and tested to allow schools to measure their active shooter prevention and compare them as such.

CHAPTER 4.　　RESULTS

This chapter provides the data of the survey as it pertains to the methodology (see Chapter 3). Data was anonymized to prevent identifiable information from being released to the public and potentially affecting the reputation of the schools (by way of principal) surveyed. Distribution reached approximately 200-300 schools in the State of Indiana through aid of the State of Indiana's study distribution site also known as Learning Connection. Distribution also occurred through the Indiana Association of School Principals (IASP). Finally, other distribution means occurred by reaching out to superintendents and allowing them to distribute the survey. Of that distribution, 55 schools filled the entirety of the survey. After data cleaning processes, the 55 surveys remained as missing data was consciously left blank.

In terms of statistical analysis, four surveys contained data that required explanation. Two surveys completed the rest of the survey but did not fill out the second demographic question. One survey stated their approximate school population as 10,000. This is not feasible according to the head of the One survey did not disclose their school county. These surveys remained in the sample size as the rest of the data was complete. Their choice to not disclose the population size or county was marked as missing data. Therefore, the final sample size is approximately 55 K-12 schools in the State of Indiana.

It is the researcher's assumption that the data is independent thorough means of collection and design. Per the Central Limit Theorem, the researcher determined that the data set, though small, assumes normality. Tests for homogeneity of variance and linearity were run per the analysis required.

4.1　Demographics Questions

Many of the demographics asked at the beginning of the survey were independent variables for analysis. The independent variables are listed below with their frequencies.

1. From the list below, please select what neighborhood best represents the school's current location. (QD1_SchoolLocal)
   a. Urban (within city limits) = 9 schools
   b. Suburban = 5 schools

   c. Rural = 21 schools

   d. Mixed (Suburban and Rural ex. smalltown) = 16

   e. Mixed (Urban and Suburban ex. just outside city limits) = 4

The neighborhood types were based on the National Assessment of Educational Progress (NAEP) data analysis as reported by the National Center of Statistics and the Federal Office of Management and Budget based on the school's proximity to an "urbanized area" (National Center for Education Statistics, 2019, p. 1). Accordingly, there are four categories: city, suburb, town, and rural and they were established in 2007 and continue to be upheld as an "urban centric locale codes" (National Center for Education Statistics, 2019). However, the 2010 U.S. Census released data that shows that there are two types of urbanized areas known as "urban clusters" (Berg, 2012). Thus, the researcher determined that having two categories: Urban (city limits) and Urban (just outside of city limits) was necessary to accurately define a school location. Additionally, the categories were expanded on to include definitions and avoid confusion.
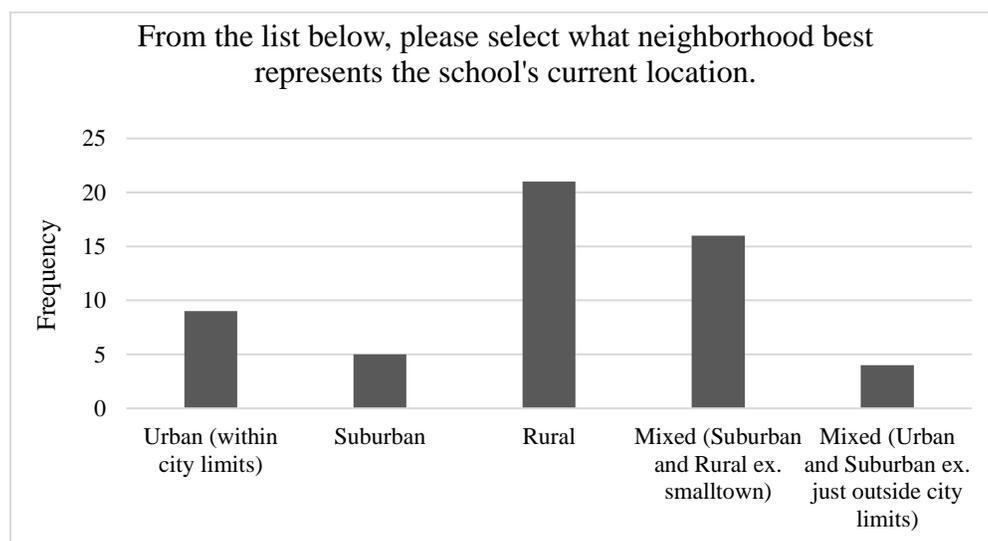

Figure 4.1. School Frequency by Location.

2. What is the approximate population of your school (including students, faculty, and staff)? (QD2_SchoolPop)

   a. Small populations = 16 schools

   b. Medium populations = 20 schools

   c. Large populations = 16 schools

This question was self-reported by the principal and then coded into population size categories. The population size categories were modelled after a 1988 study of small, medium, and large secondary schools. The small schools were made up of populations under 500, medium schools were between 501-1000, and large schools were populations of 1000 and above (Boswell & Carr, 1988).
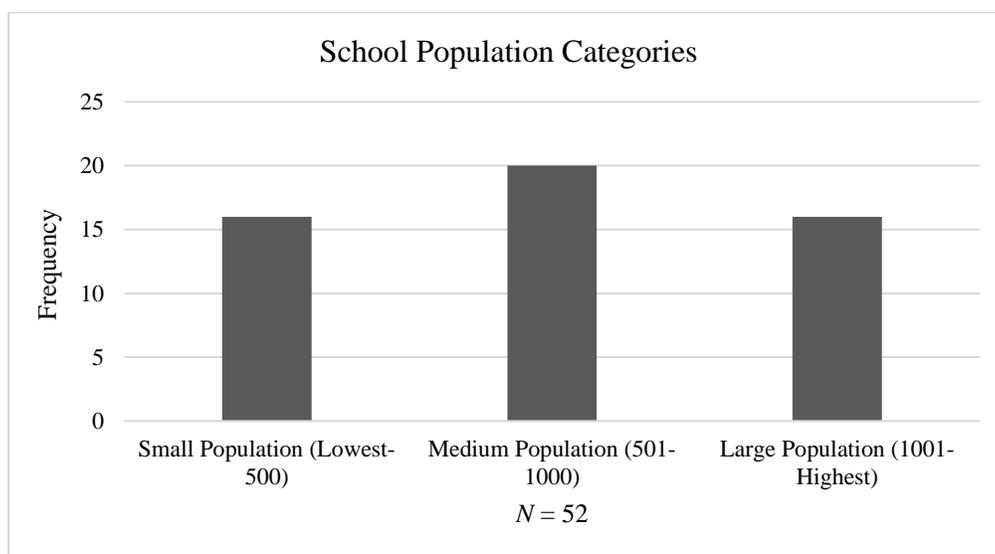
Figure 4.2. School Population by Category.

3. From the list, please select the grades that your school services. (QD3_SchoolType)
    a. Grades K-12 were all listed individually.
    b. Categories were assigned later based on grade level selected.
        i. K-12 (Kindergarten - 12th grade) = 19 schools
        ii. Elementary (Kindergarten - 5th grade) = 4 schools
        iii. Middle (5th - 8th grade) = 8 schools
        iv. High (9th - 12th grade) = 12 schools
        v. Elementary & Middle (Kindergarten - 8th grade) = 7 schools
        vi. Middle & High (5th grade - 12th grade) = 5 schools

The school categories were based on the U.S. Education system and the categorization of K-12 schools. These categories are given specific grade levels and ages that typically prescribe to this system (Corsi-Bunker, n.d.). The categories could not pertain to grade level as 5th grade and 6th grade are often used interchangeably in both middle school and elementary categories.
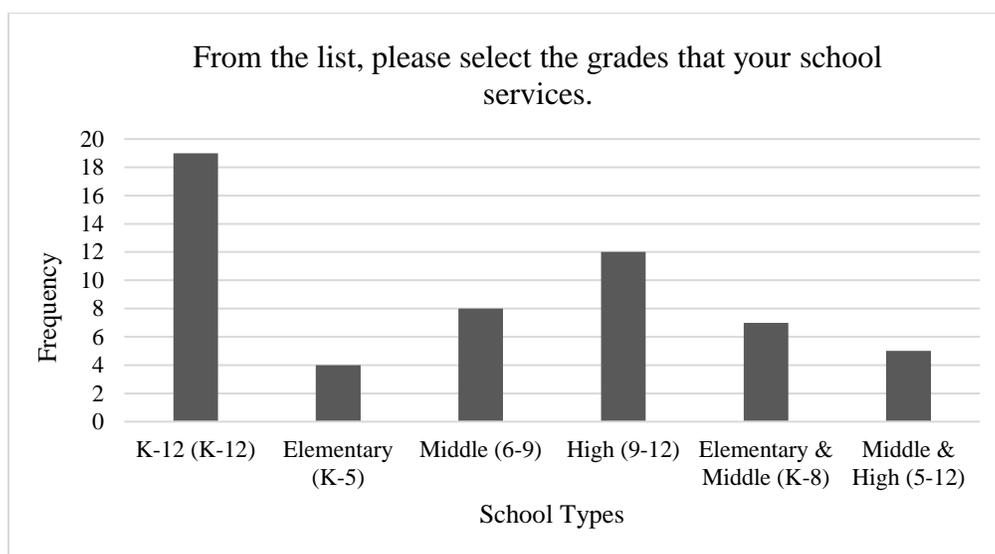
Figure 4.3. Category Type of School Grade Level Serviced.

4. Select how the State of Indiana classifies your school. (QD4_SchoolClass)
    a. Public = 47 schools
    b. Nonpublic = 8 schools

The school classification comes directly from Indiana State Regulations on what makes an accredited school of which there are two types: public and nonpublic. School principals were expected to know their school classification when answering the survey (U.S. Department of Education, 2009). In this study, a stratified sample was sought, but was not attained in interest of keeping the sample size as large as possible. In a sample of 55, the amount of public schools should have been 46, and the nonpublic schools should have been 9 in keeping with the percentages of school classification reported by the Indiana Department of Education. This research was composed of 47 public schools and 8 nonpublic schools.

5. Does the school employ a mental health counselor or social worker? (QD6_MHSW).

This question did not seek to differentiate between mental health counselors or social workers. This was done as having either a social worker or mental health counselor could have affected the social-emotional security of a school. According to the National Association of School Psychologists (2016), school counselors and school social workers do comprise part of school-based mental health services. This demographic question revealed that 33 schools of those

surveyed do have a mental health counselor or social worker. However, 22 schools do not have either.

4.2   Dependent Variables

These subject variables' answers were used to determine if they predicted, influenced or affected the dependent variables of total score (SC0), physical security score (SC1), and social-emotional security score (SC4).
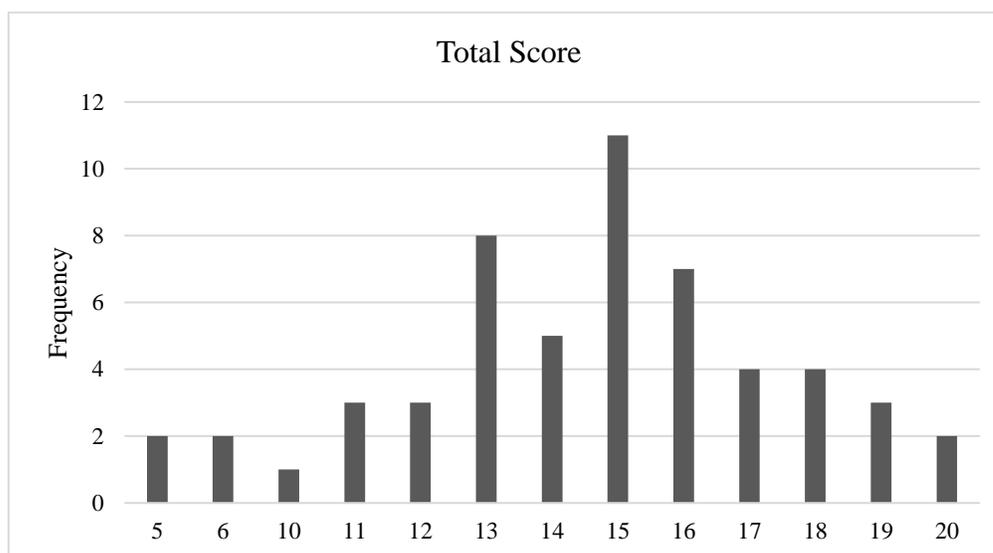
Figure 4.4. Total Score by Frequency.

As mentioned, the total score of the active shooter prevention consisted of two parts, physical security and social-emotional security. Though the scored portion of the survey could account for 23 points, the highest score reached on the survey was 20. It should also be noted that schools could score a 0, but the minimum score was 5. The scores are relatively normally distributed.
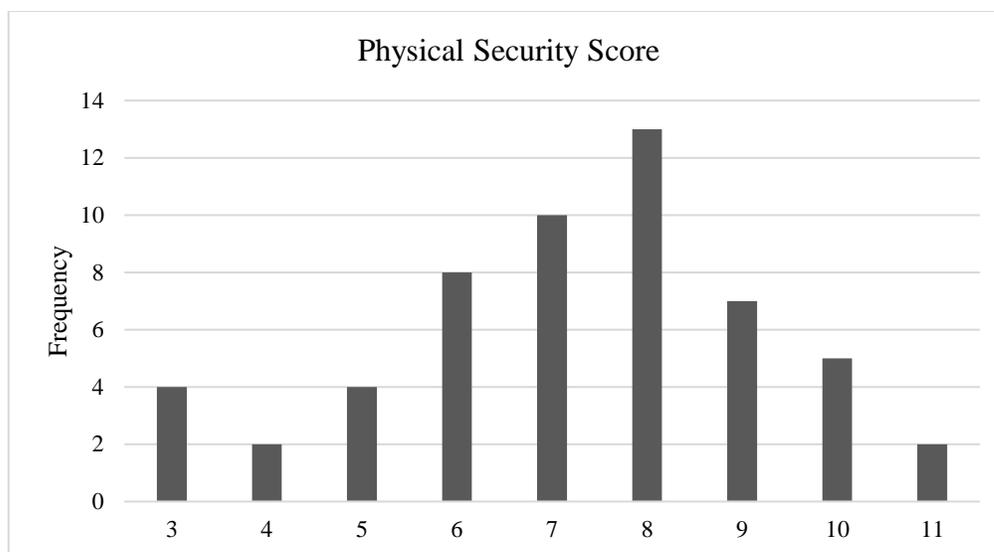
Figure 4.5. Physical Security Score by Frequency.

The physical security of a school was composed of two types: additional resources and building design. These categories consisted of 7 and 6 scored questions. Respondents could have received scores ranging from 0 to 13. The range for these scores was 3 to 11. Thus, no respondent was able to receive a perfect score. These scores are relatively normally distributed.
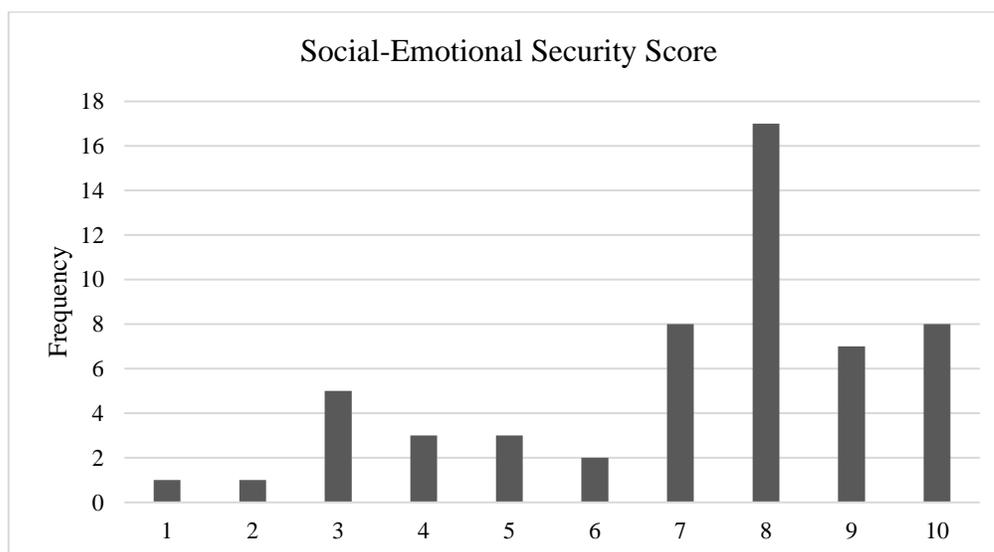
Figure 4.6. Social-Emotional Security Score by Frequency.

This score could have ranged from 0 to 10. The actual reported range was 1-10 and suggests that some participants were able to receive a perfect score. Additionally, this data is relatively skewed toward the positive. Though data transformation was considered, it was decided against as this data was a self-reported score.

4.3   Scored Data Questions

The dependent variables for analysis were composed of the score developed from the subjects' answers to the questions outlined in the Appendix. Table 4.1 illustrates the scoring maximums, minimums, means and standard deviations of the scores taken by the subjects. As seen in Table 4.1, the maximums differ from the ideal on both total and physical security. This implies that the no participant was able to have a perfect score on school active shooter prevention, or the subcategory of physical security.

Table 4.1 Descriptive Statistics of Scores

	N	Minimum	Maximum	Mean	Std. Deviation
Total Score	55	5.00	20.00	14.35	3.42
Physical Security	55	3.00	11.00	7.22	2.02
Social-Emotional Security	55	1.00	10.00	7.13	2.35

In testing these variables against one another, it is necessary to know the means of the given dependent variables to understand how much the categories may deviate from one another.

4.4   Multiple Regression

A force-entry multiple regression was run because there were multiple subject variables with no specified order. The regression was run to determine if total active shooter prevention score was able to be predicted from school location (School_Local), school type (School_Type), school classification (School_Class), and whether or not the school has a mental health counselor/social worker or not (School_MHSW). The ANOVA shows as not significantly predicting total score $F(4,50) = 1.04$ with $p > .05$.

Table 4.2 Multiple Regression of Total Score

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	16.755	2.369		7.072	.000		
School_Local	-.176	.329	-.076	-.536	.595	.925	1.081
School_Type	.196	.276	.100	.708	.482	.927	1.079
School_Class	-2.483	1.353	-.258	-1.835	.072	.933	1.072
School_MHSW	.295	.488	.085	.604	.549	.928	1.077

4.5 Independent T-Tests

The researcher ran an independent *t*-test as the researcher intends to compare the subject variable of public and nonpublic schools (QD4_SchoolClass) and the outcome variable (SC0) to determine if the two groups are on average statistically significant from each other. The subject variable is manipulated in two ways, but with two separate groups. Thus, the *t*-test is independent not dependent. Levene's test was run to determine if equal variances are assumed. Levene's test was non-significant, leading the researcher to read the independent t-test as such Table 4.2.

Table 4.3 Independent T-Test of Public vs. Nonpublic schools and Total Score

		T	*df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Total Score	Equal variances assumed	1.68	53	.099	2.16	1.29	-.42	4.74

On average, public schools experienced higher scores on active shooter prevention (*M* = 14.66, *SE* = .49) than nonpublic schools (*M* = 12.50, *SE* = 1.18). There is a moderate effect, *r* = .23. Due to the moderate effect, small sample size, and the exploratory nature of this research, this mean

difference was determined to be statistically significant ($t(53) = 1.68$, $p = .1$). The use of exploring relationships is measured as $1 > p > 0.05$ is for exploratory research Figueiredo Filho, et al., 2013).

Additionally, another independent *t*-test was run to compare the predictor variable of mental health counselors and social workers or not (QD6_MHSW) and the outcome variable total social-emotional security score (SC4) to determine if the two groups are on average statistically significant from each other. The subject variable is manipulated in two ways, but with two separate groups. Thus, the *t*-test is independent not dependent. Levene's test was run to determine if equal variances are assumed. Levene's test was non-significant, leading the researcher to read the independent t-test as such Table 4.3.

Table 4.4 Independent T-Test of Mental Health Counselor/Social Worker or Not vs. Social-Emotional Security Score

		t	*df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Social-emotional security	Equal variances assumed	-.14	53	.89	-.09	.65	-1.40	1.22

On average, schools without a mental health counselor or social worker experienced slightly higher scores on social-emotional security ($M = 7.18$, $SE = .50$) than nonpublic schools ($M = 7.09$, $SE = .41$). This difference was not significant ($t(53) = -.139$, $p > .05$. There is no effect, $r = .02$.

4.6   School Population ANOVA

The researcher ran a one-way ANOVA to see if there is a mean difference in school active shooter prevention scoring (Total Score, Physical Security, and Social-Emotional Security) based on school population. The school population variable was coded into categories representing a small, medium, and large population. This test was chosen as the outcome variable is categorical and there are 3 or more groups within the continuous predictor variable.

Levene's statistic measures the homogeneity of variance. In this case, one does not seek significance as homogeneity is not violated if the variance is evenly covered amongst all groups. This Levene's statistic $(2,49)$ has a nonsignificant $p -$ value ($p > .05$). As seen in Table 4.5, there

was no significant average difference on total score based on the population categories, F (2,49) = .125, p > .05. This finding represents a medium-larger effect size between total score and population. There was no significant average difference on social-emotional security score based on the population categories, F (2,49) = .951, p > .05. This represents a more medium to large effect between physical security score and population. Finally, there was no significant average difference on physical security score based on the population categories, F (2,49) = .45, p > .05.

Table 4.5. School Population Categories ANOVA

		Sum of Squares	*df*	Mean Square	*F*	Sig.
Total Score	Between Groups	16.59	2	8.30	.67	.515
	Within Groups	605.18	49	12.35		
	Total	621.77	51			
Physical Security	Between Groups	20.13	2	10.06	2.62	.083
	Within Groups	187.95	49	3.84		
	Total	208.08	51			
Social-Emotional Security	Between Groups	.59	2	.30	.05	.951
	Within Groups	292.18	49	5.96		
	Total	292.77	51			

4.7   School Type ANOVA

The researcher ran a one-way ANOVA to see if there is a mean difference in school active shooter prevention scoring in the Social-emotional security scores based on school type. The school population variable was coded into categories representing different school types as defined by the grades they service. This test was chosen as the outcome variable is categorical and there are 3 or more groups within the continuous predictor variable.

Levene's statistic measures the homogeneity of variance. In this case, one does not seek significance as homogeneity is not violated if the variance is evenly covered amongst all groups. This Levene's statistic (5,49) has a nonsignificant p – value ($p > .05$).

Table 4.6 Social-Emotional Security Scores Based on School Type

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	59.49	5	11.90	2.44	.05
Within Groups	238.62	49	4.87		
Total	298.11	54			

As seen in Table 4.8, there was a significant average difference on social-emotional security score based on the school type categories, F (5,49) = 2.44, p = .05. Thus, school types do have a significant effect on social-emotional security scores. Effect size calculations showed that there was a medium effect size (ω^2 = .12) for school types on social-emotional security scores.

To determine if the groups are different, significantly or not, the researcher ran *Post hoc* tests to compare each mean against the others. In this analysis, the researcher chose to run Tukey's at the suggestion of a statistical consult as the data was better fit to this test given the sample size and type of test. *Post hoc* tests showed that being in a Middle (Grades 5-8) school significantly increased social-emotional security scores as compared to being in a K-12 School (Tukey, p = .05). There was no significant mean difference between any of the other school types on social-emotional security scores.

4.8   Correlations

The researcher ran a zero-order correlation between school population and social-emotional security score to see if a relationship existed. There was a statistically significant, moderate, negative relationship between school population (School_Pop) and social-emotional security score, r(52) = -.29, p = .04. This zero-order correlation suggests that the larger the school, the lower the score on this specific area of active shooter prevention.

Table 4.7 Correlations between Social-Emotional Security Score and Population

		School_Pop	Social-Emotional Security Score
Social-Emotional Security Score	Pearson Correlation	-.29[*]	1
	Sig. (2-tailed)	.04	
	N	52	55

*. Correlation is significant at the 0.05 level (2-tailed).

4.9   Conclusion

This chapter was meant to display the results of the statistical analysis received through this research. Analysis showed how averages and scores were affected by subject variables determined through demographics. Data was cleaned before being included. The next chapter discusses the analysis of school active shooter prevention in the State of Indiana regarding these results.

CHAPTER 5.   DISCUSSION

The following chapter shows the resulting data of school active shooter prevention as determined through the results of this study. As a reminder, the hypotheses considered consisted of the following:

1. *H1*: The researcher hypothesizes that public schools would score higher on active shooter prevention than nonpublic schools. The null hypothesis was that no scores are affected by school classification.

2. *H2*: The researcher hypothesized that schools with a mental health counselor or social worker would score higher in the social-emotional security area than those without. The null hypothesis was that no scores are affected by having these personnel or not.

3. *H3*: The researcher hypothesized that large schools would score higher in active shooter prevention than small and medium schools. The null hypothesis was that no scores are affected by population.

The null hypothesis is that no variables affect active shooter prevention.

5.1   Public and Nonpublic Schools

H1: The researcher hypothesized that public schools will score higher on active shooter prevention than nonpublic schools. The null hypothesis was that no scores are affected by school classification. In accordance with this hypothesis, being in a public or nonpublic school does significantly affect scoring on active shooter school prevention, suggesting that schools in the State of Indiana may not be equally preventing active shooters. There was a moderate effect between public and nonpublic schools, but this does not indicate that a relationship exists, only that there is an effect.

A possible explanation to this data is that nonpublic schools may lack state funding, though they may receive similar funding through other means. This trend is further explained when looking at the grant funding demographics question (Figure 5.1). In this figure, public schools make up most grant applications in the public sector. Nonpublic schools appear to apply for more private funding, but the two are not mutually exclusive. According to the U.S. Department of

Education (2007), nonpublic schools face challenges to their emergency management such as size, insufficient resources, or lack of awareness to available resources. Public schools also may not require the same materials regarding active shooter prevention as other nonpublic schools. As shown in legislative priority from the Indiana Department of Education (IDOE), nonpublic schools do not require safety personnel or plans. This lack of requirement appears to negatively impact their participation in the certified Indiana School Safety Specialist program (October 2018). However, this could also be due to one of the challenges outlined by the U.S. Department of Education.

5.2   Mental Health Counselors or Social Workers

H2: Unlike the hypothesis posed by the researcher, having a mental health counselor/social worker or not does not significantly affect scoring on social-emotional security when it comes to the measurements posed by the researcher. Regarding the reasoning behind this null hypothesis, mental health counselors or social workers may not have a direct impact on the promotion or utilization of threat assessment reporting in schools. Additionally, the mental health counselor/social worker may have duties that have traditionally been performed by an external medical professional, like a school nurse (Puskar & Marie Bernado, 2007). Though not included under school mental health services, school nurses have been studied as supplying relevant data and expertise to mental health in schools. As seen in the Indiana Department of Education (IDOE) priority legislation, this may be intentional. Schools are blocked from funding mental health services, but not physical ones (2018).

5.3   Social-Emotional Security

In the resulting data, statistical significance was found relating to the social-emotional security category. Though this category was difficult to define, accurate measurement criteria was given that could prevent an active shooter incident. The data used to represent this category is questions regarding threat assessments done by both students and teachers. These two types of persons are more likely to notice concerning behavior in fellow students. Thus, prevent insider threats. The average social emotional score ($M = 7.13$) was out of 10. This category could expand to include more criteria regarding social-emotional security as it relates to active shooter

prevention by incorporating learning styles or behavioral assessments (Indiana Department of Education, 2018a). As social-emotional learning continues to be taught in schools and improve, social-emotional security may grow to adopt these principles. Additionally, social-emotional security may develop organization formed of both past and present theory (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2019).

5.3.1   School Type

In the resulting data, school type does have a significant average difference on active shooter prevention scoring on social-emotional security scores. This result suggests that school type influences the average score of the social-emotional security scores in comparison to K-12 schools.

By observing the *post hoc* tests, it shows that statistical difference in mean scores when it comes to school type, in score category. The researcher believes that this statistical significance suggests that school type may impact the focus of active shooter prevention in schools. This is shown in how middle schools scored higher on social-emotional security active shooter prevention regarding K-12 schools. This may be from an over compensation on the part of Middle schools to assessing student behaviors or due to the demographic make-up of a Middle school. Middle schools can span from grades 5-8 with learning that is focused on skills rather than academic. However, the demographics contained within the school could also be causing the discrepancy. This specific group difference would require more testing to determine if there was an actual cause to the groups in this scoring category.

5.3.2   School Population

H3: Though there was no significant mean difference across school population categories, a correlation showed that a moderate negative significant relationship in school population to social social-emotional security. Meaning that larger populations had lower scores on that category. This is possibly explained as monitoring the environment of a school could be more of a priority or potentially a requirement. Additionally, the theoretical framework mentioned in Chapter 3 accounts for this discrepancy as diffusion theory spreads through smaller populations before larger ones (Kaminski, 2011) . Further analysis should be done to fully explore the relationship between school population and scoring on social-emotional security. Though schools with larger populations are investing in physical security, there does not seem to be as much emphasis on

social-emotional security (Chute & Mack, 2018). The State of Indiana can improve their promotion of certain active shooter prevention measurements to later adopters by offering incentives or reforming the measurements to better suit need (Kaminski, 2011). This represents an area that potentially requires further research.

5.4   The Role of Grant Funding in Active Shooter Prevention

Of the grant funding types that were reviewed (government and private), both obviously differ in frequency. Thus, it may not just be the type of grant that matters for application, but rather the application purpose. Additionally, grant funding is still sought to supplement costs that may or may not be associated with active shooter prevention. Of the 55 participants, just two did not apply for grant funding in the last five years.

As shown in the 2016 NYPD report, reporting is most effective when done through sources that recognize concerning behavior (i.e. teachers, peers, parents). Rather than a "see something, say something" ® tactic, reporting focuses on "recognize something, say something" tactic (https://www.dhs.gov/see-something-say-something). This is only useful if the parties receive training or instruction. As seen in Figure 5.1, training appears to be less sought after than other areas of grant funding, implying that there may not be as great a push for training regarding active shooter prevention than other costlier, but permanent areas (personnel, equipment, physical improvements).
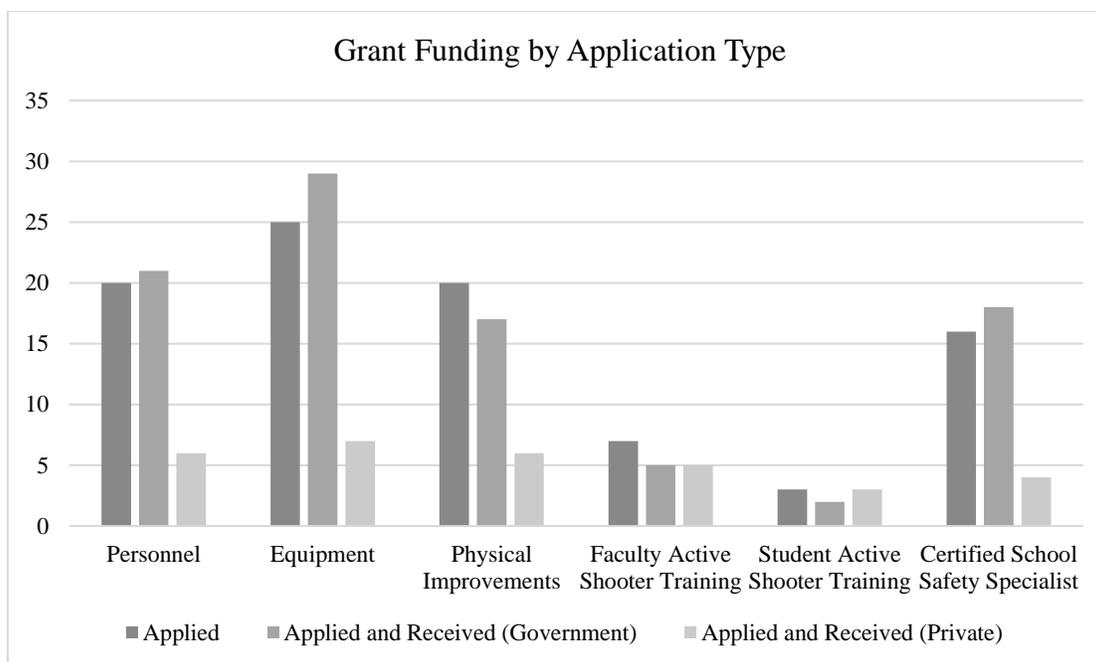
Figure 5.1. Grant Funding Applications Breakdown

A discrepancy in the grant funding data also shows that the certified school safety specialist, a process that consists of paid registration and a basic training session, is still more sought after than training. This may be due to the permanence of this specialist as opposed to the impermanence of training. However, low cost and uniform versions of training offer a solution to this problem as well as prevent miseducation. In one specific incident in Indiana, incorrect training intentionally caused injury to teachers despite occurring in a closed and professional environment (Zraick, 2019). Improper training can lead to both injury and fear of education (Herron & Hwang, 2019). Uniform training, whether it be Run Hide Fight, ALICE, or ABC requires time and planning that can be difficult for school administrators to plan or schedule. Asynchronous, Just-In-Time Training can occur electronically and multiple times over the course of a semester at the discretion of faculty (Craig, 2016). School administrators would be given the opportunity to review the training and certify that it is legitimate. Additionally, of the grant funding types mentioned, active shooter training was the only area that specifically referred to active shooters. Though the other funding areas do qualify, they can be used in other matters like recruitment, curriculum, or extra curriculars. This may explain their popularity.

CHAPTER 6.   RECCOMENDATIONS AND CONCLUSIONS

This section serves as recommendations to both the State of Indiana in their active shooter prevention and how to proceed with research directions in the future. This research was meant to determine if school demographics significantly impacted school active shooter prevention. This study also served to find where the State of Indiana can improve active shooter prevention in schools.

6.1   Future Data Collection

Though this research was not a stratified study of the State of Indiana, it was initially sought. Continued work should be done to improve this. A stratified sample size would represent a more accurate version of the State of Indiana. Additionally, the current small sample size may have influenced results and should be considered going forward. One may consider partnering with the State of Indiana to make this more possible as project organized with the full backing of the State of Indiana and consent forms may have been more fruitful. However, this may influence honesty. Of the two suggestions, a larger sample should be considered a priority moving forward.

Further recommendations include inputting physical measurements into social-emotional security. Besides publicly available bullying data, schools should consider collecting student, parent and teacher social-emotional security surveys. Software, like ClassDojo could be used to measure social-emotional security data without intruding on a classroom environment or intruding upon a school day (Saeger, 2017).

Social-emotional security is an area of school safety that seems to be left out of official surveys (US Department of Homeland Security, 2018b). Notably, the DHS recently released a report outlining K-12 security. The report outlines school climate as something separate from physical security despite being a dimension. The survey attached to the report, exclusively measures physical security for prevention of ASIs in K-12 schools (US Department of Homeland Security, 2018b). However, physical security isn't the only way to improve active shooter prevention and shouldn't be as 66% of ASIs are committed by someone associated with their intended targets (NYPD, 2016). Though school climate surveys are common, they lack the physical measurements like physical security. Additionally, training focuses on the physical aspect

of active shooter training, running through the scenario as opposed to the prior incidents (Zraick, 2019). Social-emotional security should also be built into active shooter training as it is essential to prevention of active shooter incidents (ASIs). Learning how to identify concerning behavior could potentially improve social-emotional security scores.

6.2   Future Work Using this Study

Using this study as a jumping off point, the researcher believes that further analyses can be run in this study, particularly regarding reporting scores. In looking at frequency between student and teacher reporting scores, teachers in some cases had predominately higher frequencies on some questions compared to their student counterparts. Further studies should investigate these differences using this data set or expanding upon it. Adding participants to take this survey and compare their results to the principals could also result in valuable perception and professional data. Participants could be teachers, school resource officers, students, and even parents. Other options include directly comparing public and nonpublic schools by making the samples from each larger, thus doing a full study of public and nonpublic schools.

Additionally, teacher and student knowledge appear to differ in two areas of reporting: evaluation and intervention. Teacher and student differences was not the primary study of this survey, but future research should take this into consideration. As an example, Figure 6.1 shows a distinct difference in how principals reported teachers knowing how to evaluate concerning behaviors versus students. By producing another study in which teachers and students receive training and compare their scores to those that do not, research could be done. This study would potentially reveal whether training programs do improve social-emotional security scores. This reporting area could be expanded upon to determine why these areas were affected in frequency despite other areas of social-emotional security retaining similar numbers between teachers and students.
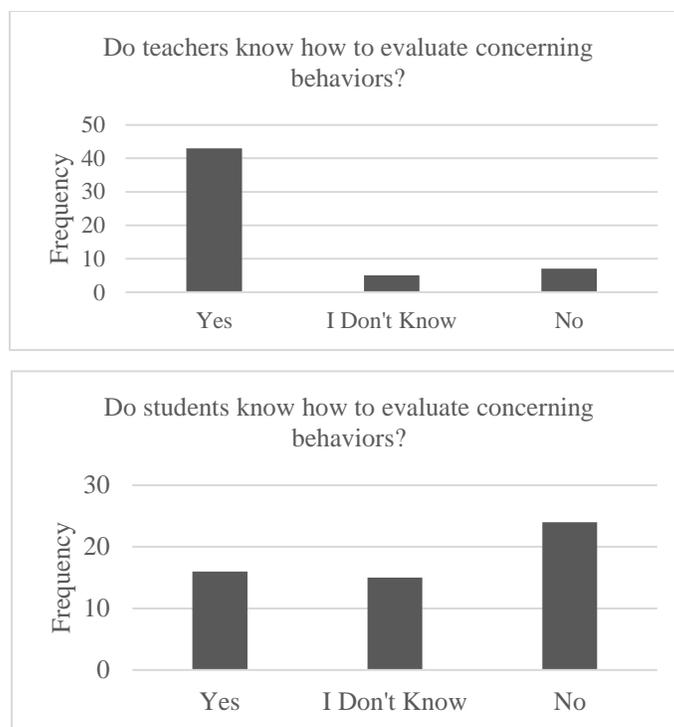
Figure 6.1. Comparisons Between Teacher and Student Reporting: Evaluate.

6.3 Future Validation

Further recommendations include further measurements into social-emotional security scores. Though the researcher considered using publicly available bullying data, this would have involved giving identifiable information to the researcher to determine the specific school. Additionally, the bullying data available corresponds to a different year than that of the survey. Using this survey to compare bullying data to a certain score on social-emotional security scale, could pose some interesting potential questions on the social-emotional security of a school while working in tandem with real-world data. In this study, threat assessment reporting represented the only measurable and reasonable scale for principals to answer questions based on. Other areas of the social-emotional security that could measure concerning behaviors include parent participation, discipline instances, and potentially mental health reports.

Validating the scoring could occur via this way as well as one could look at the amount of teacher reports of concerning behavior in comparison to student reports of concerning behavior data.

6.4   Conclusions

Through the course of this research, school active shooter prevention was measured, compared, and analyzed. It was determined that school demographics affect school active prevention in a statistically and marginally significant way. This research suggests that school classification affected total score in a marginally significant way. A possible cause is that nonpublic schools face challenges to emergency management that public schools do not. This conclusion requires further analysis to determine why nonpublic schools have lower scores than public schools.

Also observed in this study, scores in social-emotional security are affected in a statistically significant way by school population and school type. Social-emotional security, as measured through concerning behavior data, shows significance that requires further analysis to be understood fully. Larger school populations could have lower social-emotional security scores possibly because of their security focus or due to lack of diffusion. Middle schools are potentially receiving higher scores in the same category because of their student age range. However, both require further analysis. Additionally, grant funding gives a possible reason why mental health wellness in schools may not affect scores. Rather, personnel like school nurses, that impact mental health, could be performing similar duties as mental health professionals. Some grant funding is barred from being used on mental health wellness, and nurses could be used to improve physical and mental health.

Recommendations to school active shooter prevention makes note of improving the type of active shooter prevention to promote grant funding to training as opposed to equipment and personnel. Improving training would better benefit the school and prevent miseducation. Low cost and safer options could be done at the behest of school officials. The State of Indiana should also broaden training to include social-emotional security of a school along with physical training. Finally, future studies should bring in more participants like teachers, students, and school resource officers. Additional studies should explore the discrepancy between teachers and students. Studies should also work toward a greater sample size, a fully stratified study, and comparing school classifications in greater numbers if possible

Ultimately, active shooter prevention is a rapidly evolving topic that continues to change with every addition to policy. The State of Indiana continuously improves their own active shooter prevention through participation and experimentation. Thus, school active shooter prevention in the State of Indiana will remain proactive as opposed to reactive, ensuring safety for all students, faculty, visitors and staff.

APPENDIX

PURDUE
U N I V E R S I T Y.

Introduction

Intro.

Hello,

Thank you for taking this survey on school active shooter prevention measurements. This survey is geared toward Indiana principals or equivalent.
As a reminder, your response is anonymous and voluntary. Any identifiable information will be coded and then destroyed.

You will receive an opportunity to download your responses at completion. Thank you again!

Demographics

QD1. From the list below, please select what neighborhood best represents the school's current location.

○ Urban (within city limits)
○ Suburban
○ Rural
○ Mixed (Suburban and Rural ex. smalltown)
○ Mixed (Urban and Suburban ex. just outside city limits)

QD2. What is the approximate population of your school (including students, faculty, and staff)?

[   ]

QD3. From the list, please select the grades that your school services.

☐ Kindergarten
☐ 1st Grade
☐ 2nd Grade
☐ 3rd Grade
☐ 4th Grade
☐ 5th Grade
☐ 6th Grade

- [ ] 7th Grade
- [ ] 8th Grade
- [ ] 9th Grade
- [ ] 10th Grade
- [ ] 11th Grade
- [ ] 12th Grade

QD4. Select how the State of Indiana classifies your school.

- ○ Pubic
- ○ NonPublic

QD5. What county is your school located in?

[   ]

QD6. Does the school employ a mental health counselor or social worker?

- ○ Yes
- ○ I Don't Know
- ○ No

QD6a. How are they funded?

○ Through grants
○ Through private means
○ Both

QD7. To your knowledge, has your school applied for any grants in the last 5 years?

○ Yes
○ No

QD7a. Click all the following that apply to your school.

	Personnel	Equipment	Physical Improvements	Faculty Active Shooter Training	Student Active Shooter Training	Certified School Safety Specialist
Applied	☐	☐	☐	☐	☐	☐
Applied and Received (Government)	☐	☐	☐	☐	☐	☐
Applied and Received (Private)	☐	☐	☐	☐	☐	☐

Additional Resources

Q1.AR. Do you have more than 1 scheduled lockdown/lockout drill per semester (every two months)?

O Yes
O I Don't Know
O No

Q2.AR. Do you use metal detecting technology?

O Yes
O I Don't Know
O No

Q2a.AR. Which type of metal detector do you use?

O Walk-through Metal Detectors
O Hand Held Metal Detectors
O Both

Q3.AR. Does the school reinforce (protective coatings, adhesives, internal metal, etc.) in windows?

O Yes

O I Don't Know

O No

Q3a.AR. Which type of window is reinforced?

O Internal Facing

O External Facing

O Both

Q4.AR. Does the school have a resource officer?

O Yes

O I Don't Know

O No

Q4a.AR. Please select all that apply to your school resource officer.

☐ Part-time

☐ Full time

☐ Shared with another school

☐ Monitors more than one building

☐ Monitors one building

☐ Certified School Safety Specialist through the State of Indiana

Q5.AR. Does the school have any interior or exterior cameras?

○ Yes
○ I Don't Know
○ No

Q5a.AR. Does someone monitor them throughout the school day?

○ Yes
○ I Don't Know
○ No

Building Design

Q1.BD-LR. Can teachers lock their doors from the inside?

○ Yes
○ I Don't Know
○ No

Q2.BD-TS. Are there external barriers in place to prevent cars from driving through/into the school?

○ Yes
○ I Don't Know
○ No

Q3.BD-RAC. Is roof access always locked unless in use by a verified professional?

○ Yes
○ I Don't Know
○ No

Q4.BD-AC. Does the school employ a double access control system (a holding area in which visitors can be visually verified before entering the building)?

○ Yes
○ I Don't Know
○ No

Q5.BD-NS. Does the school have fire doors?

○ Yes

○ I Don't Know

○ No

Q5a.BD-NS. Are the fire doors locked during a lockdown/lockout scenario?

○ Yes

○ I Don't Know

○ No

Q6.BD-AO. Are administration offices near alternate entrances and exits?

○ Yes

○ I Don't Know

○ No

Reporting

Q1.RPT-IS. Do students receive training on identifying concerning behavior?

O Yes

O I Don't Know

O No

Q2.RPT-IT. Do teachers receive training on identifying concerning behavior?

O Yes

O I Don't Know

O No

Q3.RPT-NS. Do students notify an authority figure about concerning behavior?

O Yes

O I Don't Know

O No

Q4.RPT-NT. Do teachers notify an authority figure about concerning behavior?

O Yes

O I Don't Know

O No

Q5.RPT-ES. Do students know how to evaluate concerning behaviors?

O Yes
O I Don't Know
O No

Q6.RPT-ET. Do teachers know how to evaluate concerning behaviors?

O Yes
O I Don't Know
O No

Q7.RPT-ITVS. Do students know how to properly intervene when another student displays a concerning behavior?

O Yes
O I Don't Know
O No

Q8.RPT-ITVT. Do teachers know how to properly intervene when a student displays a concerning behavior?

○ Yes
○ I Don't Know
○ No

Q9.RPT-DDS. Are student reports of concerning behavior documented and disseminated?

○ Yes
○ I Don't Know
○ No

Q10.RPT-DDT. Are teacher reports of concerning behavior documented and disseminated?

○ Yes
○ I Don't Know
○ No

Thank you

Thank You.

Please continue forward to print a copy for your records.

Thank you again for your participation.

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