

School level and urbanicity differences in drilled plans for evacuation, lockdown, and shelter-in-place scenarios: A national analysis

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ABSTRACT

The purpose of this article was to determine the degree to which differences were present in drilled school safety plans by school level and urbanicity for the 2015-2016 and 2017-2018 school years. Data from a national survey were analyzed. As such, a causal-comparative or ex post facto research design was present. Inferential statistical analyses of nationwide survey data revealed the presence of statistically significant differences in the incidence of drilled school safety plans. Elementary schools were fourth less likely to perform shelter-in-place drills than were high schools. More than three times as many schools located within a suburb performed lockdown drills at a more significant rate than schools in rural settings. Given the recent school violence tragedies, implications for all schools having written plans and, more importantly, having drilled their students and teachers in those plans are present. Recommendations for future research studies were discussed.

Keywords: Bomb threat, Drilled plan, Elementary, Evacuation, High school, Lockdown, Middle school, Safety drills, School safety, School shootings, Shelter-in-place, Urbanicity.

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Highlights of this paper

- A national survey was analyzed with respect to schools drilling their students and staff for evacuation, lockdown, and shelter-in-place.
- Elementary, middle, and high schools had different percentages that drilled their students and staff in these plans.
- All schools, regardless of level or location, need to not only have written plans for these three areas, but more importantly, to have their students and staff drilled in the execution of these plans.

1. INTRODUCTION

Emergency operations plans that include drills are critical for school leaders when life threatening events occur in educational settings. Educational leaders need to prepare for catastrophic school safety events through the use of practiced safety drills. Evacuation drills are recommended in schools when addressing certain dangerous situations, such as a bomb threat, even when a hoax is a possibility due to the enormous pressure to perform this drill as a discretionary practice (Newman, 2005). Since the mass school shooting at Columbine High School in Littleton, Colorado lockdown drills were introduced and considered practical for addressing active shooter situations (Schildkraut, Grogan, & Nabors, 2020). Similarly, school officials must determine if shelter-in-place protocols are necessary to mitigate loss of life and property from disasters such as tornadoes, chemical leaks, and earthquakes (Stough, Kang, & Lee, 2018). In a survey conducted by the National Center for Education Statistics, respondents from the 2017-2018 school year indicated that 93% of public school students were drilled in evacuation procedures, 96% of public school students were drilled on lockdown techniques, and 83% of public school students were drilled for shelter-in-place protocols (Wang, Zhang, & Oudekerk, 2020).

According to Campbell (2020) from 2014-2018 approximately 3,200 school fires occurred in each of the years of study. These reported fires caused one death, 39 injuries, and an estimated \$37 million in U.S. dollars of property damage (Campbell, 2020). In the 2018-2019 school year, a total of 66 school shootings were reported in both private and public educational institutions with 29 deaths and 37 injuries related to the shootings throughout the United States (Wang et al., 2020). In addition, administrators of the National Oceanic and Atmospheric Administration Centers for Environmental Information documented that an average of over 1,200 tornadoes develop annually in the United States. These types of disasters are cause for robust school safety programs. School leaders who prepare for emergencies using quality safety action plans with applicable drills can improve survival rates when unforeseen disasters occur.

In a recent investigation, Kingshott and McKenzie (2013) examined elements that comprised effective emergency operations plans for schools. In their investigation, they focused on the perceptions and attitudes of school personnel toward emergency operations plans and school district safety practices. Apathy was determined to play a substantial part in creating and using emergency operations plans. Unfortunately, because of the perceived low probability of incidents happening on their specific campuses, respondents did not recognize the importance of designing, training, and practicing school safety plans as a necessary requirement of their role as an educator (Kingshott & McKenzie, 2013). Educators must not become complacent in the adherence to and in the practice of safety procedures in school settings that could most importantly save lives. Educational leaders and elected officials are charged with providing a safe learning environment for students and the overall school community (McAlpin & Slate, 2021). School officials are held accountable in most states for performing frequent safety exercise (e.g., evacuations, lockdowns, and shelter-in-place drills) in efforts to improve response time and to apply the necessary skills to prepare for possible threats to their schools.

Through the implementation of school safety prevention practices and the regular incorporation of life-saving drills, school leaders could reduce student anxiety, stress, susceptibility to danger, and improve upon their abilities

during a disaster. Students of all ages are reliant upon faculty, staff, and administrators to guide them through safety incidents that can take place in school settings (Stough et al., 2018). Incidents such as fires, bomb threats, active shooters, tornadoes, chemical leaks, or other natural disasters require a tremendous amount of training and observance of drill routines. School leaders need to establish and enforce the practice of safety drills such as evacuations, lockdowns, and shelter-in-place plans to improve student and staff responses and to curtail fears in relation to school emergencies. Stough et al. (2018) declared in their study of school-related disasters that six overarching factors existed: (a) application of safety protocols are essential when children are involved, (b) it is important to have knowledge of a variety of safety practices in multiple settings, (c) if students are at risk then school personnel are at risk, (d) school employees of all types should be highly trained enough in school-related safety techniques to make sound autonomous decisions in a crisis, (e) students should be well versed in safety practices to make decisions independently if necessary, (f) well-designed school facilities are essential to school safety, and (g) legislators play a role in guaranteeing a safe learning environment for students and members of the school community.

Implementing safety drills on a frequent basis could improve students and educators' responses to catastrophic events. Because of the complexity and enormity of school facilities and the challenges of student management it can be difficult to plan, mitigate, and respond to school safety concerns in a concise and practical manner (Stough et al., 2018). Stough et al. (2018) affirmed the notion that educators should adhere to the practice of *in loco parentis*, in other words, in place of the parent. That is, they have a moral obligation to nurture and support students while under their care and supervision, especially during a crisis situation. Safety practices and drills should be used by school leaders to reduce apprehensions and diminish possible adverse reactions to school safety incidents.

Bomb threats are a common occurrence for schools in the United States and can disrupt the educational learning process for students. Newman (2005) reported that almost 5% of all bomb threats in the United States during 1999 were directed at schools. The United States Bureau of Alcohol, Tobacco, Firearms, and Explosives Department recorded approximately 1,055 incidents where bombs were found on school properties across the country during a 12-year period (Newman, 2005). Whereas, of the 1,055 aforementioned incidents, only 14 of those threats were accompanied with prior notifications or warnings (Newman, 2005). Further documented by Newman (2005) was the infrequency of actual bombs on school premises resulting in a majority of these emergencies declared as false alarms. Regardless, this type of threat may require an evacuation of an entire campus. Schools that are forced to evacuate are often later closed for a period of time leading to disruptions to the educational process, resulting in student learning and financial losses (Newman, 2005). Trump and Miller (2015) concluded in their study of 812 United States public schools that 30% of threats resulted in an evacuation and 10% of those threats closed these institutions for a period of time following the incident. High schools experienced 70% of the overall threats with middle schools at 18%, and elementary schools received approximately 10% of these threats (Trump & Miller, 2015).

Perpetrators of school violence are using more unconventional techniques to cause harm and create fear in our school systems. Technological advances in recent years have contributed to increases in school related threats and have required evacuations in the United States. Trump and Miller (2015) established that 37% of school threats were conducted through the use of electronic means, with social media being used at a rate of 28%. Moreover, of the 812 school related threats, 359 were bomb threats that composed 44% of the total threats in the 2014-2015 school year (Trump & Miller, 2015). Safety events that require an evacuation of schools occur in the United States too frequently based on the aforesaid data. Evacuation drills should be practiced regularly and efficiently with school leader oversight. This method enables school health safety officials to enforce compliance with emergency plans and assist in ensuring members of the learning community remain safe and protected.

Active shooter situations are addressed by practicing lockdown drills as a measure to mitigate these types of threats. Wang et al. (2020) confirmed that educational settings were second only to private business settings as the most likely location of an active shooter threat. From 2000 to 2017, there were 52 total active shooters in elementary, secondary, and postsecondary schools. Of the aforementioned active shooter situations, 37 occurred at the elementary and secondary school levels, with 15 incidents reported in postsecondary institutions during the same 17-year time frame (Wang et al., 2020). Victims of these active shooter events included a total of 153 casualties in elementary and secondary schools, 67 killed and 86 wounded, from 2000-2017 (Wang et al., 2020). Wang et al. (2020) in the same National Center for Education Statistics study of elementary and secondary settings, determined all 37 of the active shooters were male and a majority of the offenders were current or previously enrolled students.

Based on these data, it is imperative that lockdown drills be conducted in educational settings. Lockdown drills are performed by school safety officials through the use of a simulated threat such as an active shooter scenario. The active shooter scenario is presented to the campus administration and the lockdown drill is initiated. Next, a public service announcement is made by a campus official stating the campus is on lockdown or a similar statement is made following the emergency operations plan created specifically for that campus. Lastly, the occupants of the entire school are locked down in their classrooms or other designated areas and participants remain silent until the drill is concluded by school officials with a final public service announcement. Educational leaders need to instruct students and staff in the correct training methods of executing a lockdown procedure in preparation for an actual event (Dickson & Vargo, 2017). School district safety personnel may reproduce loud noises, screams, and knocking on classroom doors to create a semblance of reality to improve the success of the lockdown procedure (Stevens, Barnard-Brak, Roberts, Acosta, & Wilburn, 2020). Stevens et al. (2020) noted, however, that lockdown drills should never be performed without prior notification to prevent confusion and potential harm to all involved. Though lockdown drills are required to be conducted across many states, only a limited number of research studies have been published regarding this type of school safety training (Stevens et al., 2020).

Safety drills are an ideal way to mitigate the health and well-being of school community members in an effort to prevent and prepare for breaches in school security. Shelter-in-place protocols are essential elements of a quality school safety plan. A shelter-in-place response is activated in situations such as an inclement weather event, a tornado, a hazardous liquid or gas leak, or to address an imminent threat risk that is slower moving (e.g., an acute viral disease). Practicing shelter-in-place protocols can help enhance the possibility of survival during a multitude of natural or man-made disasters. School leaders are expected to respond quickly to threats that involve sheltering-in-place by following best practices. The United States Department of Labor Occupational Safety and Health Administration (2016) recommends that during shelter-in-place events those individuals in leadership roles should (a) lock all exterior doors and close all windows; (b) gather essential resources such as flashlights, batteries, duct tape, and first aid supplies; (c) shelter in a large ground floor room that is in the interior of the building; and (d) have a hard-wired telephone for communication with authorities.

The most common of all the shelter-in-place events are tornadoes. These natural disasters are very violent and can cause serious loss of life and property damage increasing the importance of practicing shelter-in-place drills. Tornadoes develop into a vast array of sizes and speeds. They range from wind speeds of 40 miles per hour to over 300 miles per hour, traveling up to 50 miles, and have been recorded at over 2 miles wide according to Burgess et al. (2014). Regrettably, on March 1, 2007 in Enterprise, Alabama, was the location of a devastating tornado that struck Enterprise High School taking the lives of eight students (Gurspan, 2021). Additionally, on May 22, 2011 a tornado touched down in Joplin, Missouri that damaged almost half of the Joplin Independent School District's 20 structures (Banzet-Ellis, 2014). Fortunately, the event occurred on a Sunday while school was out of session leaving school

officials to help piece their communities and schools back together after the destruction from the wind storm. Similarly, in May of 2013 in Moore, Oklahoma a tornado touched down and traveled just over 50 miles at wind speeds over 200 miles per hour destroying over 4,250 structures, injuring 212 people, and killing 24 others (Brumfield, 2014). This tornado caused the walls and ceilings to collapse at the Plaza Towers Elementary School where more than 70 students were sheltered with nine students ultimately losing their lives from this tragic event (Brumfield, 2014). School leaders must practice proactiveness, preparedness, and prevention as it relates to any emergency or disaster such as a tornado requiring a shelter-in-place response that could befall their educational institutions.

1.1. Statement of the Problem

Failure to implement school safety drills such as evacuations, lockdowns, and shelter-in-place procedures have been disastrous for school communities and have contributed to the loss of valuable life. Olinger Steeves, Metallo, Byrd, Erickson, and Gresham (2017) suggested that emergency operations plans should be proactively designed, implemented, and practiced for all potential school safety hazards not just for the standard and most widely broadcasted types of violations to school security. Prevention and preparation tactics are essential elements for responding appropriately to realistic crises that can occur in schools. Additionally, laws related to awareness, security training, and safety strategies have been enacted by the legislative and executive branches at the national, state, and local levels to address current issues affecting educational practices (McAlpin & Slate, 2021). Olinger Steeves et al. (2017) stated that school accountability, including safety practices, could be improved through lawmaking endeavors based on their examination of a variety of regulations pertaining to school safety. Furthermore, Diliberti, Jackson, Correa, and Padgett (2019) analyzed data related to educational institutions techniques as it pertains to crisis planning and declared that the most frequently performed school safety drills were for (a) natural disasters at 94%, (b) active shooters at 92%, and (c) bomb threats or incidents at 91%. Educational leaders are challenged with the mission of creating a safe learning environment in which the mental, physical, and social well-being of students, staff, and all members of the learning community are advanced.

1.2. Purpose of the Study

The purpose of this study was to examine the degree to which differences were present in evacuation drilled plans as a function of school level (i.e., elementary, middle, and high schools), and school urbanicity (i.e., city, suburb, town, and rural). National survey data were analyzed to determine the degree to which differences were present in lockdown drilled plans as a function of school level and school urbanicity. Correspondingly, the degree to which differences were present in shelter-in-place drilled plans as a function of school level and school urbanicity was addressed. Through the analysis of a nationwide dataset, the degree to which school level and school urbanicity differences were present in evacuation, lockdown, and shelter-in-place drilled plans was determined.

1.3. Significance of the Study

Educational administrators and school board of trustees are concerned about potential safety breaches in school settings. Through the formulation of safety practices that increase the prevalence of school safety awareness, practical safety training, and more methodical approaches to evacuation, lockdown, and shelter-in-place protocols, opportunities can be created for an improved safety culture that could proliferate across a multitude of school systems. The true purpose of educational institutions can be distorted by media headlines that often dominate the airwaves as a constant reminder of an educational practitioner's inadequacies. Schools currently are not perceived as a setting that meets the mental, physical, and social well-being of learners. Research studies in the areas of school level

implementation of campus safety drills could further expand the regularity of potentially vital life-saving drills and augment school district response times when encountering a crisis. School district administrators and boards of trustees should deliberate all possibilities related to the safety of their students, faculty, and staff. Various factors contribute to the efficiency of evacuation, lockdown, and shelter-in-place drilled plans as it relates to school level and urbanicity. Therefore, an investigation into the areas of evacuation, lockdown, and shelter-in-place drill policies by school level and school urbanicity could be advantageous to educational leaders as a whole.

1.4. Research Questions

The following research questions were addressed in this study: (a) What is the difference in drilled evacuation plans in public schools as a function of school level?; (b) What is the difference in drilled lockdown plans in public schools as a function of school level?; (c) What is the difference in drilled shelter-in-place plans in public schools as a function of school level?; (d) What is the difference in drilled evacuation plans in public schools by school urbanicity?; (e) What is the difference in drilled lockdown plans in public schools by school urbanicity?; and (f) What is the difference in drilled shelter-in-place plans in public schools by school urbanicity? These six research questions were examined separately for the 2015-2016 and the 2017-2018 school years.

2. METHOD

2.1. Research Design

In this multiyear analysis, a causal-comparative research design was present because of the use of pre-existing data. Already existing survey data for two different school years were obtained and analyzed to address the research questions previously delineated. In such a study, the independent variables and dependent variables were not altered nor manipulated. Moreover, any extraneous variables that might be present were unknown. Accordingly, [Johnson and Christensen \(2020\)](#) have cautioned against making cause-and-effect determinations from causal-comparative research investigations.

In this investigation, one independent variable, school level, was comprised of three groups: elementary schools, middle schools, and high schools. The second independent variable of interest was school urbanicity which consisted of four groups: city, suburb, town, and rural. Dependent variables were educational leaders' survey responses to questions regarding the presence of evacuation, lockdown, and shelter-in-place drilled plans.

2.2. Participants and Instrumentation

Participants in this study were principals by school level and school urbanicity who participated in a safety survey that inventoried schools with or without drilled plans for evacuation, lockdown, and shelter-in-place scenarios along with other safety and security data from public schools. The School Survey on Crime and Safety gathers data from principals from primary and secondary public schools as mandated by the federal government. The survey questions focus on a variety of school related safety and security questions that could assist schools in implementing effective safety measures and prevent or reduce loss of life, property, and incidence of crime in public schools documented by [Diliberti et al. \(2019\)](#).

Respondents completed the survey by answering the questions with either a Yes or a No. For the purpose of this study, school level will be based on the standard school levels of elementary, middle, and high schools and school urbanicity. The National Center for Education Statistics in 2006 released new standards for determining urbanicity for the purposes of their research parameters. Based on these changes, 12 categories were derived from four specific locales (i.e., city, suburb, town, and rural) replacing the previous classification process of population density with a

new standard utilizing proximity to urban centers across the U.S. In addition, drilled plans were those school administrators who practiced and documented the outcome of such drills for their schools.

3. RESULTS

The inferential statistical procedure used to address the research questions discussed above was the Pearson chi-square procedure. The Pearson chi-square method was the optimal statistical procedure because frequency data were present for the two independent variables and for the survey questions.

Because both the independent and dependent variables were categorical, chi-squares were the statistical procedure of choice (Slate & Rojas-LeBouef, 2011). With large sample sizes from the national survey, the available sample size per cell was much more than the minimum requirement of five per cell. Accordingly, Pearson chi-square procedure assumptions were met.

3.1. Drilled Plan for Evacuation Scenario by School Level

With respect to the 2015-2016 school year, a statistically significant difference was not yielded for school level, $\chi^2(2) = 1.69, p = 0.43$. As revealed in Table 1, elementary schools were least likely to perform drilled evacuations than middle and high schools. All school levels drilled for evacuations at a rate greater than 90%.

Table 1. Descriptive statistics for drilled evacuation scenario plans by school level for the 2015-2016 school year.

School level	Drilled plan <i>n</i> and %age of total	No drilled plan <i>n</i> and %age of total
Elementary schools	(<i>n</i> = 473) 91.70%	(<i>n</i> = 43) 8.30%
Middle schools	(<i>n</i> = 673) 93.60%	(<i>n</i> = 46) 6.40%
High schools	(<i>n</i> = 717) 92.60%	(<i>n</i> = 57) 7.40%

Note: The *n* represents the number of principals who completed the survey.

With respect to the 2017-2018 school year, the result was not statistically significant, $\chi^2(2) = 2.07, p = 0.36$. Though not statistically significant, elementary and high schools were more likely to perform evacuation drills more frequently than were middle schools. Approximately one fifth of middle schools were less likely to perform evacuation drills than did elementary schools. Delineated in Table 2 are the descriptive statistics for this analysis.

Table 2. Descriptive statistics for drilled evacuation scenario plans by school level for the 2017-2018 school year.

School level	Drilled plan <i>n</i> and %age of total	No drilled plan <i>n</i> and %age of total
Elementary schools	(<i>n</i> = 624) 93.00%	(<i>n</i> = 47) 7.00%
Middle schools	(<i>n</i> = 903) 92.60%	(<i>n</i> = 72) 7.40%
High schools	(<i>n</i> = 939) 94.20%	(<i>n</i> = 58) 5.80%

Note: The *n* represents the number of principals who completed the survey.

3.2. Drilled Plan for Lockdown Scenario by School Level

Regarding drilled plans related to lockdown scenarios for the 2015-2016 school year by school level, the result was not statistically significant, $\chi^2(2) = 1.01, p = 0.60$. Though not statistically significant, middle schools were more likely to have a lockdown drill than did elementary and high schools. Each of the three school levels performed drilled evacuations at a rate of 95% or greater for the 2015-2016 school year. Table 3 contains the descriptive statistics for this analysis.

Table 3. Descriptive statistics for drilled lockdown scenario plans by school level for the 2015-2016 school year.

School level	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
Elementary schools	(<i>n</i> = 494) 95.70%	(<i>n</i> = 22) 4.30%
Middle schools	(<i>n</i> = 693) 96.40%	(<i>n</i> = 26) 3.60%
High schools	(<i>n</i> = 738) 95.30%	(<i>n</i> = 36) 4.70%

Note: The *n* represents the number of principals who completed the survey.

Concerning the 2017-2018 school year, a statistically significant difference was not yielded for school level, $\chi^2(2) = 2.15, p = 0.34$. Both elementary and high schools were almost a third less likely to practice a lockdown drill than did middle schools. Drill frequency for all school levels exceeded a rate of 96% or greater for lockdown performance. Revealed in Table 4 are the descriptive statistics for this analysis.

Table 4. Descriptive statistics for drilled lockdown scenario plans by school level for the 2017-2018 school year.

School level	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
Elementary schools	(<i>n</i> = 647) 96.40%	(<i>n</i> = 24) 3.60%
Middle schools	(<i>n</i> = 951) 97.50%	(<i>n</i> = 24) 2.50%
High schools	(<i>n</i> = 963) 96.60%	(<i>n</i> = 34) 3.40%

Note: The *n* represents the number of principals who completed the survey.

3.3. Drilled Plan for Shelter-in-Place Scenario by School Level

With respect to the 2015-2016 school year, a statistically significant difference was present for shelter-in-place drills, $\chi^2(2) = 7.57, p = 0.02$.

The effect size for this finding, Cramer's V, was below small, 0.06 (Cohen, 1988). Elementary schools were one fourth less likely to perform shelter-in-place drills than were high schools. Middle schools were one fifth more likely to drill for shelter-in-place scenarios than were elementary schools. Table 5 contains the descriptive statistics for this analysis.

Table 5. Descriptive statistics for drilled shelter-in-place scenario plans by school level for the 2015-2016 school year.

School level	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
Elementary schools	(<i>n</i> = 391) 75.80%	(<i>n</i> = 125) 24.20%
Middle schools	(<i>n</i> = 575) 80.00%	(<i>n</i> = 144) 20.00%
High schools	(<i>n</i> = 635) 82.00%	(<i>n</i> = 139) 18.00%

Note: The *n* represents the number of principals who completed the survey.

Concerning the 2017-2018 school year, a statistically significant difference was not yielded, $\chi^2(2) = 0.30, p = 0.86$. As presented in Table 6, shelter-in-place drills were reported to occur at a rate less than 85% for all levels of schools. Elementary schools were least likely to perform shelter-in-place drills than were middle and high schools.

Table 6. Descriptive statistics for drilled shelter-in-place scenario plans by school level for the 2017-2018 school year.

School level	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
Elementary schools	(<i>n</i> = 560) 83.50%	(<i>n</i> = 111) 16.50%
Middle schools	(<i>n</i> = 820) 84.10%	(<i>n</i> = 155) 15.90%
High schools	(<i>n</i> = 842) 84.50%	(<i>n</i> = 155) 15.50%

Note: The *n* represents the number of principals who completed the survey.

3.4. Drilled Plan for Evacuation Scenario by Urbanicity

With respect to the 2015-2016 school year, the result approached, but did not reach, the conventional level of statistical significance, $\chi^2(2) = 7.15, p = 0.07$. More than a third of schools within cities drilled for evacuations than did schools within rural settings. Schools within a town or rural setting were least likely to perform an evacuation drill than did city and suburb schools. Revealed in Table 7 are the descriptive statistics for this analysis.

Table 7. Descriptive statistics for drilled evacuation scenario plans by urbanicity for the 2015-2016 school year.

Urbanicity	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
City	(<i>n</i> = 527) 94.40%	(<i>n</i> = 31) 5.60%
Suburb	(<i>n</i> = 727) 93.10%	(<i>n</i> = 54) 6.90%
Town	(<i>n</i> = 269) 91.20%	(<i>n</i> = 26) 8.80%
Rural	(<i>n</i> = 414) 90.40%	(<i>n</i> = 44) 9.60%

Note: The *n* represents the number of principals who completed the survey.

Concerning the 2017-2018 school year, a statistically significant difference was not revealed, $\chi^2(3) = 5.24, p = 0.16$. As delineated in Table 8, just over a third of schools located within a township did not perform an evacuation drill as did schools within a suburb. Schools located within towns and rural areas were a third less likely to have performed evacuation drills than did schools located in a city or suburb.

Table 8. Descriptive statistics for drilled evacuation scenario plans by urbanicity for the 2017-2018 school year.

Urbanicity	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
City	(<i>n</i> = 674) 93.20%	(<i>n</i> = 49) 6.80%
Suburb	(<i>n</i> = 977) 94.50%	(<i>n</i> = 57) 5.50%
Town	(<i>n</i> = 351) 91.90%	(<i>n</i> = 31) 8.10%
Rural	(<i>n</i> = 573) 92.00%	(<i>n</i> = 50) 8.00%

Note: The *n* represents the number of principals who completed the survey.

3.5. Drilled Plan for Lockdown Scenario by Urbanicity

Regarding the 2015-2016 school year for drilled plans related to lockdown scenarios, a statistically significant difference was revealed, $\chi^2(3) = 28.05, p < 0.001$. The effect size for this finding, Cramer's V, was small, .12 (Cohen, 1988). More than three times as many schools in cities performed drills for a lockdown scenario than schools in a rural setting. Rural schools were almost three times less likely to implement a lockdown drill than were schools in a suburb. Table 9 contains the descriptive statistics for this analysis.

Table 9. Descriptive statistics for drilled lockdown scenario plans by urbanicity for the 2015-2016 school year.

Urbanicity	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
City	(<i>n</i> = 543) 97.30%	(<i>n</i> = 15) 2.70%
Suburb	(<i>n</i> = 755) 96.70%	(<i>n</i> = 26) 3.30%
Town	(<i>n</i> = 283) 95.90%	(<i>n</i> = 12) 4.10%
Rural	(<i>n</i> = 417) 91.00%	(<i>n</i> = 41) 9.00%

Note: The *n* represents the number of principals who completed the survey.

With respect to the 2017-2018 school year, a statistically significant difference was yielded, $\chi^2(3) = 22.29, p < 0.001$. The effect size for this finding, Cramer's V, was below small, 0.09 (Cohen, 1988). More than three times as many schools located in a suburb performed lockdown drills than schools in rural settings. Schools located within

cities were almost twice as likely to have implemented a lockdown drill than schools within a township. Table 10 contains the descriptive statistics for this analysis.

Table 10. Descriptive statistics for drilled lockdown scenario plans by urbanicity for the 2017-2018 school year.

Urbanicity	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
City	(<i>n</i> = 704) 97.40%	(<i>n</i> = 19) 2.60%
Suburb	(<i>n</i> = 1014) 98.10%	(<i>n</i> = 20) 1.90%
Town	(<i>n</i> = 364) 95.30%	(<i>n</i> = 18) 4.70%
Rural	(<i>n</i> = 586) 94.10%	(<i>n</i> = 37) 5.90%

Note: The *n* represents the number of principals who completed the survey.

3.6. Drilled Plan for Shelter-in-Place Scenario by Urbanicity

Concerning the 2015-2016 school year, a statistically significant difference was present for drilled plans for shelter-in-place scenarios by urbanicity, $\chi^2(3) = 27.62, p < 0.001$. The effect size for this finding, Cramer's V, was below small, .06 (Cohen, 1988). Almost twice as many schools located in a town did not implement drills for shelter-in-place than schools within a city. More than a fourth of schools in rural settings did not perform a shelter-in-place drill than schools located in a suburb. Revealed in Table 11 are the descriptive statistics for this analysis.

Table 11. Descriptive statistics for drilled shelter-in-place scenario plans by urbanicity for the 2015-2016 school year.

Urbanicity	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
City	(<i>n</i> = 468) 83.90%	(<i>n</i> = 90) 16.10%
Suburb	(<i>n</i> = 635) 81.30%	(<i>n</i> = 146) 18.70%
Town	(<i>n</i> = 210) 71.20%	(<i>n</i> = 85) 28.80%
Rural	(<i>n</i> = 340) 74.20%	(<i>n</i> = 118) 25.80%

Note: The *n* represents the number of principals who completed the survey.

Regarding the 2017-2018 school year, a statistically significant difference was revealed, $\chi^2(3) = 27.71, p < 0.001$. The effect size for this finding, Cramer's V, was small, .10 (Cohen, 1988). Almost twice as many schools in rural settings were less likely to perform a shelter-in-place drill than were suburb schools. Schools implemented shelter-in-place drills at a rate less than 90% for the urbanicity categories in question. Contained in Table 12 are the descriptive statistics for this analysis.

Table 12. Descriptive statistics for drilled shelter-in-place scenario plans by urbanicity for the 2017-2018 school year.

Urbanicity	Drilled plan <i>n</i> and % age of total	No drilled plan <i>n</i> and % age of total
City	(<i>n</i> = 605) 83.70%	(<i>n</i> = 118) 16.30%
Suburb	(<i>n</i> = 910) 88.00%	(<i>n</i> = 124) 12.00%
Town	(<i>n</i> = 308) 80.60%	(<i>n</i> = 74) 19.40%
Rural	(<i>n</i> = 491) 78.80%	(<i>n</i> = 132) 21.20%

Note: The *n* represents the number of principals who completed the survey.

4. DISCUSSION

In this multiyear analysis, the degree to which differences were present in drilled plans for evacuation, lockdown, and shelter-in-place by school level and urbanicity for the 2015-2016 and 2017-2018 school years was addressed. Statistically significant differences were revealed for shelter-in-place drilled plans by school level for 2015-2016 school year. Results for urbanicity differences for the two of the three drilled safety plans in this examination were less consistent for lockdown and shelter-in-place for the school years.

Drilled plans for all school levels in the study for evacuation and lockdown were performed at rates greater than 90% for each school year. During the 2015-2016 school year, elementary schools were least likely to perform drilled evacuations than were middle and high schools. In addition, middle schools for the 2017-2018 school completed drills for evacuation less often than elementary and high schools. All school levels performed shelter-in-place drills at a rate of less than 85% for both school years. Middle schools demonstrated a higher rate of drill completion for lockdowns during each of the school years in this examination. Both elementary and high schools were almost a third less likely to practice a lockdown drill than did middle schools. Moreover, elementary schools performed shelter-in-place drills less frequently than middle and high schools for both school years of study. For the 2017-2018 school year, all school levels completed shelter-in-place drills at a rate of less than 85%.

During the 2016-2017 school year, more than one third of schools within cities drilled for evacuations than did schools in rural settings. For 2017-2018, schools located within towns and rural areas were a third less likely to have performed evacuation drills than did schools located in a city or suburb. For the same school year, just over a third of schools located within a township did not perform an evacuation drill in comparison to schools within a suburb. Lockdown drills were completed more than three times as often for cities than schools in rural locations in 2015-2016. Additionally, rural schools were almost three times less likely to implement a lockdown drill than were schools in a suburb. More than a fourth of schools in rural settings did not perform a shelter-in-place drill than schools located in a suburb in 2015-2016. Moreover, almost twice as many schools in rural settings were less likely to perform a shelter-in-place drill than were suburb schools. Schools implemented drills for shelter-in-place at a rate of less than 90% for all urbanicity categories. Represented in [Figure 1](#) through 6 are the results for this study.

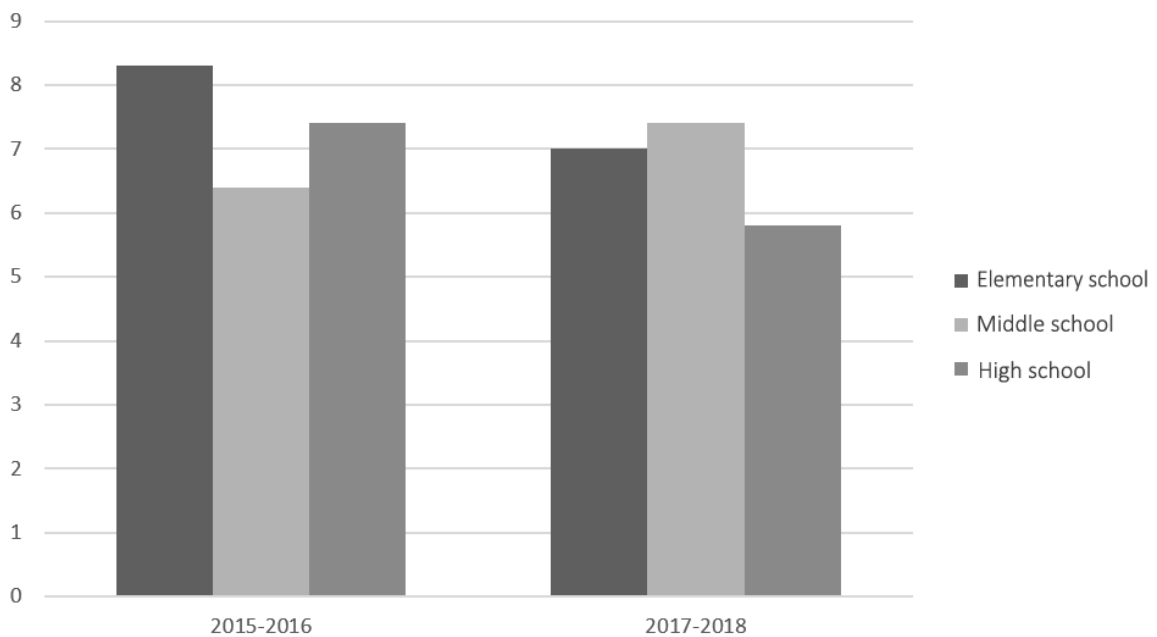


Figure 1. Percent of schools without a drilled plan for an evacuation by school level for the 2015-2016 and 2017-2018 school years.

Depicted in [Figure 1](#) above are the percentages of elementary, middle, and high schools that did not have a drilled plan for evacuations for the 2015-2016 and 2017-2018 school years. As the reader can see, not all schools drilled their students and staff in evacuations.

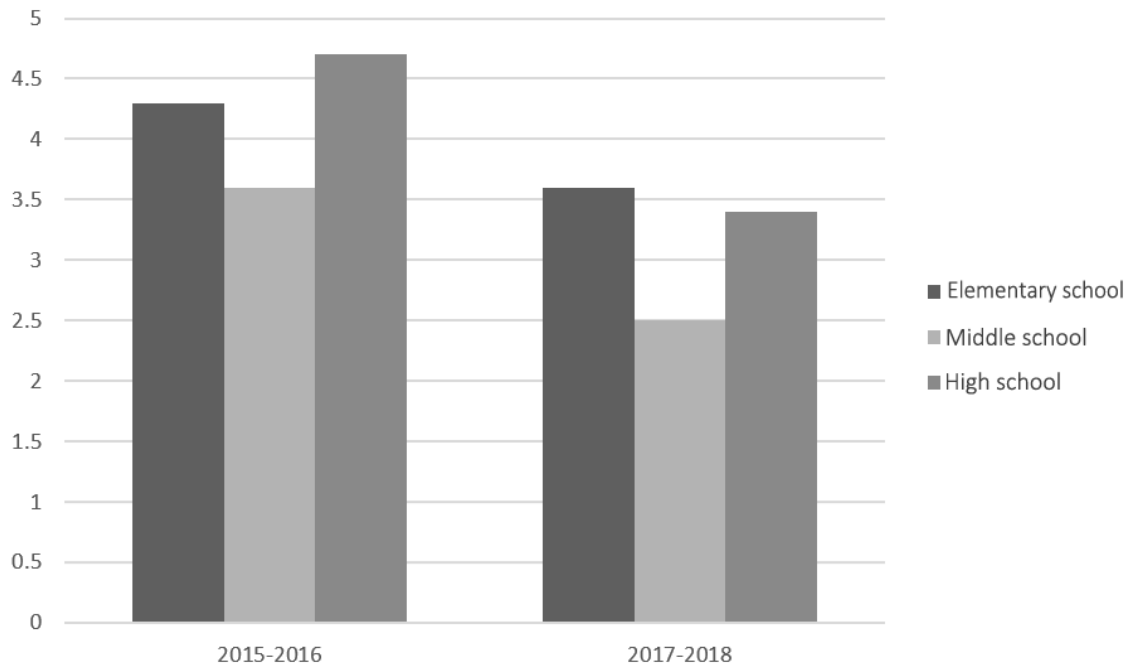


Figure 2. Percent of schools without a drilled plan for a lockdown by school level for the 2015-2016 and 2017-2018 school years.

Illustrated in Figure 2 above are the percentages of elementary, middle, and high schools that did not have a drilled plan for a lockdown for the 2015-2016 and 2017-2018 school years. Given the recent school shootings, not having a drilled plan for lockdown should not be possible. Though low, not all schools drilled their students and staff in a lockdown procedure.

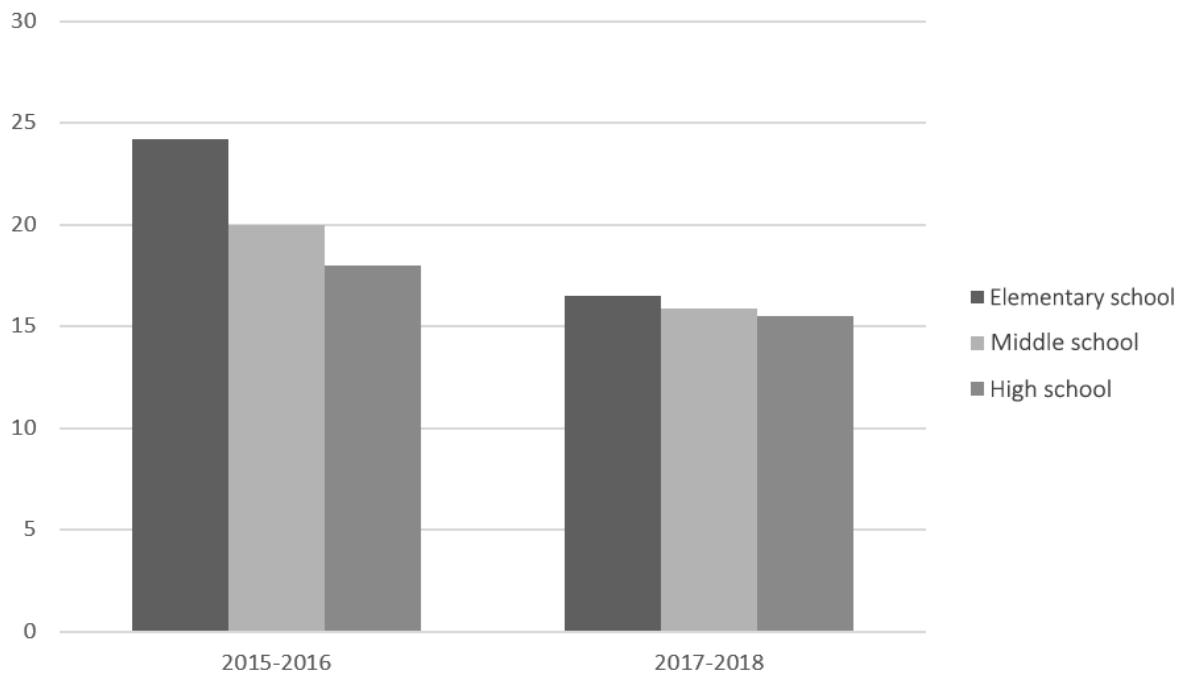


Figure 3. Percent of schools without a drilled plan for a shelter-in-place by school level for the 2015-2016 and 2017-2018 school years.

Shown in Figure 3 above are the percentages of elementary, middle, and high schools that did not have a drilled plan for a shelter-in-place for the 2015-2016 and 2017-2018 school years. Given the recent extreme weather events,

not having a drilled plan for a shelter-in-place is inexcusable. All schools, without exception, should have a shelter-in-place written plan and to then have their students and staff drilled in its execution.

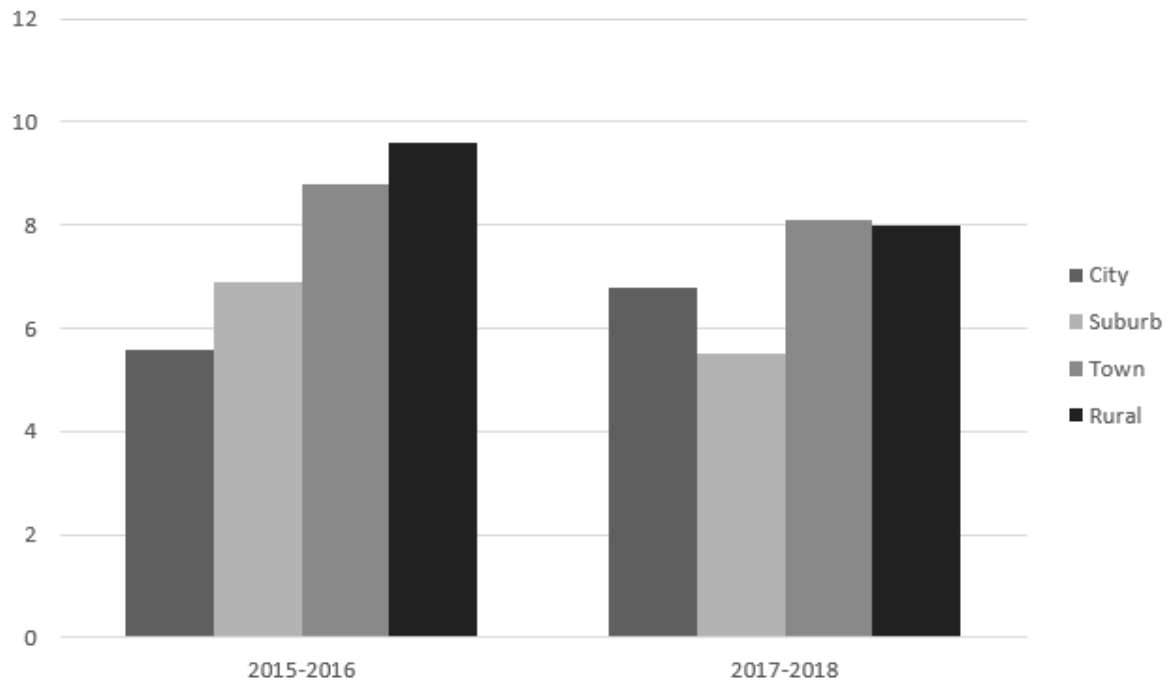


Figure 4. Percent of schools without a drilled plan for an evacuation by urbanicity for the 2015-2016 and 2017-2018 school years.

Depicted in Figure 4 above are the percentages of schools by their geographic location that did not have a drilled plan for an evacuation for the 2015-2016 and 2017-2018 school years. Given recent school events of violence and weather, we believe that all schools, regardless of their location, should have both a written plan and then have their students and staff drilled in being able to evacuate the school premises.

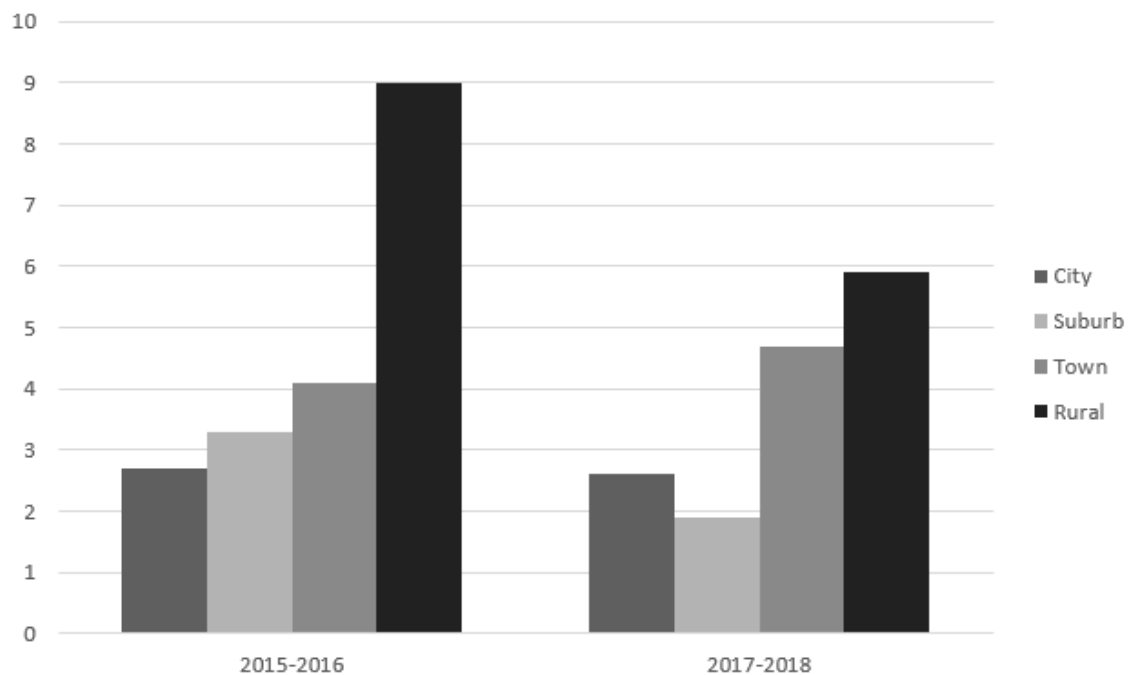


Figure 5. Percent of schools without a drilled plan for a lockdown by urbanicity for the 2015-2016 and 2017-2018 school years.

Illustrated in Figure 5 above are the percentages of schools by their geographic location that did not have a drilled plan for a lockdown for the 2015-2016 and 2017-2018 school years. Given recent school events of violence, we believe that all schools, regardless of their location, should have both a written plan and then have their students and staff drilled in a lockdown procedure.

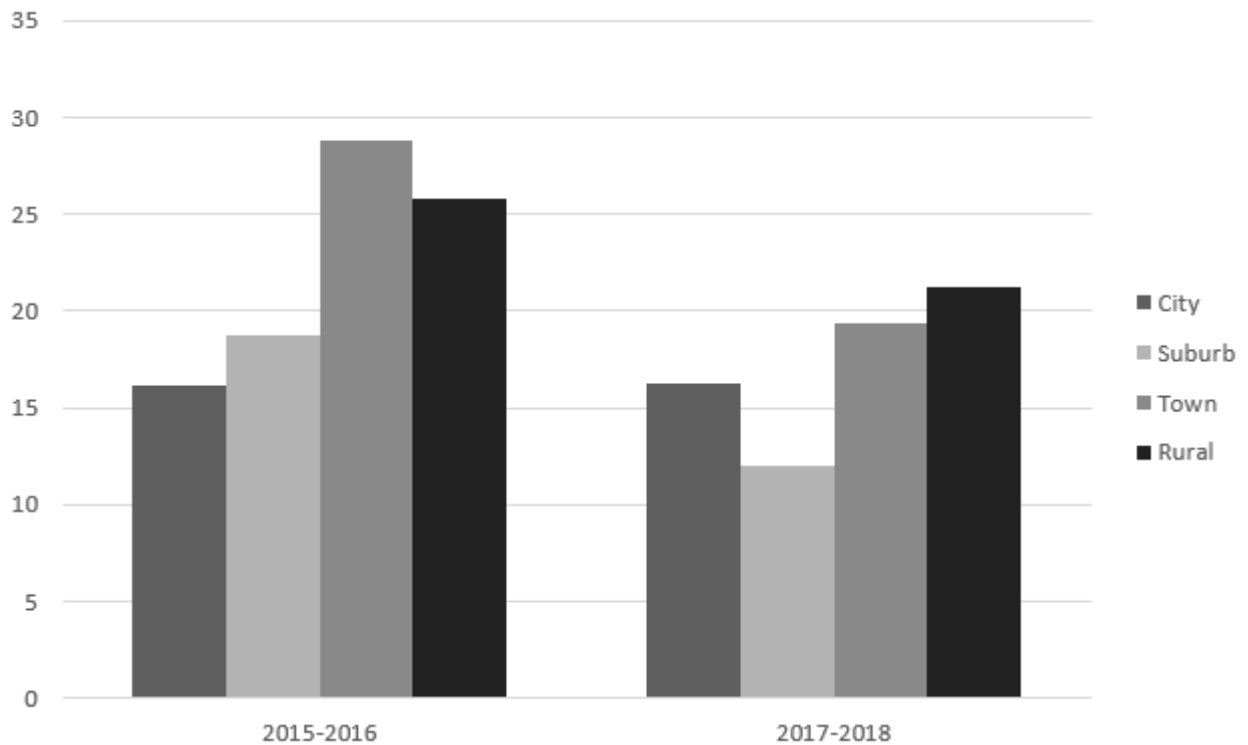


Figure 6. Percent of schools without a drilled plan for a shelter-in-place by urbanicity for the 2015-2016 and 2017-2018 school years.

Shown in Figure 6 above are the percentages of schools by their geographic location that did not have a drilled plan for a shelter-in-place for the 2015-2016 and 2017-2018 school years. Given recent school events of violence, we believe that all schools, regardless of their location, should have both a written plan and then have their students and staff drilled in a shelter-in-place procedure.

4.1. Connections to Existing Literature

As documented in this study, differences in drilled school safety plans by school level and urbanicity were present. These findings were commensurate with the results reported by other researchers (Kingshott & McKenzie, 2013; Newman, 2005; Schildkraut et al., 2020; Stough et al., 2018; Trump & Miller, 2015; Wang et al., 2020) who have established similar deficiencies in the implementation of drilled safety plans for schools and other entities. School leaders must actively engage in the adherence to and performance of drilled safety plans for the prevention of loss of life and property.

4.2. Implications for Policy and for Practice

Based upon the results discussed herein, the following implications for policy and practice can be recommended. Educational leaders who do not perform safety drills on a consistent basis could create substantial risks for their students, faculty, and staff. Concerning policy, school officials should utilize proactive measures to minimize the effects of a disaster that could affect school systems. Policymakers could assist in the implementation of school safety

accountability programs that incorporate drills as a critical component. Through the possible development of a unified safety drill implementation plan conducted regionally or at a state level, improved school safety accountability could be established. In addition, elected school boards or school officials could adopt, locally, drill enactment plans with periodic reviews to improve response and success during a crisis. School safety can be correlated to mental and social health concerns that produce additional complications for educational leaders. Moreover, additional practical methods to aid in refining school safety are improved educational programs and allocation of funds for mental health issues to assist school personnel, parents/guardians, and students in the deterrence of school related safety matters.

With respect to practice, drilled safety plans for schools were not administered consistently across all school or urbanicity levels. More accountability is needed in the area of drill implementation for the safety of students and staff members within our school systems. Educational leaders should consider factors such as time constraints, apathy, lack of accountability, funding, and the effects of mental health issues when developing a plan of action for school safety practice improvement. With additional staff members and more practical training sessions for students and staff members, enhancing school safety practices can be possible. Due to the potential for violence and unpredictability for a natural disaster, social and emergency management services could support educational leaders with the detection of a variety of security susceptibilities and assist with the mediation techniques, if necessary. Educational institutions that unsuccessfully develop, implement, and effectually sustain emergency practices through consistency eventually succumb to the perils of both preventable and mitigatable events that lead to unintentional outcomes for their constituencies.

4.3. Recommendations for Future Research

Several recommendations are possible for further research based on the results of this national, multiyear investigation. The survey data analyzed herein pertained only to drilled plans for evacuation, lockdown, and shelter-in-place scenarios. Research investigations are encouraged for other drilled safety plans (e.g., reverse evacuation and duck-cover-hold), written safety plans (e.g., pandemic flu/disease, active shooter, hostage, and bomb threats), safety drill frequencies, and other similar related scenarios. Similarly, qualitative interviews of a sampling of school level principals from various urbanicity groupings could garner additional data to minimize concerns about extraneous variables. Researchers could ask more detailed questions about the community makeup, the physical design of school campuses, or access to public services (e.g., fire safety and rescue, police services, and emergency medical services). Similarly, a more focused study on the implementation of elementary drilled safety plans and rural school safety practices could complement the findings of this article.

5. CONCLUSION

The purpose of this research investigation was to determine the degree to which differences were present in drilled safety plans by school level and urbanicity. Inferential statistical analyses of the 2015-2016 and 2017-2018 school years of nationwide school safety data yielded the presence of statistically significant differences between drilled safety plans for schools by school level and urbanicity. Drilled safety plans were more likely to occur at middle and high schools as compared to elementary schools. Elementary schools were least likely to perform evacuations as compared to middle and high schools. Middle schools had more frequent lockdown drills than both elementary and high schools by almost a third more frequently. Elementary schools were a fourth less likely to perform shelter-in-place drills than were high schools for school year 2015-2016. In addition, for both school years of study schools located in rural areas performed drills less often than the other urbanicity categories. More than a third of schools within cities drilled for evacuations than did schools in rural areas. Similarly, more than three times as many schools in cities completed

drills for a lockdown scenario than schools in a rural setting. Almost twice as many schools in rural settings were less likely to conduct a shelter-in-place drill than were suburb schools. Safety for schools should be prioritized by educational leaders along with other key stakeholders such as parents, teachers, policymakers, and community members.

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