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Evidence-Based Security Practices

The Effectiveness of School Security Measures on School Shooting Incidents

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International Association of Professional Security Consultants

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INTRODUCTION

While school shooting incidents remain a relatively rare event, evidence suggests these events are on the rise,¹ leading to increased awareness and public outcry for improved security procedures on campuses. This is particularly important as firearms remain one of the leading causes of child and adolescent fatalities within the U.S.² When it comes to shootings by location, more than 20% were reported on school campuses,³ with a large percentage of them having been committed by a current or former student.⁴ With high profile cases over the last few decades (e.g., Sandy Hook Elementary in Newtown, CT, Marjory Stoneman Douglas High School in Parkland, FL, Robb Elementary School in Uvalde, TX, and Santa Fe High School in Santa Fe, TX, to name a few), parents, policymakers, and officials are calling for more security changes,⁵ but in order to do so effectively, researchers and practitioners must understand the impact of security measures and evaluate their efficacy. This includes redirecting efforts towards place-based research and identifying measures that improve safety.

¹ Katsiyannis, A., Rapa, L. J., Whitford, D. K., & Scott, S. N. (2023). An examination of US school mass shootings, 2017–2022: Findings and implications. *Advances in neurodevelopmental disorders*, 7(1), 66–76. <https://doi.org/10.1007/s41252-022-00277-3>

² Cunningham, R. M., Walton, M. A., & Carter, P. M. (2018). The major causes of death in children and adolescents in the United States. *New England Journal of Medicine*, 379(25), 2468–2475. <https://doi.org/10.1056/NEJMSr1804754>

³ O’Neill, J. P., Miller, J. J., & Waters, J. R. (2016). Active shooter: Recommendations and analysis for risk mitigation. *New York City Police Department, NY*. <https://www.nyc.gov/assets/nypd/downloads/pdf/counterterrorism/active-shooter-analysis2016.pdf>

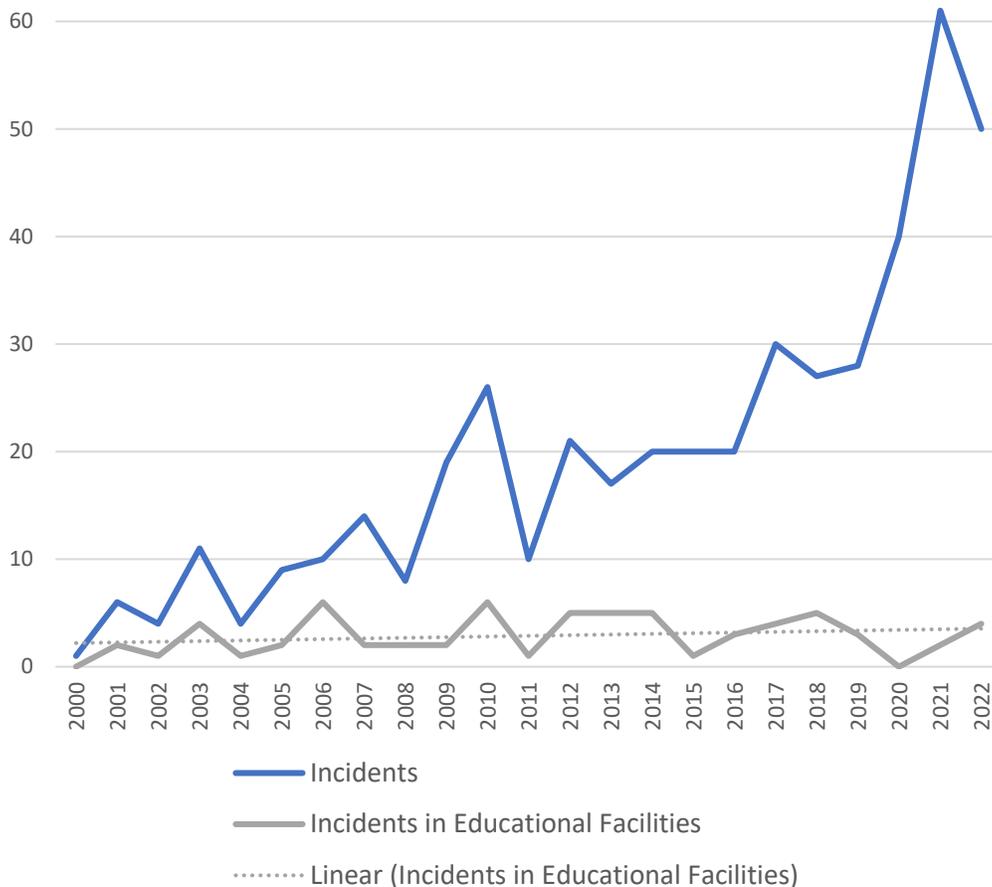
⁴ Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B. & Vineyard, N. (2021). Averting targeted school violence: A US Secret Service analysis of plots against schools. <https://www.secretservice.gov/sites/default/files/reports/2021-03/USSS%20Averting%20Targeted%20School%20Violence.2021.03.pdf>

⁵ Madfis, E. (2016). “It’s better to overreact”: School officials’ fear and perceived risk of rampage attacks and the criminalization of American public schools. *Critical Criminology*, 24(1), 39–55. <https://doi.org/10.1007/s10612-015-9297-0>



Active Shooter Incidents by Year

Source: Federal Bureau of Investigation



Note: The figure above presents the active shooter incidents by year reported by the Federal Bureau of Investigation (FBI) in the Active Shooter Incident Reports for the years 2000-2022. These reports do not include all gun-related shootings and are intended to provide law enforcement, first responders, and educators information on active shooter incidents. These results do not report the number of casualties.

The ease of accessing firearms within the country means risk of violence on school campuses will remain; however, understanding which security measures reduce that risk plays an essential role for policy and safety. This review aims to understand how different security measures and policies implemented on school campuses affect campus safety and reduce

risk of school shootings through situational crime prevention (SCP) and briefly discusses crime prevention through environmental design (CPTED). Using evidence-based research to identify effective security measures that reduce school shooting incidents and minimize casualties can highlight strategies that save lives, bolster school and community safety, and reduce crime.

FRAMEWORK

Situational Crime Prevention

Theoretical framework surrounding mass public violence has called attention to situational crime prevention as a way to reduce harm,⁶ and by extension more recently, used to explain school shootings.⁷ Rather than focusing on individuals committing criminal acts, SCP focuses on the setting where a crime occurs, highlighting the importance of environment.⁸ In order for a crime to occur, there must be opportunity for an offender to commit an offense.⁹ As a result, schools can create an environment that either motivates or discourages a potential offender from engaging in violent crime, such as school shootings.

SCP is rooted in two criminological theories: Rational choice theory and routine activity theory. Rational choice theory suggests that potential offenders are rational beings that will weigh the costs and benefits (i.e., make a rational decision) of committing a crime, attempting to maximize reward and minimize risk.¹⁰ When addressing crime prevention efforts, SCP aims to challenge an individual's perception of risk and reward by increasing risk and/or minimizing reward, and is therefore focused on changing the criminal outcome by changing a person's decision. Effective intervention strategies that reduce risk could mean the utilization of "hard"

⁶ Freilich, J. D., Chermak, S. M., & Klein, B. R. (2020). Investigating the applicability of situational crime prevention to the public mass violence context. *Criminology & Public Policy*, 19(1), 271–293. <https://doi.org/10.1111/1745-9133.12480>

⁷ Gammell, S. P. (2019). *Beyond motive: Situational influences in student perpetrated shootings*. The University of Texas at Dallas. Retrieved from <https://www.proquest.com/docview/2497177250?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20&%20Theses>

⁸ Clarke, R. V. (1983). Situational crime prevention: Its theoretical basis and practical scope. *Crime and justice*, 4, 225–256. <https://doi.org/10.1086/449090>

⁹ Clarke, R. V. (1995). Situational crime prevention. *Crime and justice*, 19, 91–150. <https://doi.org/10.1086/449230>

¹⁰ Cornish, D. B., & Clarke, R.V. (Eds) (1986). *The reasoning criminal: Rational choice perspectives on offending*. New York: Springer-Verlag.



interventions such as making it more difficult (or impossible) for a crime to be committed, or at the very least, mitigating harm through quick response times for first responders (i.e., an enhanced communication system) and providing protective devices at a location (e.g., bullet proof glass) to reduce potential fatalities.¹¹ In the context of school shootings, enforcing effective security safety measures that increases risk of being detected and reduces the likelihood of victim fatality would therefore serve as effective SCP measures that should be considered in school settings.

Routine activity theory also guides SCP and states that crime will occur when there is (1) a motivated offender, (2) a suitable target, and (3) the absence of a capable guardian (e.g., people such as security officers, police, or trained staff, as well as environmental factors such as locks), and is more focused on altering the criminal outcome by changing the situation.¹² Increasing risk could mean adding to the number of capable guardians at a location and/or minimizing the number of suitable targets (e.g., limiting the number of targets in large, open spaces¹³). This means that the nature of the physical environment, including technology and communications, can facilitate or hinder guardianship, increasing or decreasing the likelihood there will be a motivated offender.¹⁴ Within school contexts of SCP, “visible security measures” have been used as techniques to increase risk of detection including surveillance devices (e.g., metal detectors or video surveillance), security personnel (e.g., school resource officers or security officers), as well as access control measures (e.g., locked doors and fences) as a way to limit or block access to certain areas and discourage potential offenders.¹⁵

SCP can be used as a framework for location-specific crime occurrences – particularly at-risk settings – that is applicable to school shootings. SCP aims to reduce crime by altering the environment where crime would occur by increasing risk and reducing reward. Environmental

¹¹ Freilich, J. D., Chermak, S. M., & Klein, B. R. (2020). Investigating the applicability of situational crime prevention to the public mass violence context. *Criminology & Public Policy*, 19(1), 271–293. <https://doi.org/10.1111/1745-9133.12480>

¹² Cohen, L. E., & Felson, M. (1979). Social change and crime rate trends: A routine activity approach (1979). *American Sociological Review*, 44(4), 588–608.

¹³ Silva, J. R., & Greene-Colozzi, E. A. (2021). Mass shootings and routine activities theory: The impact of motivation, target suitability, and capable guardianship on fatalities and injuries. *Victims & Offenders*, 16(4), 565–586. <https://doi.org/10.1080/15564886.2020.1823919>

¹⁴ Clarke, R. V. (1995). Situational crime prevention. *Crime and Justice*, 19, 91–150. <https://doi.org/10.1086/449230>

¹⁵ Zhang, A., Wang, K., Zhang, J., Kemp, J., Diliberti, M., & Oudekerk, B. A. (2018). Indicators of School Crime and Safety: 2017. NCES 2018-036/NCJ 251413. *National Center for Education Statistics*.



changes and interventions have the opportunity to reduce the likelihood a violent attack will occur,¹⁶ but security measures taken to reduce the likelihood of these events need to be independently assessed using evidence-based research. This paper reviews the evidence on SCP techniques including visible security measures, structural safety measures (e.g., access control), and proactive school safety measures (e.g., threat assessment teams) that seek to minimize risk of school shootings.

Crime Prevention Through Environmental Design (CPTED). CPTED and SCP are both concerned with changing environments and how it can decrease the opportunity for a crime to be committed.¹⁷ However, CPTED focuses on architectural design. Specifically, how the physical environment of a school can reduce antisocial behavior by focusing on natural surveillance (e.g., creating layouts to maximize line of sight), access control, and territoriality (e.g., adding signs that prohibit drugs and/or weapons or encouraging adherence to rules),¹⁸ which has been generally found to be viewed favorably by students as it increases feelings of safety.¹⁹

SCHOOL SECURITY MEASURES

Advancement in electronic security systems and alternative approaches to combating violent crime on campus have gradually been incorporated over the past couple decades. For example, public schools in more recent years (2019-2020) have seen an increase in a multitude of safety and security measures including access control, security cameras, requiring staff, faculty, and student IDs, metal detector checks, and sweeps for contraband.²⁰

¹⁶ Freilich, J. D., Chermak, S. M., & Klein, B. R. (2020). Investigating the applicability of situational crime prevention to the public mass violence context. *Criminology & Public Policy*, 19(1), 271–293. <https://doi.org/10.1111/1745-9133.12480>

¹⁷ Cozens, P., & Love, T. (2015). A review and current status of crime prevention through environmental design (CPTED). *Journal of Planning Literature*, 30(4), 393–412. <https://doi.org/10.1177/08854122155954>

¹⁸ Lamoreaux, D., & Sulkowski, M. L. (2020). An alternative to fortified schools: Using crime prevention through environmental design (CPTED) to balance student safety and psychological well-being. *Psychology in the Schools*, 57(1), 152–165. <https://doi.org/10.1002/pits.22301>

¹⁹ Lamoreaux, D. J., & Sulkowski, M. L. (2021). Crime prevention through environmental design in schools: students' perceptions of safety and psychological comfort. *Psychology in the Schools*, 58(3), 475–493. <https://doi.org/10.1002/pits.22459>

²⁰ National Center for Education Statistics. (2022). Safety and security practices at public schools. *U.S. Department of Education, Institute of Education Sciences*. Retrieved from <https://nces.ed.gov/programs/coe/indicator/a19>



Evidence supporting the degree in which many of these security measures reduces school shooting incidents, however, varies.

Visible Security Measures

Visible security measures are methods commonly used in public spaces (e.g., schools or malls) that aim to deter crime and improve public safety. These measures can include cameras, metal detectors, or security personnel such as police officers, security officers, or school resource officers on school campuses that act as a “guardian” to deter would-be offenders. While school safety remains a top priority for schools, there is a dearth of research empirically testing the efficacy of school security measures on school shooting incidents. The following section highlights the current literature on visible security measures and their effectiveness in reducing school shootings.

Security Personnel. Security personnel can be school resource officers (SROs), or security officers placed on campus as a way to promote a safe environment. SROs are sworn law enforcement officers assigned to a school or multiple schools that act as a guardian on campus to increase safety and deter crime by responding immediately to a crisis.²¹ As the Department of Justice has offered a financial incentive of nearly \$750 million dollars in grant money for SROs dating back to 2004, many schools have decided to employ more SROs as a way to respond to mass shooting incidents.²² While there has been widespread support for the use of SROs on campus, there is little evidence of its effectiveness when it comes to actually preventing school shootings.

The lack of empirical evidence supporting the claim that SROs prevent school shootings suggests the use of these officers on campus to stop such events should be taken with caution. In fact, only recently has research begun to empirically test the effectiveness of SROs

²¹ Gammell, S. P. (2019). *Beyond motive: Situational influences in student perpetrated shootings*. The University of Texas at Dallas. Retrieved from <https://www.proquest.com/docview/2497177250?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20%20Theses>; Zhang, A., Wang, K., Zhang, J., Kemp, J., Diliberti, M., & Oudekerk, B. A. (2018). Indicators of School Crime and Safety: 2017. NCES 2018-036/NCJ 251413. *National Center for Education Statistics*.

²² Addington, L. A. (2009). Cops and cameras: Public school security as a policy response to Columbine. *American Behavioral Scientist*, 52(10), 1426–1446.
<https://doi.org/10.1177/000276420933256>



despite the inclusion of them on campus since the 1990s. Recent literature examining the effectiveness of SROs in public schools found that while they increased the number of drug- and weapon-related offenses and number of crimes reported, SROs are not necessarily improving school safety but increasing the number of students who get expelled.²³ Other studies, however, have identified positive effects of SROs on school violence. For example, schools that had SROs assigned saw a decrease in fighting and possession of drugs, as well as major offenses including the use of a handgun, knife, or other weapon.²⁴ Others have reported positive perceptions of SROs. The frequency in which one speaks to SROs was associated with a greater willingness to report peers who have brought a gun to school or who have talked about killing someone.²⁵

More recently, research has begun identifying the effectiveness of SROs in reducing school shootings. When testing the association between SROs and the occurrence of a school shooting, research found a positive effect, suggesting schools who had SROs were actually more likely to report a school shooting.²⁶ Taken together, limited, available evidence does not appear to support the use of SROs to prevent gun violence,²⁷ but may instead be more beneficial in reducing other types of crimes. An example of this can be seen when looking at the Robb Elementary School shooting that occurred in Uvalde, Texas, where the SRO program

²³ Gottfredson, D. C., Crosse, S., Tang, Z., Bauer, E. L., Harmon, M. A., Hagen, C. A., & Greene, A. D. (2020). Effects of school resource officers on school crime and responses to school crime. *Criminology & Public Policy*, 19(3), 905–940. <https://doi.org/10.1111/1745-9133.12512>

Devlin, D. N., & Gottfredson, D. C. (2018). The roles of police officers in schools: Effects on the recording and reporting of crime. *Youth Violence and Juvenile Justice*, 16(2), 208–223. <https://doi.org/10.1177/1541204016680405>

²⁴ Johnson, I. M. (1999). School violence: The effectiveness of a school resource officer program in a southern city. *Journal of Criminal Justice*, 27(2), 173–192. [https://doi.org/10.1016/S0047-2352\(98\)00049-X](https://doi.org/10.1016/S0047-2352(98)00049-X)

²⁵ Crichlow-Ball, C., Cornell, D., & Huang, F. (2022). Student perceptions of school resource officers and threat reporting. *Journal of School Violence*, 21(2), 222–236. <https://doi.org/10.1080/15388220.2022.2054423>

²⁶ Flores, Y., Belton, I., Woods-Jaeger, B., Cummings, J., & Livingston, M. (2023). Examining the association between the presence of an SRO and the occurrence of a school shooting. *Frontiers in Public Health*, 12, 1322156. <https://doi.org/10.3389/fpubh.2024.1322156>

²⁷ Flannery, D. J., Fox, J. A., Wallace, L., Mulvey, E., & Modzeleski, W. (2021). Guns, school shooters, and school safety: What we know and directions for change. *School Psychology Review*, 50(2-3), 237–253. <https://doi.org/10.1080/2372966X.2020.1846458>



was used but failed to deter a school shooter.²⁸ Despite these findings, SROs have in the past prevented school shootings. For example, the SRO at Blountville High School was able to prevent an incident and gave the school enough time to initiate a lockdown.²⁹ More research is needed empirically testing the effects of SROs on school shooting incidents.

Video Surveillance. Video surveillance is another form of visible security measures that offer surveillance to a targeted area such as schools. In line with SCP, video surveillance aims to deter an offender from committing a crime by creating the perception that they are more likely to get caught.³⁰ Cameras can be located in many spaces of the targeted area such as hallways, gyms, or lunchrooms. Despite the prevalence of cameras on school campuses, there is limited support in its effectiveness, and instead, security cameras may be unrelated to crime reduction in school.³¹ In addition, a large percentage of shooters (40%) commit suicide,³² suggesting video surveillance may not be useful because the perpetrator is not concerned about getting caught. This draws attention to past school shootings such as the one that occurred at Columbine high school in 1999, where the two shooters were not deterred by the presence of video surveillance, suggesting it may instead act as more of a reactive rather than proactive measure that serves to minimize loss (e.g., theft) and assist in solving crime rather than preventing violent crime.³³ In support of this sentiment, research seeking to understand the effects of video surveillance on crime by reviewing 40 years of research found modest effects in the reduction of vehicle and property crime in general, but

²⁸ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services.

<https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>

²⁹ Silva, J. R., & Greene-Colozzi, E. A. (2022). An exploratory study of failed mass shootings in America. *Security Journal*, 35(2), 367–399. <https://doi.org/10.1057/s41284-020-00281-z>

³⁰ Ratcliffe, J. (2006). *Video surveillance of public places*. Washington, DC: US Department of Justice, Office of Community Oriented Policing Services. Retrieved from https://popcenter.asu.edu/sites/default/files/video_surveillance_of_public_places_2d_ed_9.1.22.pdf

³¹ Fisher, B. W., Higgins, E. M., & Homer, E. M. (2021). School crime and punishment and the implementation of security cameras: Findings from a national longitudinal study. *Justice Quarterly*, 38(1), 22–46. <https://doi.org/10.1080/07418825.2018.1518476>

³² Blair, J. P., & Schweit, K. W. (2014). A study of active shooter incidents in the United States between 2000 and 2013. *US Department of Justice*.

³³ King, S., & Bracy, N. L. (2019). School security in the post-Columbine era: Trends, consequences, and future directions. *Journal of contemporary criminal justice*, 35(3), 274–295. <https://doi.org/10.1177/1043986219840188>



no effect was observed for violent crime, suggesting crime prevention efforts and security budget expenditure should be focused elsewhere.³⁴

Metal Detectors. In line with SCP, the use of metal detectors on school campuses is believed to act as a deterrent by increasing the risk of weapons detection. Once an alert has been triggered, individuals should experience a secondary screening that would allow for further inspection to determine if there is a legitimate threat.³⁵ However, the use of metal detectors on school campuses, while mixed, does not garner a lot of support when it comes to reducing school shootings. Although they may act to deter individuals from carrying a weapon daily into school buildings, they may not necessarily be relevant for acts of mass gun violence among individuals who are planning a single event with the goal of maximizing the number of casualties.³⁶ Prior literature has found some support for a deterrent effect of metal detectors; however, a small percentage of students were still not deterred.³⁷ Additionally, while metal detectors may be more likely to identify weapons coming into the school, it does not mean it would prevent a school shooting. For example, the Columbine High School shooters, Eric Harris and Dylan Klebold, began outside of the school – which did not have metal detectors – by tossing a pipe bomb into the parking lot. In this case, metal detectors would not have been useful. These findings taken together suggest that there may be some deterrent effect, but it does not completely eliminate students from bringing weapons into school, especially if students have access to the school from a separate, unlocked door. When considering the technical and operational factors of metal detectors such as cost, maintenance, privacy rights, and screening policy, it is important to weigh their efficacy in crime reduction as this could

³⁴ Piza, E. L., Welsh, B. C., Farrington, D. P., & Thomas, A. L. (2019). CCTV surveillance for crime prevention: A 40-year systematic review with meta-analysis. *Criminology & Public Policy*, 18(1), 135–159. <https://doi.org/10.1111/1745-9133.12419>

³⁵ Pinzón-Gómez, C. L. (2023) Weapons detection in public access areas. *International Association of Professional Security Consultants*. Retrieved from https://www.iapsc.org/site/assets/files/2477/ebsp_23-02_weapon_detection_in_public_access_facilities.pdf

³⁶ Kleck, G. (2009). Mass shootings in schools: The worst possible case for gun control. *American Behavioral Scientist*, 52(10), 1447–1464. <https://doi.org/10.1177/0002764209332557>

³⁷ Ginsberg, C., & Loffredo, L. (1993). Violence-related attitudes and behaviors of high school students—New York City, 1992. *The Journal of School Health*, 63(10), 438–440. <https://doi.org/10.1111/j.1746-1561.1993.tb06080.x>



lead to fiscal cuts elsewhere,³⁸ and therefore investing in effective security measures should rely on more empirical support.

More recently, new weapons detection systems are emerging that are AI-driven and are starting to be introduced into schools. These AI-driven systems aim to automatically identify people who pose a security risk to the public in real time by identifying weapons or suspicious objects³⁹; however, more empirical research is needed testing the efficacy of these new systems within K-12 school institutions. Additionally, reliable data are also needed to assess the accuracy of AI weapons detection systems.⁴⁰

Summary of visible security measures

While research is available on visible security measures and their association with school shooting incidents, there remains limited support when it comes to making schools safer from gun violence. These measures may help in weapon and crime detection on campuses, but it does not mean it acts as a deterrent to violence or reduces exposure to firearms.⁴¹ Visible security measures used in schools has remained a controversial subject, particularly when it comes to the role SROs play in school shooting prevention, as well as metal detectors,⁴² which could lead to the criminalization of students through more punitive approaches and decreased student sense of safety.⁴³ They are also more costly and lack empirical support for their effectiveness in preventing gun violence. If the use of visible security measures is

³⁸ Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. *Victims & Offenders*, 12(6), 956–973. <https://doi.org/10.1080/15564886.2017.1307293>

³⁹ Ahmed, A. A., & Nyarko, B. (2024) Smart-Watcher: An AI-powered IoT monitoring system for small-medium scale premises. *Workshop on Computing, Networking and Communications (CNC)*. Retrieved from <http://www.conf-icnc.org/2024/papers/p139-ahmed.pdf>

⁴⁰ Pinzón-Gómez, C. L. (2023) Weapons detection in public access areas. *International Association of Professional Security Consultants*. Retrieved from https://www.iapsc.org/site/assets/files/2477/ebsp_23-02_weapon_detection_in_public_access_facilities.pdf

⁴¹ Tanner-Smith, E. E., Fisher, B. W., Addington, L. A., & Gardella, J. H. (2018). Adding security, but subtracting safety? Exploring schools' use of multiple visible security measures. *American Journal of Criminal Justice*, 43, 102–119. <https://doi.org/10.1007/s12103-017-9409-3>

⁴² Finley, L. L. (2006). Examining school searches as systemic violence. *Critical Criminology*, 14(2), 117–135. <https://doi.org/10.1007/s10612-006-9002-4>

⁴³ Hankin, A., Hertz, M., & Simon, T. (2011). Impacts of metal detector use in schools: Insights from 15 years of research. *Journal of School Health*, 81(2), 100–106. <https://doi.org/10.1111/j.1746-1561.2010.00566.x>



included when targeting gun violence on school campuses, then more research is needed to provide support of its efficacy.

Access Control

Access control is a type of SCP and CPTED technique that has been used in schools as a safety measure aimed at limiting access or blocking an offender from accessing a specific space. These strategies include doors, locks, fences, gates, or screening visitors to monitor those entering or leaving a school.⁴⁴ Most school shooting incidents occur outside, with a higher percentage reporting (1) the parking lot (28%), (2) front of the school (13%), and (3) beside a building (9%) compared to other outside and indoor spaces (e.g., classrooms, hallways, cafeterias, etc.), and most occurred after the escalation of a dispute (39%).⁴⁵ When it comes to the time in which a school shooting event occurred, most occurred during morning classes (17%), followed by a sport event (14%) and dismissal (13%). When accounting for morning and afternoon classes, less than one third (29%) of school shooting incidents occurred during these times. These data suggest that while there are incidents occurring within the school, there does appear to be a greater likelihood that a school shooting event will take place outside, which could hold implications for access control measures taken to prevent school shootings within buildings, or that there is more opportunity to commit a school shooting outside; however, more empirical research is needed to test this assumption.

Few studies have empirically tested access control strategies as a way to reduce violent crime in schools. Research that does exist suggests access control does little, if anything, to reduce violent crime.⁴⁶ More recent literature instead finds that access control security measures

⁴⁴ Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. *Victims & Offenders*, 12(6), 956–973. <https://doi.org/10.1080/15564886.2017.1307293>

⁴⁵ K-12 School Shooting Database. (2024). Retrieved from <https://k12ssdb.org>

⁴⁶ Jennings, W. G., Khey, D. N., Maskaly, J., & Donner, C. M. (2011). Evaluating the relationship between law enforcement and school security measures and violent crime in schools. *Journal of Police Crisis Negotiations*, 11, 109–124. <https://doi.org/10.1080/15332586.2011.581511>; Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. *Victims & Offenders*, 12(6), 956–973. <https://doi.org/10.1080/15564886.2017.1307293>



may actually increase the likelihood of a shooting occurring inside of a school building,⁴⁷ which may speak to the unique and complex nature of school gun violence that creates vast differences between school shooting incidents and context in which the shooting incident occurred that requires more exploration. It is also possible that these results are drawing attention to differences in motivated offenders who are not dissuaded by access control measures.

It is also important to note that many school shooters could already have access to the school grounds (e.g., students, teachers, or staff), and therefore access control strategies may not be as effective. This has been the case for prior school shootings since Columbine High School. Additionally, while interior and exterior doors may be required to remain locked while classes are in session at some schools, this is not always followed. A critical review of Robb Elementary School in Uvalde, TX revealed the controversy of locked doors, where they would often be propped open with a rock by staff.⁴⁸ There was a lack of systematic tracking of policy violations, and while doors were required to remain locked, not all police had access to master keys to enter rooms. It may be that access control is an effective strategy, but it requires a lot more from students, faculty, and staff, making it a potentially effective but difficult strategy to implement when getting everyone to comply with policy.

The lack of evidence-based research might call into question the efficacy of access control measures but does not eliminate them completely. It may be that these measures may need to be combined with others or need to be implemented in a targeted way. For example, when considering the entirety of the school property, parking spaces, traffic patterns, and pick-up or drop-off areas should encourage safe movement and supervision, and within the building, establishing a single-entry point that is secure would allow for personnel to monitor those who come in.⁴⁹ During a previous active shooter incident at Virginia Tech, students who locked and barricaded the door saw fewer fatalities because they made it harder for the shooter to gain

⁴⁷ Gammell, S. P. (2019). *Beyond motive: Situational influences in student perpetrated shootings*. The University of Texas at Dallas. Retrieved from <https://www.proquest.com/docview/2497177250?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20&%20Theses>

⁴⁸ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services. <https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>

⁴⁹ Trump, K. S. (2011). *Proactive school security and emergency preparedness planning*. Corwin Press.



access.⁵⁰ This holds some implications that access control may act as a deterrent, particularly for those who do not have legitimate access, and highlights the effectiveness of combining different safety strategies, including those during an emergency.

In line with these implications, research on failed mass shootings found support for SCP strategies at different types of locations (e.g., schools, hotels, public spaces, or venues), where shooters were unable to gain access.⁵¹ Restricted access to outsiders was a common theme among failed shootings. For example, a school shooter at Blountville High School (non-student) encountered a locked door and receptionist when attempting to enter the building, giving the receptionist time to inform the SRO and principal of the incident. Receptionists and other administrative staff can play a crucial role in assisting in lockdown procedures and notifying school personal and law enforcement and/or SROs on campus of a potential threat – as was the case in Blountville High School.⁵² Training office staff can be critical in preventing entrance onto school grounds and mitigating potential school shooting incidents. With proper guidance, staff can learn which questions to ask when identifying individuals who can enter the school, who should be denied, understand verbal de-escalation training, and obtain knowledge on emergency guidelines if de-escalation is not successful.⁵³ These efforts can assist administrative staff in building confidence in their judgement that strengthens school safety. While these findings provide insight into best practices, it must also be recognized that these practices may be difficult to implement successfully as schools often have many exterior doors that can be left open by students and staff.

⁵⁰ Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. *Victims & Offenders*, 12(6), 956–973. <https://doi.org/10.1080/15564886.2017.1307293>

⁵¹ Silva, J. R., & Greene-Colozzi, E. A. (2022). An exploratory study of failed mass shootings in America. *Security Journal*, 35(2), 367–399. <https://doi.org/10.1057/s41284-020-00281-z>

⁵² Silva, J. R., & Greene-Colozzi, E. A. (2022). An exploratory study of failed mass shootings in America. *Security Journal*, 35(2), 367–399. <https://doi.org/10.1057/s41284-020-00281-z>

⁵³ Hibbert, C. (2014) Training office staff critical to school entrance access control. *National School Safety and Security Services*. Retrieved from <https://schoolsecurity.org/2014/02/training-office-staff-critical-to-school-main-entrance-access-control/>



Emergency Preparedness

Active School Shooter Drills and Exercises. About 95% of public schools between 2015–2016 were using lockdown procedures⁵⁴ that aim to prepare staff and students on how to take appropriate action when there is an emergency, including school shootings. In the case of active shooter drills, they inform staff on how to respond to protect students and themselves in the case of an active shooter on campus,⁵⁵ which includes lockdown procedures (e.g., locking doors and turning off lights); however there has been little empirical literature that supports the efficacy of these drills until recently. Although research is still unclear about their effectiveness, evidence does suggest that at the very least, teachers are uncertain about their ability to improve safety,⁵⁶ and students may experience greater fear, perceived risk, and express a decrease in perceptions of school safety.⁵⁷ Others have reported that some students feel more prepared to respond to emergencies after participating in drills and that these drills could have a protective effect that leads to fewer injuries and deaths during real-world emergency events.⁵⁸

More research is needed to assess the effectiveness of these drills in reducing active school shooting incidents and improving safety, particularly as there is significant concern surrounding drills and the negative consequences on student and staff mental health and well-being.⁵⁹ It is also recommended that active shooter drills for students and staff be

⁵⁴ Musu-Gillette, L., Zhang, A., Wang, K., Zhang, J., Kemp, J., & Diliberti, M. (2018). Indicators of school crime and safety: 2017. *US Department of Education*. <https://nces.ed.gov/pubs2018/2018036.pdf>

⁵⁵ Active shooter drills guide and resource. (2020). *Kentucky Department of Education*. Retrieved from <https://www.education.ky.gov/school/sdfs/Documents/Trauma%20Toolkit%20-%20Active%20Shooter%20Drills.pdf>

⁵⁶ Rider, C. F. (2015). *Teachers' perceptions of their ability to respond to an active shooter incident*. The University of Southern Mississippi. Retrieved from <https://aquila.usm.edu/cgi/viewcontent.cgi?article=1067&context=dissertations>

⁵⁷ Huskey, M. G., & Connell, N. M. (2021). Preparation or provocation? Student perceptions of active shooter drills. *Criminal Justice Policy Review*, 32(1), 3–26. <https://doi.org/10.1177/0887403419900316>

⁵⁸ Schildkraut, J., Greene-Colozzi, E., Nickerson, A. B., & Florczykowski, A. (2023). Can school lockdowns save lives? An assessment of drills and use in real-world events. *Journal of School Violence*, 22(2), 167–182. <https://doi.org/10.1080/15388220.2022.2162533>; Schildkraut, J., & Nickerson, A. B. (2022). *Lockdown drills: Connecting research and best practices for school administrators, teachers, and parents*. MIT Press.

⁵⁹ ElSherief, M., Saha, K., Gupta, P., Mishra, S., Seybolt, J., Xie, J., ... & De Choudhury, M. (2021). Impacts of school shooter drills on the psychological well-being of American K-12 school communities: a social media



expanded to include all areas of campus as most of these drills are often conducted inside of classrooms, which could be useful in reducing fatalities in real-life emergencies by better preparing staff and students on standard response protocols from different locations.⁶⁰

Emergency Response Protocols to Active Shooters

The number of active shooter incidents has continued to rise. Between 2000 to 2019, there have been over 300 incidents with more than 60 occurring in schools (K-12 to higher education), resulting in 179 deaths between 2000-2019.⁶¹ This has led to the development of different programs for handling emergency responses on campus; however, there is much debate about these options-based trainings among security professionals and their effectiveness, calling for more empirical support:

1. ALERRT. Advanced Law Enforcement Rapid Response Training (ALERRT) was formed in 2002 and is considered a national standard in active shooter training that has trained over 130,000 first responders in active shooter response.⁶² This training provides scenario-based training to better prepare first responders on how to effectively handle an active school shooter, as well as evaluates outcomes of shooting events to inform training.
2. ALICE. Alert, Lockdown, Inform, Counter, and Evaluate (ALICE) is a program consisting of a set of steps that should be utilized when faced with an armed intruder. This starts with: a person being alerted to danger; barricading the door with preparation to either evacuate or counter; inform (i.e., communicate the intruder's location in real time); counter by creating movement, distance, or distraction to reduce the shooter's ability to hit their

study. *Humanities and Social Sciences Communications*, 8(1), 1-14. <https://doi.org/10.1057/s41599-021-00993-6>

⁶⁰ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services. <https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>

⁶¹ Active Shooter incidents 20-Year Review, 2000-2019. (2021). *Department of Justice, Federal Bureau of Investigation*.

⁶² Martaindale, M. & Blair, J. P. (2019). The evolution of active shooter response training protocols since Columbine: Lessons from the Advanced Law Enforcement Rapid Response Training Center. *Journal of Contemporary Criminal Justice*, 35(3), 342-356. <https://doi.org/10.1177/1043986219840237>



target; evacuate when it is safe.⁶³ This program relies on the individual in the active shooter event (i.e., the civilian).

3. **RUN HIDE FIGHT.** Many active shooter trainings follow a “run, hide, fight” procedure as a way to prepare for emergency incidents, which may require a person to wait until first responders arrive. There is not a lot of research assessing its effectiveness, but there does appear to be discrepancies between first responders and civilians on what was believed to be effective.⁶⁴ Additionally, when evaluating the Columbine tragedy⁶⁵, many students who chose to run were left uninjured or were injured but survived while those who chose to hide were more likely to be killed. Furthermore, “run, hid, fight” is not necessarily applicable to K-12. For example, teachers may choose to fight but it is not recommended for the students.
4. **Standard Response Protocols (SRP).** SRP is an “all hazards” approach rather than scenario-based that allows for flexibility when handling a situation. Actions include: *Hold* (which may require students and staff to remain in their classrooms until the issue has been resolved); *secure* (or bring students into a secure building and lock all outside access points); *lockdown* (which calls for everyone to be out of the line of sight and away from window while remaining silent and locking doors); *evacuation* (or where students and staff leave in an orderly fashion); and *shelter*, which is the protective action needed requiring individuals to seek shelter, depending on the threat faced (e.g., school shooters, tornadoes, earthquakes, or other disasters or hazards).⁶⁶

PA Systems and Phones. Emergency alert systems assist in an emergency situation but are not necessarily a crime prevention technique used; however, these alerts act as a way to

⁶³ ALICE Training Institute. (2014). Active Shooter Response. Retrieved from www.alicetraining.com

⁶⁴ Stone, R., Kim, J., Mgaedeh, F., Backous, G., & Fales, C. (2022). The effectiveness of active shooter responses for civilians and law enforcement. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 66, No. 1, pp. 987–991). Sage CA: Los Angeles, CA: SAGE Publications. <https://doi.org/10.1177/1071181322661501>

⁶⁵ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services. <https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>

⁶⁶ K-12 Standard Response Protocol Toolkit. (2024). *Texas State University, Texas School Safety Center*. Retrieved from <https://txssc.txstate.edu/tools/srp-toolkit/shelter>



mitigate harm caused during a threatening situation. Public announcement (PA) systems, phones, and radios have been used to assist in emergency alerts on school campuses. Although traditional alert methods have used PA systems, they may not necessarily work properly during an emergency event. For example, during the Uvalde shooting at Robb Elementary (May of 2022), the PA system was used, but was not used consistently in all classrooms or the announcement was not heard as one of the teachers had turned off the sonic board in the room to prevent the shooter from becoming aware of their presence.⁶⁷

Phones have the ability to send information quickly and in a controlled way, which could be done to warn students and/or staff about campus threats. When looking at previous school shooting incidents, sending text messages did not appear to prevent or assist in these emergencies, but rather, help with crowd control. Issues with this system include: it could be used too often and people may show a lack of willingness to comply with the messages; there is opportunity for abuse as it can lead to a school being locked down for a non-emergency; could increase anxiety during a threatening event.⁶⁸ There could also be issues with weak signals or poor connections, particularly within buildings, resulting in some students or staff not receiving notification of an incident. This was the case during the Uvalde (TX) shooting at Robb Elementary School, where some staff had issues receiving alerts on their phones and some had not been added to the alert notification system. The two-way radios used at Robb Elementary School designed to communicate between the school and outside agencies (including the police department) worked relatively well inside buildings, however, the police department's radios did not always work, highlighting the need for improved equipment among law enforcement as well.

Proactive School Safety Measures

Threat Assessment Teams, Protocols, and Training. Threat assessment teams consist of a group of educators, mental health professionals, law enforcement, and community stakeholders who identify, assess, and manage potential threats within a school to prevent

⁶⁷ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services.

<https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>

⁶⁸ Bambenek, J., & Klus, A. (2008). Do emergency text messaging systems put students in more danger? *Educause Quarterly*, 31(3), 12–16.



violence and enhance school safety.⁶⁹ While not all threats are the same, they should be managed in a timely manner and carefully. Addressing credible threats could prevent the next school shooting, but also handle other threats in a way that avoids overreactions that lead to unfair punishments of students that are not dangerous.⁷⁰

The Comprehensive School Threat Assessment Guidelines (CSTAG) is an evidence-based model for schools who plan to conduct threat assessments for K-12. This approach emphasizes early attention to a variety of problems including bullying or teasing, as well as other types of student conflict before it escalates to violent behavior.⁷¹ Staff are taught to avoid punitive practices and encourage flexible, problem-solving approaches to improve staff and student interactions and positively change school climate. Students at schools that use CSTAG have reported less bullying, a greater willingness to seek help when faced with threats of violence or bullying and have reported that it helped create more positive perceptions of school staff.⁷² Steps to CSTAG⁷³ include:

1. A team evaluates a threat by getting information on the threat, interviewing witnesses, and gathering information in which the threat was made.
2. After all available information has been collected, the team considers the credibility and seriousness of the threat. “Transient” threats mean threats were made but there was no intent to carry it out or there was a low risk of it being carried out, while “substantive” threats made are statements or behaviors that could lead to a serious risk of harm. The case is resolved if it is identified as transient, but if it is substantive, it moves to step 3.

⁶⁹ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services.
<https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>

⁷⁰ O'Toole, M. E. (2009). *The school shooter: A threat assessment perspective*. DIANE Publishing.

⁷¹ The Comprehensive School Threat Assessment Guidelines. *University of Virginia*. Retrieved from [https://education.virginia.edu/research-initiatives/research-centers-labs/research-labs/youth-violence-project/school-threat-assessment/comprehensive-school-threat-assessment-guidelines#:~:text=The%20Comprehensive%20School%20Threat%20Assessment%20Guidelines%20\(CSTAG\)%2C%20originally%20known,assessments%20in%20K%2D12%20schools.](https://education.virginia.edu/research-initiatives/research-centers-labs/research-labs/youth-violence-project/school-threat-assessment/comprehensive-school-threat-assessment-guidelines#:~:text=The%20Comprehensive%20School%20Threat%20Assessment%20Guidelines%20(CSTAG)%2C%20originally%20known,assessments%20in%20K%2D12%20schools.)

⁷² Cornell, D., Sheras, P., Gregory, A., & Fan, X. (2009). A retrospective study of school safety conditions in high schools using the Virginia threat assessment guidelines versus alternative approaches. *School Psychology Quarterly*, 24(2), 119–129. <https://doi.org/10.1037/a0016182>

⁷³ Cornell, D. G. (2020). *Overview of the comprehensive school threat assessment guidelines (CSTAG)*. <https://doi.org/10.13140/RG.2.2.21229.44002/1>



3. The threat assessment team will respond to all substantive threats that vary by circumstance, which could mean notifying potential victims or contacting parents.
4. The school may take additional action, such as screening students for mental health services and counseling to determine what conflict has led to the threat. Law enforcement will investigate to determine if a crime has been committed. The student may be suspended.
5. The threat assessment team will monitor the safety plan and make adjustments as needed.

Research examining CSTAG teams found that threats classified as substantive were more likely to be associated with warning behaviors (e.g., a history of violence) and were 36 times more likely to be attempted compared to transient threats.⁷⁴ These threats were also more likely to result in suspension or legal action. Threat assessments overall provide schools with a proactive approach in preventing violence rather than reactive like zero tolerance policies and incorporate mental health services and counseling. Additionally, threat assessment has the ability to identify troubled students who may commit a school shooting or shooting outside of school by investing in counselors, psychologists, or social workers rather than traditional security measures.⁷⁵ By taking the individual situation into account, it can decrease the likelihood students are suspended or expelled and regulate real threats. Using a sample of over 23,000 threat assessment cases from 3,400 public K-12 schools in the state of Florida, about 13.4% were classified as a serious, substantive threat (including assault, strike, or a threat to beat someone up) and about 4.7% were classified as a very serious, substantive threat (such as a threat to kill, rape, or inflict serious injury beyond a transient threat).⁷⁶ Findings showed that very few students who received a threat assessment were actually arrested (0.7%), charged (1.8%), or incarcerated (0.1%), resulting in low rates of school

⁷⁴ Burnette, A. G., Datta, P., & Cornell, D. (2018). The distinction between transient and substantive student threats. *Journal of Threat Assessment and Management*, 5(1), 4–20. <https://doi.org/10.1037/tam0000092>

⁷⁵ Cornell, D. G. (2020). Threat assessment as a school violence prevention strategy. *Criminology & Public Policy*, 19(1), 235–252. <https://doi.org/10.1111/1745-9133.1247>

⁷⁶ Maeng, J. L., Cornell, D. G., Kerere, J., Huang, F., Konold, T., & Afolabi, K. (2023) School threat assessment in Florida: Technical report of 2021-2022 case data. Retrieved from https://www.researchgate.net/profile/Dewey-Cornell/publication/371544975_SCHOOL_THREAT_ASSESSMENT_IN_FLORIDA_TECHNICAL_REPORT_OF_2021-2022_CASE_DATA_6-1-23/links/6489b15f9605ba270e44affc/SCHOOL-THREAT-ASSESSMENT-IN-FLORIDA-TECHNICAL-REPORT-OF-2021-2022-CASE-DATA-6-1-23.pdf



removal or law enforcement action and highlighting the positive outcomes among schools who use threat assessments.

Social, Emotional, and Mental Health Support

Research strongly supports the use of proactive measures including social, emotional, and mental health in reducing risk of gun violence at school. Nurturing social and emotional development by connecting with others emotionally can promote positive mental health outcomes that reduce violent behavior in children.⁷⁷ When threat assessment teams are implemented on campus, these teams include both mental health and law enforcement partners that can contribute to a positive school climate.⁷⁸ Investing in social emotional well-being of students includes mental health professionals who can navigate the education system and who can act as one of the first people to identify risk of a student becoming violent.⁷⁹

Table 1. School Security Measure on School Shooting Incidents Summary Table

School Security Measure	Does it work or is it promising?
Security Personnel (SROs or Security Officers)	Evidence is promising for other types of crimes, but more evidence is needed on school shootings.
Video Surveillance	Does not appear to be effective prevention
Metal Detectors	Does not appear to be effective prevention
Access Control	Mixed
Active Shooter Drills	More research is needed to determine effectiveness
Functional PA Systems and Phones	Does not appear to be effective for prevention
Threat Assessment Programs	Promising

⁷⁷ Malti, T. (2020). Children and violence: Nurturing social-emotional development to promote mental health. *Social Policy Report*, 33(2), 1–27. <https://doi.org/10.1002/sop2.8>

⁷⁸ Flannery, D. J., Fox, J. A., Wallace, L., Mulvey, E., & Modzeleski, W. (2021). Guns, school shooters, and school safety: What we know and directions for change. *School Psychology Review*, 50(2-3), 237–253. <https://doi.org/10.1080/2372966X.2020.1846458>

⁷⁹ Urge your school board to act on school safety. (2022). *Everytown*. Retrieved from https://studentsdemandaction.org/report/urge-your-school-board-to-act-on-school-safety/?_gl=1*n7b5rv*_ga*MTkyODUwNjQwOC4xNzA1Njk0NzAw*_ga_LT0FWV3EK3*MTcxNTU0Mzk2MS42LjEuMTcxNTU0NDA0OS4wLjAuMA



Social, Emotional, and Mental Health Support	Promising
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LIMITATIONS

Evidence-based research testing the effectiveness of different security measures on preventing school shooting incidents remains limited despite the high cost of employing such measures and considering the length of time that has passed since the first major school shooting (over two decades ago).⁸⁰ Yet, schools continue to employ measures despite the limited research available. This makes it difficult to identify “what works” and what is most effective, particularly as there are too few studies to draw definitive conclusions. In addition, the nature of this topic makes it hard to conduct research on as school shooting incidents are already a rare event and the definition of what constitutes a school shooting is unclear. For example, the Federal Bureau of Investigation (FBI) defines an active school shooter as “an individual actively engaged in killing or attempting to kill people in a populated area.”⁸¹ Others have favored the term “mass school shooting” (i.e., four or more victims during a single event).⁸² Scholarly literature has noted this lack of a concrete definition, leading to differences amongst researchers about what constitutes a school shooting and data collection processes and methodology, challenging the validity of results.⁸³ Furthermore, it should be recognized that schools vary in size, demographic and socioeconomic backgrounds, and geographies that can create unique differences that may influence school shooting incidents. These limitations highlight areas of direction for future work.

⁸⁰ Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. *Victims & Offenders*, 12(6), 956–973. <https://doi.org/10.1080/15564886.2017.1307293>

⁸¹ U.S. Department of Justice Federal Bureau of Investigation. (2024). *Active Shooter Incidents 20 Year Review 2000-2019*. Federal Bureau of Investigation. Retrieved from <https://www.fbi.gov/how-we-can-help-you/active-shooter-safety-resources>

⁸² Kim, C., Capellan, J. A., & Adler, A. (2021). Exploring the empirical literature on mass shooting: A mixed-method systematic review of peer-reviewed journal articles. *Aggression and Violent Behavior*, 58, 101584. <https://doi.org/10.1016/j.avb.2021.101584>

⁸³ Comer, B. P. (2023). *Forest for the trees: Examining state macro-level correlates and incidents of school gun violence*. Sam Houston State University, Huntsville, TX. (Doctoral dissertation); Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. *Victims & Offenders*, 12(6), 956–973. <https://doi.org/10.1080/15564886.2017.1307293>; ⁸³ Kim, C., Capellan, J. A., & Adler, A. (2021). Exploring the empirical literature on mass shooting: A mixed-method systematic review of peer-reviewed journal articles. *Aggression and Violent Behavior*, 58, 101584. <https://doi.org/10.1016/j.avb.2021.101584>



RECOMMENDATIONS

Based on the available literature, there are mixed results on the effectiveness of many security measures that have been or are currently being implemented on campuses across the country to reduce school shootings. To provide more consistency across research, having a standardized definition of school shootings would aid in our understanding in what a school shooting incident is and how we can enact security measures to reduce the likelihood these incidents will occur in the future.

Research is most promising when schools take a comprehensive approach to school safety, which addresses risk and protective factors, creating a positive school environment, implementing effective information gathering systems including threat assessments, meeting students' behavioral needs, and providing mental health support;⁸⁴ however, schools have often struggled to implement and sustain comprehensive school safety programs as there is often need for better coordination of resources and strategies across districts that outline procedures during emergency situations.⁸⁵ Districts should adopt a multidisciplinary approach to school safety, including law enforcement, mental health professionals, and other stakeholders (e.g., parents, students, nurses, or counselors), as well as establish a Threat Assessment Team as a proactive measure to decrease fear and improve safety.⁸⁶

Combining access control strategies with other security measures may help reduce gun violence on campus, but more research is needed to establish its effectiveness. These safety measures could also be expanded to include other aspects of a student's life, including the home. Parents play a key role in school safety and prevention by recognizing concerning

⁸⁴ Kingston, B., Mattson, S. A., Dymnicki, A., Spier, E., Fitzgerald, M., Shipman, K., Goodrum, S., Woodward, W., Witt, J., Hill, K. G., & Elliott, D. (2018). Building schools' readiness to implement a comprehensive approach to school safety. *Clinical Child and Family Psychology Review*, 21, 433–449. <https://doi.org/10.1007/s10567-018-0264-7>

⁸⁵ Reischi, T. M., Hsieh, H. F., & Pomerantz, N. (2020) Focusing On Safety: Understanding school safety needs and concerns through school superintendents focus group discussions. *National Center for School Safety*. Retrieved <https://www.nc2s.org/wp-content/uploads/2020/09/AASA-Focus-Group-Report-Final.pdf>

⁸⁶ U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services. <https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf>



behavior.⁸⁷ Courts have supported this perspective as well, suggesting parents could also be responsible for their children's role in a school shooting. For example, James and Jennifer Crumbley, the parents of Ethan Crumbley, the Oxford school shooter in Detroit, MI, were sentenced to 10-15 years in prison on manslaughter charges that led to the fatality of four students because they failed to secure a handgun used in the shooting.⁸⁸ Research shows that a large proportion of school shooters under 18 years of age gain access to a firearm from the home of a parent or relative, and over half were considered easily accessible.⁸⁹ School districts could encourage safety protocols for firearms in the home through proper storage and locking mechanisms to prevent access and reduce the likelihood of a school shooting incident. Improved communication between schools and parents can help address the importance of securing all firearms at home and assist parents in recognizing concerning behavior. Additionally, when a school is scheduled to have an active school shooter drill, parents can receive information on what they can do to be actively involved in the prevention of gun violence at home that positively impacts school campus safety.

Finally, while school shootings are rare events that can vary, it would be beneficial to establish a list of resources and materials that assist in the development of proper security measures on campus and the development of a program targeting school violence.

Future Directions for Research and Implementation:

- Researchers and practitioners should develop a clear and consistent definition of what constitutes a school shooting incident in order to better understand the effectiveness of school safety measures.
- More empirical research is needed to assess the effectiveness of school safety measures in reducing school shootings incidents.

⁸⁷ Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B. & Vineyard, N. (2021). Averting targeted school violence: A US Secret Service analysis of plots against schools; Trump, K. S. (2011). *Proactive school security and emergency preparedness planning*. Corwin Press.

⁸⁸ Johncox, C., & Hutchinson, D. (2021) Involuntary manslaughter charges filed against parents of Oxford High School shooting suspect. Click on Detroit. Retrieved from <https://www.clickondetroit.com/news/local/2021/12/03/involuntary-manslaughter-charges-filed-against-parents-of-oxford-high-school-shooting-suspect/>

⁸⁹ National Threat Assessment Center. (2019). Protecting America's schools: A US Secret Service analysis of targeted school violence. *US Secret Service, Department of Homeland Security*. Retrieved from https://www.secretservice.gov/sites/default/files/2020-04/Protecting_Americas_Schools.pdf



- School districts should adopt a multidisciplinary approach through threat assessment teams to identify legitimate risk of school shooting incidents.

CONCLUSION

School officials should rely on evidence-based research when making decisions about school security to improve safety for students and staff. Many of the security measures that have been implemented were done so without empirical support and have since shown evidence of ineffectiveness or mixed findings. Schools must carefully consider which security measures and policies should be implemented that are supported by evidence-based research as effective tools and should carefully consider how these measures can impact their school in a positive way. There also needs to be a more robust listing of resources and material that is helpful for schools to design and evaluate programs (e.g., see the Department of Justice report: Critical Incident Review on Robb Elementary). It would be beneficial to take a comprehensive approach that works with law enforcement and other community stakeholders to create a campus climate that promotes learning, development, and safety.

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APPENDIX: RESEARCH SUMMARY TABLE



**Effectiveness of School Security Measures on School Shooting Incidents
Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
Active shooter drills guide and resource. (2020). Kentucky Department of Education. Retrieved from https://www.education.ky.gov/school/sdfs/Documents/Trauma%20Toolkit%20-%20Active%20Shooter%20Drills.pdf	Active shooter drills Training	Active Shooter Drills	N/A	The literature does not support active shooter drills but they suggest employing trauma informed active shooter training to minimize traumatizing staff, and avoid simulated bullets as it does no evidence suggests in enhances learning. Provide behavioral health resources and apply active shooter drills in different settings on campus (e.g., outdoor areas or common spaces).
Active Shooter incidents 20-Year Review, 2000-2019. (2021). <i>Department of Justice, Federal Bureau of Investigation</i> .	School Shootings School Shooter Statistics	N/A	N/A	The FBI identified an "active shooter" as a person or people who actively engage in killing or attempting to kill others in a populated area using one or more firearm. The FBI evaluated over 300 active shooter incidents occurring between 2000-2019 that was then aggregated. Schools (K-12) were one of the highest numbers of incidents with 44. Multiple shooters were found in K-12 schools. In total, 62 incidents occurred in either a public or private education setting (K-12 or higher education and school board meetings). There were 179 killed and 240 wounded in education environments.
Addington, L. A. (2009). Cops and cameras: Public school security as a policy response to Columbine. <i>American Behavioral Scientist</i> , 52(10), 1426–1446. https://doi.org/10.1177/00027642093325	School Violence School Security	Visible Security Measures Cameras Security Guards	No	This study synthesized the current literature on visible security cameras and guards and their role in reducing school shootings and policy response. General findings suggest there is a lack of evaluative work on the effectiveness of school security and how there is little known about the impact on students. Efforts may be more of a result of just "do something" while we do not actually know what works.

**Effectiveness of School Security Measures on School Shooting Incidents
Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
<p>Alathari, L., Drysdale, D., Driscoll, S., Blair, A., Mauldin, D., Carlock, A., McGarry, J., Cotkin, A., Nemet, J., Johnston, B. & Vineyard, N. (2021). Averting targeted school violence: A US Secret Service analysis of plots against schools. https://www.secretservice.gov/sites/default/files/reports/2021-03/USSS%20Averting%20Targeted%20School%20Violence.2021.03.pdf</p>	School Violence	Prevention SROs Threat Assessment / Mental Health	Yes	Data include analysis of 67 averted school attacks with 100 student "plotters". Removing a student from a school does not necessarily remove risk of harm without proper supports involved. Of the 100 "plotters," 95% were current students and 5% were recently former students who most often held a grievance with a classmate. When it came to prevention, parents recognizing concerning behavior plays a major role. In addition, many of the "plotters" had access to weapons.
<p>Bambenek, J., & Klus, A. (2008). Do emergency text messaging systems put students in more danger? <i>Educause Quarterly</i>, 31 (3), 12-16.</p>	Emergency Text Messaging Systems	Cell Phones Emergency Preparedness	No	Review of the literature suggests that while text messages as a form of emergency preparedness for school shooters is fast and can reach a large number of people, there are limitations to consider. Text messages fall short in reliability and controlled access. Messages could: lead people toward a shooter; people may choose not to comply with the messages; there are opportunities for misuse of the system; result in messages locking down a school when it was not needed and increasing anxiety among staff and students.
<p>Blair, J. P., & Schweit, K. W. (2014). A study of active shooter incidents in the United States between 2000 and 2013. <i>US Department of Justice</i>.</p>	Active Shooter Incidents between 2000-2013	School Shooter Statistics	Yes	This report is a summary of shooting incidents between 2000-2013. There were about 160 active shooter incidents in the U.S. during this time. About 40% of active shooters committed suicide. about 70% occurred in commerce and educational environments. Findings suggests incidents are increasing annually.

**Effectiveness of School Security Measures on School Shooting Incidents
Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
Borum, R., Cornell, D. G., Modzeleski, W., & Jimerson, S. R. (2010). What can be done about school shootings? A review of the evidence. Educational Researcher, 39(1), 27–37. https://doi.org/10.3102/0013189X09357620	At-risk students; School psychology; School shootings; Threat assessment violence	Threat assessment	Yes	Threat assessment has been identified as a promising strategy for school violence prevention and alternative to profiling. Threat assessment occurs when an investigation is triggered by a student's concerning behavior rather than characteristics to assess if they pose a threat. If a student is identified as a threat, then action is taken to prevent the threat from being carried out by enacting security measures including: notifying law enforcement, warning potential victims, and developing an intervention plan to resolve conflict that has occurred leading up to the threat.
Burnette, A. G., Datta, P., & Cornell, D. (2018). The distinction between transient and substantive student threats. Journal of Threat Assessment and Management, 5(1), 4–20. https://doi.org/10.1037/tam0000092	Threat Assessment; Transient and Substantive Distinction; School Safety	Threat Assessment	Yes	Threats associated with warning behaviors such as a history of violence or weapon use were more likely to be classified as a substantive threat (higher risk) and were more likely to be made by older students. While overall, less than 3% of threats were attempted, substantive threats were 36 times greater when it came to attempt compared to transient threats, providing insight into evidence-based research on threat assessment and effectiveness.
Crichlow-Ball, C., Cornell, D., & Huang, F. (2022). Student perceptions of school resource officers and threat reporting. Journal of School Violence, 21(2), 222–236. https://doi.org/10.1080/15388220.2022.2054423	SROs; Threat Reporting; Threat Assessment; School Safety	SROs	Yes	Students who felt SROs made them feel safer predicted willingness to report a peer who brought a gun to school or talked about killing someone, suggesting SROs who establish good relationships with students can increase willingness to report threats.
Cornell, D. G. (2020). Overview of the comprehensive school threat assessment guidelines (CSTAG). https://doi.org/10.13140/RG.2.2.21229.44002/1	School Shootings; Threat Assessment; Violence Prevention	Threat Assessment	N/A	This paper is an overview of the literature on Threat Assessment Guidelines for CSTAG. This model integrated recommendations from both the Secret Service and FBI studies based on school shootings. This includes differences between transient threats (threats that may not reflect genuine threats of harm) and substantive threats (threats that pose real risk of harm). This program in 2013 became the only threat assessment program that was evidence-based.

**Effectiveness of School Security Measures on School Shooting Incidents
Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
<p>Cornell, D. G. (2020). Threat assessment as a school violence prevention strategy. <i>Criminology & Public Policy</i>, 19(1), 235–252. https://doi.org/10.1111/1745-9133.1247</p>	<p>School Shootings; Threat Assessment; Violence Prevention</p>	<p>Threat Assessment</p>	<p>Yes</p>	<p>This paper is a research summary on the literature for CSTAG and threat assessment. There is difficulty in determining who will carry out a school shooting, but schools who employ threat assessment strategies through multidisciplinary teams can develop responses specific to the level of threat a person is. A summary of the literature finds that these teams have helped resolve thousands of threats where there was no serious act of violence and allowed most students to return to school. Implications of these findings suggest using threat assessment strategies may lead to a more broad approach to preventing violence and help those who are at risk through proactive interventions rather than zero tolerance policies.</p>
<p>Cornell, D. G., Mayer, M. J., & Sulkowski, M. L. (2020). History and future of school safety research. <i>School Psychology Review</i> 50(2–3), 143–157. https://doi.org/10.1080/2372966X.2020.1857212</p>	<p>School safety; School violence; School Climate</p>	<p>Physical safety (target hardening and security personnel, security drills, zero tolerance discipline, and threat assessment)</p>	<p>Mixed</p>	<p>There is not enough support for security technology, personnel, or drills, and most security measures do not meet the requirement for evidence-based practices. More research is needed for school threat assessment. While threat assessment appears promising, research is still needed to test if threat assessment prevents shootings. While studies focusing on averted school shootings have used threat reporting by authorities and students, it has not directly tested how this practice has prevented shootings.</p>

**Effectiveness of School Security Measures on School Shooting Incidents
Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
Cornell, D., Sheras, P., Gregory, A., & Fan, X. (2009). A retrospective study of school safety conditions in high schools using the Virginia threat assessment guidelines versus alternative approaches. <i>School Psychology Quarterly</i> , 24(2), 119–129. https://doi.org/10.1037/a0016182	Threat Assessment; School Violence; School Safety	Threat Assessment	Yes	In a sample of 280 schools (95 using a threat assessment guideline), a survey was conducted on 9th grade students to identify differences of a threat assessment program on a variety of outcomes. Students in schools that used threat assessment guidelines reported a greater willingness to seek help, reported less bullying, and reported higher positive perceptions of school climate compared to schools that did not.
Cunningham, R. M., Walton, M. A., & Carter, P. M. (2018). The major causes of death in children and adolescents in the United States. <i>New England Journal of Medicine</i> , 379(25), 2468–2475. https://doi.org/10.1056/NEJMs1804754	Child Mortality Rates; Gun Fatalities	N/A	N/A	This report summarizes the leading causes of death for children and adolescents between the ages of 1-19. Results find that firearms were the second leading cause of death, with 59% reported as a homicide, 35% suicide, and 4% unintentional injuries.
Devlin, D. N., & Gottfredson, D. C. (2018). The roles of police officers in schools: Effects on the recording and reporting of crime. <i>Youth Violence and Juvenile Justice</i> , 16(2), 208–223. https://doi.org/10.1177/1541204016680405	SROs; Policing	SROs	Partial Support	This study aimed to study how the presence of SROs influence school crime and reporting to law enforcement using a survey on crime and safety. Findings revealed that crime reporting and recording increased at schools with SROs. This may results in youth being more likely to come into contact with the criminal justice system.

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<p>EISherief, M., Saha, K., Gupta, P., Mishra, S., Seybolt, J., Xie, J., ... & De Choudhury, M. (2021). Impacts of school shooter drills on the psychological well-being of American K-12 school communities: a social media study. <i>Humanities and Social Sciences Communications</i>, 8(1), 1–14. https://doi.org/10.1057/s41599-021-00993-6</p>	<p>Gun Violence; School Shooter Drills</p>	<p>School Shooter Drills</p>	<p>No</p>	<p>Findings suggest drills negatively impact mental health by increasing anxiety and stress by 42% and depression by 39% following drills. Effects continued for at least 90 days following drills. This research provides support toward the reservations parents, teachers, and students have when it comes to K-12 drills.</p>
<p>Finley, L. L. (2006). Examining school searches as systemic violence. <i>Critical Criminology</i>, 14(2), 117–135. https://doi.org/10.1007/s10612-006-9002-4</p>	<p>Metal Detectors; Violence</p>	<p>Metal Detectors</p>	<p>No</p>	<p>A summary of the literature demonstrates the ineffectiveness of preventing school violence through metal detectors, which instead may cause harm to students and teachers. As a result, alternative methods should be considered.</p>
<p>Fisher, B. W., Higgins, E. M., & Homer, E. M. (2021). School crime and punishment and the implementation of security cameras: Findings from a national longitudinal study. <i>Justice Quarterly</i>, 38(1), 22–46. https://doi.org/10.1080/07418825.2018.1518476</p>	<p>School Safety; Surveillance; School Security</p>	<p>Surveillance / Cameras</p>	<p>No</p>	<p>Using a nationally representative School Survey on Crime and Safety, this study looked at the relationship between school security cameras and crimes recorded and reported to police. Results showed no effect across outcomes suggesting crimes in schools without cameras were similar to those with cameras.</p>

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<p>Flannery, D. J., Fox, J. A., Wallace, L., Mulvey, E., & Modzeleski, W. (2021). Guns, school shooters, and school safety: What we know and directions for change. <i>School Psychology Review</i>, 50(2-3), 237–253. https://doi.org/10.1080/2372966X.2020.1846458</p>	<p>School safety; Mental health; Threat assessment</p>	<p>Threat Assessment Target hardening</p>	<p>N/A</p>	<p>This study summarizes the literature on school security and safety. Based on available evidence, it is recommended that we should take a public health approach to addressing school gun violence. Active shooter drills can increase fear and anxiety and should therefore be removed or deemphasized. Improved gun storage policies may reduce the likelihood a child or adolescent will gain access to a firearm. Establishing a multidisciplinary team with school staff, school psychologists, law enforcement, and counselors to take a more proactive approach (i.e., threat assessment via CPTED) can help reduce gun violence.</p>
<p>Flores, Y., Belton, I., Woods-Jaeger, B., Cummings, J., & Livingston, M. (2023). Examining the association between the presence of an SRO and the occurrence of a school shooting. <i>Frontiers in Public Health</i>, 12, 1322156. https://doi.org/10.3389/fpubh.2024.1322156</p>	<p>School Shootings; Gun Violence; SROs</p>	<p>SROs</p>	<p>No</p>	<p>This study examined the association between school shootings and the presence of SROs on campus. Results indicated that school shootings were more likely to occur in schools that had SROs.</p>
<p>Freilich, J. D., Chermak, S. M., Connell, N. M., Klein, B. R., & Greene-Colozzi, E. A. (2020). Understanding the causes of school violence using open source data. National Institute of Justice, OJP, Department of Justice. Retrieved from https://www.ojp.gov/pdffiles1/nij/grants/301665.pdf</p>	<p>School shooters; Non-fatal and fatal shootings; Security measures; Situational crime prevention</p>	<p>Target hardening SROs and police</p>	<p>Mixed</p>	<p>Adolescent school shooters were more likely to be male, 16 years of age, unemployed, report psychological issues, and have a prior criminal record including gang affiliation. SCP strategies revealed mixed results. Schools with adolescent shootings that had police officers or were multi-storied had greater odds that there was a non-fatal event compared to fatal shootings. Metal detectors increased the odds there was a non-fatal shooting, but increased the odds for a fatal attack for adult shooters. More than 50% of school shooters made threats or gave prior warning before they committed the shooting; however, more often, these warnings were ignored (over 80% of warnings/threats were ignored).</p>

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Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
<p>Freilich, J. D., Chermak, S. M., & Klein, B. R. (2020). Investigating the applicability of situational crime prevention to the public mass violence context. <i>Criminology & Public Policy</i>, 19(1), 271–293. https://doi.org/10.1111/1745-9133.12480</p>	<p>SCP; Environmental Criminology; Mass Shootings</p>	<p>SCP</p>	<p>N/A</p>	<p>A review of the literature suggests SCP strategies can be used to prevent public mass violence including terrorism that can also be applied to school shootings. Target selection includes identifying certain locations that make them more attractive or vulnerable to attack. Using the EVIL DONE terrorism risk assessment template, it is argued that targets more "exposed, vital, iconic, legitimate, destructible, occupied, near and easy" are at greater risk of attack (p. 276). Identifying vulnerable locations should also be done in specific context to the crime (e.g., mass shootings).</p>
<p>Gammell, S. P., Connell, N. M., & Huskey, M. G. (2021). A descriptive analysis of the characteristics of school shootings across five decades. <i>American journal of criminal justice</i> , 47 (5), 818–835. https://doi.org/10.1007/s12103-021-09636-7</p>	<p>School shootings; Firearms; School Safety</p>	<p>N/A - Shooting characteristics</p>	<p>N/A</p>	<p>School incident characteristics are related to school shooting severity. Characteristics association with higher casualties include: Incidents with multiple shooters; incidents with multiple weapons; handguns and long guns. Elementary schools saw higher non-perpetrator casualties and most perpetrators were adults. Junior high schools and high schools had more gun related deaths, and differences exist in shooting type such as rampage shootings and single victim homicides, and suicides. Authors suggest 2 important areas for attention including the application of situation crime prevention and a focus on student mental health needs (e.g., threat assessment). Many shooters were adults not affiliated with the school, suggesting we re-examine building access.</p>
<p>Gammell, S. P. (2019). <i>Beyond motive: Situational influences in student perpetrated shootings</i> . The University of Texas at Dallas. Retrieved from https://www.proquest.com/docview/2497177250?pq-origsite=gscholar&fromopenview=true&sourcecetype=Dissertations%20&%20These</p>	<p>Situational crime prevention; Situational security measures</p>	<p>Access control visible security measures</p>	<p>No</p>	<p>Security measures do not impact the time of day and location of a shooting. The lack of support for SCP when assessing school shootings could mean this type of offense requires highly specified security approaches (e.g., metal detectors</p>

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<p>Hankin, A., Hertz, M., & Simon, T. (2011). Impacts of metal detector use in schools: Insights from 15 years of research. <i>Journal of School Health</i>, 81(2), 100–106. https://doi.org/10.1111/j.1746-1561.2010.00566.x</p>	<p>School Violence; Metal Detectors</p>	<p>Metal Detectors</p>	<p>No</p>	<p>A literature search using 7 studies was conducted looking at the effects of metal detectors in schools. Results were inconclusive on whether the presence of metal detectors in schools reduced violent behavior, but others suggest they negatively impact perceptions of safety among students.</p>
<p>Huskey, M. G., & Connell, N. M. (2021). Preparation or provocation? Student perceptions of active shooter drills. <i>Criminal Justice Policy Review</i>, 32(1), 3–26. https://doi.org/10.1177/0887403419900316</p>	<p>School Shootings; Lockdown Drills; School Safety</p>	<p>Active Shooter Drills</p>	<p>No</p>	<p>This study used survey data collected at a university to assess perceptions of active shooter drills while in high school. Active shooter drills in high school were associated with greater fear, perception of risk, and lower perceptions of school safety.</p>
<p>Jennings, W. G., Khey, D. N., Maskaly, J., & Donner, C. M. (2011). Evaluating the relationship between law enforcement and school security measures and violent crime in schools. <i>Journal of Police Crisis Negotiations</i>, 11, 109–124. https://doi.org/10.1080/15332586.2011.581511</p>	<p>Police; School Shootings; Crime</p>	<p>SROs; Weapon-Detection Devices</p>	<p>Yes/Mixed</p>	<p>The number of SROs was negatively association with serious violence, suggesting they may act as a deterrent to violent crime. SROs were also associated with fewer incidents of serious school violence; However, there was no significant effect between weapon-detection devices and serious violence.</p>

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Johnson, I. M. (1999). School violence: The effectiveness of a school resource officer program in a southern city. <i>Journal of Criminal Justice</i> , 27(2), 173–192. https://doi.org/10.1016/S0047-2352(98)00049-X	School Violence; SROs	SROs	Yes	This study evaluated a School Resource Officer Program and its impact on school violence. Having a school resource officer on campus reduced intermediate and major offenses in both high school and middle school from 3,267 to 2,710. About 52% said fighting decreased, marijuana possession decreased by about 65%, about 53% reported misdemeanor arrests decreased, and the use of handguns (71%) and knives (65%) decreased after the presence of a school resource officer.
Jonson, C. L. (2017). Preventing school shootings: The effectiveness of safety measures. <i>Victims & Offenders</i> , 12(6), 956–973. https://doi.org/10.1080/15564886.2017.1307293	Active shooter response; Situational crime prevention; security; Situational Approach	SROs Metal Detectors Access Control Lockdown	No	Limiting access to schools, metal detectors and may seem like good measures to implement, but they have failed in the past. Hard security measures do not completely eliminate threats. When it comes to lockdowns, threats may often happen outside of where drills take place (i.e., outside of the classroom), yet drills prioritize events where students are inside the classroom. SROs do not appear to prevent mass shootings or decrease fatalities in these events. During prior school shooting incidents, students in rooms who locked and barricading the door, or were able to flee saw less fatalities because their resistance made it harder for the shooter to victimize them. Despite these suggestions, more research is needed as the research is lacking.
Keatley, D. A., Mcgurk, S., & Allely, C. S. (2020). Understanding school shootings with crime script analysis. <i>Deviant Behavior</i> , 41(9), 1084–1096. https://doi.org/10.1080/01639625.2019.1596543	Crime script analysis (CSA); Crime prevention; School shootings	Crime script analysis	Yes	CSA can be used as a way to understand behaviors and action by sharing insight into the process of crime (e.g., purchasing a gun before committing a crime). CSA used to understand school shooters and their preparation into an offense consisted of five precursors that led up to the shooting: (1) influences (e.g., mental health issues); (2) operational (e.g., time where shooters initiate preparatory behaviors and ideas may become verbalized or acted upon); (3) reconnaissance (knowing their environment); (4) activity (e.g., relating to behaviors on the day of the attack); and (5) withdrawal (i.e., the final scene of the crime script and conclusion where the shooter is arrested or killed).

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<p>Kim, C., Capellan, J. A., & Adler, A. (2021). Exploring the empirical literature on mass shooting: A mixed-method systematic review of peer-reviewed journal articles. <i>Aggression and Violent Behavior</i>, 58, 101584. https://doi.org/10.1016/j.avb.2021.101584</p>	<p>Mass Shootings; Systematic Review</p>	<p>N/A</p>	<p>N/A</p>	<p>There needs to be a standard definition for mass shootings. Most mass shooting studies have relied on open-source data that have used varying definitions.</p>
<p>King, S., & Bracy, N. L. (2019). School security in the post-Columbine era: Trends, consequences, and future directions. <i>Journal of Contemporary Criminal Justice</i>, 35 (3), 274–295. https://doi.org/10.1177/10439862198401</p>	<p>School security; School police; School shootings; Surveillance</p>	<p>N/A - Assessing shifts in school safety over time</p>	<p>N/A</p>	<p>Fear-based panic regarding school shootings has led to the implementation of security practices that are not evidence-based. There is also a lack of support for punitive and surveillance security procedures. CCTV footage is more reactive than proactive as it is often viewed after a crime has been committed. Threat assessment teams, however, are promising as they help determine seriousness of a threat and develop an intervention plan. There appears to be a shift from harsh disciplinary policies and security measures to restorative practices.</p>

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Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
<p>Lamoreaux, D., & Sulkowski, M. L. (2020). An alternative to fortified schools: Using crime prevention through environmental design (CPTED) to balance student safety and psychological well-being. <i>Psychology in the Schools</i>, 57(1), 152–165. https://doi.org/10.1002/pits.22301</p>	<p>Crime Prevention Through Environmental Design; School Safety; School Violence</p>	<p>CPTED</p>	<p>Yes</p>	<p>This review addresses the research on CPTED as a way to deter criminal or antisocial behavior by using natural surveillance, territorial reinforcement (i.e., clearly defining an area as your property), and access control. Excessive visible security measures such as metal detectors or cameras can negatively impact students. The literature supports the benefits of CPTED as a method that balances safety with well-being. The physical environment can influence human behavior. Natural surveillance means open campus layouts that maximize line of site and improve monitoring of large spaces such as cafeterias, playgrounds, or hallways. Access control would mean limiting the number of entry/exit points and monitoring visitors. Territoriality focuses on identifying clear spaces using visual cues that outline clear property lines (e.g., signage prohibiting weapons or certain behaviors). This would mean keeping the property clear of vandalism.</p>
<p>Lamoreaux, D. J., & Sulkowski, M. L. (2021). Crime prevention through environmental design in schools: students' perceptions of safety and psychological comfort. <i>Psychology in the Schools</i>, 58(3), 475–493. https://doi.org/10.1002/pits.22459</p>	<p>CPTED; School Safety; School Violence</p>	<p>CPTED</p>	<p>Yes</p>	<p>Using a sample of 900 middle and high school students, the current study assessed student preferences for physical safety and psychological comfort. Findings revealed CPTED strategies using natural surveillance, territoriality, and access control were perceived to be more physically safe and comfortable by students. Findings were consistent across demographics.</p>

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<p>Maeng, J. L., Cornell, D. G., Kerere, J., Huang, F., Konold, T., & Afolabi, K. (2023). School threat assessment in Florida: Technical report of 2021-2022 case data.</p>	<p>School Gun Violence; Threat Assessment</p>	<p>Threat Assessment</p>	<p>Yes</p>	<p>The sample included over 23,000 threat assessment cases from 3,400 public school in Florida between the 2021 - 2022 school year. About 17.8% of cases were classified as "no threat," about 64% were classified as a "transient threat," about 13.4% were classified as a "serious substantive threat," and 4.7% were classified as a "very serious substantive threat," or threats to kill, rape, or inflict serious harm or injury with a weapon. Almost 87% of cases were resolved without law enforcement action, and only 2.5% resulted in a court charge, arrest, or juvenile detention. Findings suggest threat assessment may be less punitive than "zero-tolerance policies."</p>
<p>Malti, T. (2020). Children and violence: Nurturing social-emotional development to promote mental health. Social Policy Report, 33(2), 1-27. https://doi.org/10.1002/sop2.8</p>	<p>Children and Violence; Mental Health; Social-Emotional Development; Protective Factors</p>	<p>Protective Factors and Mental Health</p>	<p>Yes</p>	<p>This study focused on protective factors of violence and addressing trauma and exposure to violence among youth. Negative emotions (e.g., frustration or anger) can lead to violence and aggression; however, kind emotions (e.g., one's ability to care and connect) act as socio-emotional protective factors. The ability to self-regulate emotions and experience empathy is associated with protective factors against violence. This suggests addressing violence by focusing on mental health early on can reduce violence among youth. Schools, family, and the community should focus on improving climate, encourage prosocial behaviors, and address mental health.</p>
<p>Martaindale, M. H., & Blair, J. P. (2019). The evolution of active shooter response training protocols since Columbine: Lessons from the Advanced Law Enforcement Rapid Response Training Center. Journal of Contemporary Criminal Justice, 35(3), 342-356. https://doi.org/10.1177/1043986219840237</p>	<p>Active Shooter; Policing</p>	<p>ALERTT</p>	<p>Yes</p>	<p>This paper addresses ALERTT, the national standard in active shooter training, and its training protocols over the last couple decades: Active shooter response teams; civilian response; medical intervention training. Training has since evolved following Columbine High School. Active shooter response used to reflect SWAT techniques but have now moved from 4-5 officer teams to smaller teams for improved response times. Sometimes, a single officer in the right circumstances can stop an active shooter. Officers are now being trained to perform lifesaving medical interventions until other first responders can intervene. Law enforcement and fire/EMS are now training together to improve response during an active shooter incident.</p>

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Musu-Gillette, L., Zhang, A., Wang, K., Zhang, J., Kemp, J., & Diliberti, M. (2018). Indicators of school crime and safety: 2017. US Department of Education. https://nces.ed.gov/pubs2018/2018036.pdf	Violent and Criminal Incidents; Emergency Preparedness; Safety	Lockdown Procedures Emergency Preparedness Cameras	N/A - Percentage Summary	Over 92% of schools had a written plan for procedures regarding school shootings. Between 1999 to 2015, locked entrance/exit doors during the day increased from 38% to 78%; security guards increased from 54% to 70%. Adults supervising the hallway increased from 85% to 90%. Metal detectors increased from 9% to over 12%. The use of security cameras increased from 39% to 83% between 2001 to 2015. Between the 2015 to 2016 school year, about 95% of schools had drilled students on lockdown procedures. All results highlighting an upward trend toward greater security measures and preparedness for school shootings.
National Center for Education Statistics. (2022). Safety and security practices at public schools. U.S. Department of Education, Institute of Education Sciences. Retrieved from https://nces.ed.gov/programs/coe/indicator/a19	Security Safety Measure Usage	N/A	N/A	This report addresses the changes in safety practices by percentage between 2019 to 2020. Controlled access during school hours remained high at over 97%; Cameras were used 91% of the time; Staff ID badges were used about 77% percent; Random sweeps for contraband were completed at about 29%; Random metal detector checks were used 6% of the time.
National Threat Assessment Center. (2019). Protecting America's schools: A US Secret Service analysis of targeted school violence. US Secret Service, Department of Homeland Security. Retrieved from https://www.secretservice.gov/sites/default/files/2020-04/Protecting_Americas_Schools.pdf	School Violence; School Shootings	N/A	N/A	This report was a systematic review of incidents between 2008 to 2017 on individuals (K-12) who were current or former students who purposefully used a weapon. Key findings include: (1) there is no profile for the type of school that is targeted; (2) the most common motive for an attack was a grievance with classmates; (3) Most attackers used firearms and those firearms were usually acquired from the home; (4) most attackers had some psychological, behavioral, or neurological/developmental symptoms; (5) many were interested in violent topics; (6) all attackers had social stressors that involved peers or partners and negative home life factors; (7) most were victims of bullying; (8) many had prior contact with law enforcement; (10) all attackers exhibited concerning behaviors and most communicated their intent.

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<p>O'Neill, J. P., Miller, J. J., & Waters, J. R. (2016). Active shooter: Recommendations and analysis for risk mitigation. New York City Police Department, NY. https://www.nyc.gov/assets/nypd/downloads/pdf/counterterrorism/active-shooter-analysis2016.pdf</p>	<p>Active Shooter; Risk Mitigation</p>	<p>N/A</p>	<p>N/A</p>	<p>About 21% of incidents occurred at a school. Many school-related shooters stole weapons from parents.</p>
<p>O'Toole, M. E. (2009). <i>The school shooter a threat assessment perspective</i>. DIANE Publishing.</p>	<p>Threat assessment perspective</p>	<p>Threat assessment</p>	<p>Yes</p>	<p>This work provides a summary of a threat assessment perspective. Not all threats are created equal but all schools must have an established threat assessment procedure that is managed by properly trained staff and administrators to distinguish between the various levels of threats in order to choose an appropriate response. This requires understanding of how credible and serious the threat is and to what extent the person making the threat has resources, intent, and the motivation to carry it out. For threat assessment, a Four-Pronged Assessment Model is designed to assess a person who has made a threat and evaluate the likelihood they will carry it out: (1) Prong 1 - personality of the student; (2) Prong 2 - family dynamics; (3) Prong 3 - school dynamics and the student's role in those dynamics; (4) Prong 4 - social dynamics.</p>
<p>Piza, E. L., Welsh, B. C., Farrington, D. P., & Thomas, A. L. (2019). CCTV surveillance for crime prevention: A 40-year systematic review with meta-analysis. <i>Criminology & Public Policy</i>, 18(1), 135-159. https://doi.org/10.1111/1745-9133.12419</p>	<p>Meta Analysis; CCTV; Crime Prevention</p>	<p>CCTV</p>	<p>No</p>	<p>This meta analysis focuses on CCTV and impact on crime. Results indicate CCTV is associated with a significant but modest decrease in crime, particularly for cars and parks. Both vehicle and property crime saw reductions but no effect was found for violent crime.</p>

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<p>Reischi, T. M., Hsieh, H. F., & Pomerantz, N. (2020) Focusing On Safety: Understanding school safety needs and concerns through school superintendents focus group discussions. National Center for School Safety. Retrieved https://www.nc2s.org/wp-content/uploads/2020/09/AASA-Focus-Group-Report-Final.pdf</p>	<p>Superintendents; Focus Groups; Challenges to School Safety</p>	<p>Threat Assessment; School Safety Drill; Mental Health Resources</p>	<p>N/A</p>	<p>Participants include superintendents who addressed school safety strategies through focus groups. While mental health resources were implemented with success, it was also considered to be one of the most difficult to implement. Participants also indicated threat assessment was difficult to implement, and that they needed more standardized training. They have also expressed concern about conflicting recommendations regarding school safety drills (e.g., run hide, confront, or hide, run confront as recommendations). There should also be more coordination with first responders.</p>
<p>Rider, C. F. (2015). Teachers' perceptions of their ability to respond to an active shooter incident. The University of Southern Mississippi. Retrieved from https://aquila.usm.edu/cgi/viewcontent.cgi?article=1067&context=dissertations</p>	<p>Active Shooter Drills; Teacher Perceptions</p>	<p>Active Shooter Drills</p>	<p>No</p>	<p>This dissertation aimed to investigate the perceptions teachers had regarding their ability to respond effectively to an active shooter incident by looking at active shooter drills. Teachers were unsure about the effectiveness of active shooter drills. Over 48% reported practicing active shooter incident drills 1-2 times a year, while almost 36% never did. Over 60% reported not knowing how often the school updates these drills. Over 85% reported a full-time SRO, but only about 44% reported the SRO as providing training at the school. Many teachers reported no active shooter incident preparedness training but expressed need for it. Districts were more willing to focus on other types of training unrelated to safety. Teachers had some uncertainty about their school district's ability to provide them with proper training. Teachers are also uncertain that the practice and drills are adequate. There is a strong association between drills and level of confidence in responding to an active shooter. Some districts were not taking safety issues seriously.</p>

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Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
Rocque, M. (2012). Exploring school rampage shootings: Research, theory, and policy. <i>The Social Science Journal</i> , 49 (3), 304–313. https://doi.org/10.1016/j.soscij.2011.11.001	School shootings; School violence; Policy implications	N/A - Overview / Summary	N/A	Schools need to be trained to recognize threats, control access to guns, and increase security measures, and using SCP in school settings, including parking lot placement and line of sight hallways to reduce school violence. SCP policies focus on target hardening but these have not been theoretically informed.
Ratcliffe, J. (2006). Video surveillance of public places. Washington, DC: US Department of Justice, Office of Community Oriented Policing Services. Retrieved from https://popcenter.asu.edu/sites/default/files/video_surveillance_of_public_places_2d_ed._9.1.22.pdf	CCTV; Law Enforcement; Fear of Crime	CCTV	No	This review on CCTV discusses the function and role of surveillance in reducing crime. CCTV aims to trigger the mechanism that leads to a would-be offender to choose whether or not they commit a crime. They may also reduce fear of crime, aid in police investigations, information gathering, and place management; however, cameras may also displace crime, or lead to greater suspicion or fear of crime. CCTV may be more effective to combat property offenses rather than violent crime and may be better for smaller areas.
Schildkraut, J., Greene-Colozzi, E., Nickerson, A. B., & Florczykowski, A. (2023). Can school lockdowns save lives? An assessment of drills and use in real-world events. <i>Journal of School Violence</i> , 22(2), 167–182. https://doi.org/10.1080/15388220.2022.2162533	Lockdown Drills; School Shootings; Emergency Preparedness	School Lockdown Drills	Yes	This study examines the role of lockdowns in practice and in real-world events. Findings suggest training and drills have a protective effect, leading to fewer injuries and deaths.
Schildkraut, J., & Nickerson, A. B. (2022). <i>Lockdown drills: Connecting research and best practices for school administrators, teachers, and parents</i> . MIT Press.	Lockdown Drills; School Safety; Emergency Preparedness	Lockdown Drills	Yes	Self-reported anxiety levels stayed the same or decreased following a drill. Students also reported feeling more prepared to respond appropriately to an emergency event.

**Effectiveness of School Security Measures on School Shooting Incidents
Research Summary Table**

Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
<p>Silva, J. R., & Greene-Colozzi, E. A. (2021). Mass shootings and routine activities theory: The impact of motivation, target suitability, and capable guardianship on fatalities and injuries. <i>Victims & Offenders</i>, 16(4), 565–586. https://doi.org/10.1080/15564886.2020.1823919</p>	<p>Routine Activities Theory; Mass Shootings</p>	<p>Open-Spaces / Design</p>	<p>Yes</p>	<p>Open spaces and schools create more suitable targets for mass shootings. Incidents involving rifles or more than one gun resulted in greater victimization.</p>
<p>Silva, J. R., & Greene-Colozzi, E. A. (2022). An exploratory study of failed mass shootings in America. <i>Security Journal</i>, 35 (2), 367–399. https://doi.org/10.1057/s41284-020-00281-z</p>	<p>Mass shooting; Situational crime prevention; Crime script analysis (CSA)</p>	<p>Target Hardening Access Control Crime script analysis SCP</p>	<p>Yes</p>	<p>SCP, including target hardening and access control appeared to reduce harm when it came to individuals who did not have legitimate access to conduct attacks. Lockdowns, armed security, and place managers appeared to reduce victimization in semi-protected locations once a perpetrator entered the building. A perpetrator's end goal of suicide also appeared to decrease incident severity, and perpetrators who had failed shooting attacks were less trained in weapon use and less prepared. Findings reveal support for SCP.</p>
<p>Stone, R., Kim, J., Mgaedeh, F., Backous, G., & Fales, C. (2022). The effectiveness of active shooter responses for civilians and law enforcement. In <i>Proceedings of the Human Factors and Ergonomics Society Annual Meeting</i> (Vol. 66, No. 1, pp. 987–991). Sage CA: Los Angeles, CA: SAGE Publications. https://doi.org/10.1177/1071181322661501</p>	<p>Active Shooter; Training; Training Evaluation</p>	<p>"Run, Hide, Fight"</p>	<p>Mixed</p>	<p>This study surveyed law enforcement officers and teachers ranging from K-12 and Higher Education on experiences and opinions on active shooter training. Teachers felt much less prepared compared to law enforcement officers. Officers were split regarding the effectiveness of "Run, Hide, Fight." It is suggested future training incorporate training that is complementary between civilian and officer response.</p>

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<p>Tanner-Smith, E. E., Fisher, B. W., Addington, L. A., & Gardella, J. H. (2018). Adding security, but subtracting safety? Exploring schools' use of multiple visible security measures. <i>American Journal of Criminal Justice</i>, 43, 102–119. https://doi.org/10.1007/s12103-017-9409-3</p>	<p>School Safety; School Surveillance</p>	<p>Visible Security Measures Cameras Security Guards Metal Detectors</p>	<p>No</p>	<p>This study used a quasi-experimental design to analyze nationally representative school administrator-reported data. Utilization of multiple security measures (e.g., cameras, metal detectors, or security personnel) were associated with decreased likelihood of exposure to property crime in high schools, but increased exposure to crime and violence at school. There was no evidence that any of the visible security measures reduced exposure to crime or violence but may protect against property crime. Schools using security personnel along or in combination with surveillance via cameras, or surveillance and metal detectors increased exposure to drugs. No effects were seen for firearm crimes.</p>
<p>Trump, K. S. (2011). <i>Proactive school security and emergency preparedness planning</i>. Corwin Press.</p>	<p>School Safety; School Security</p>	<p>Cameras SROs Access Control Threat Assessment</p>	<p>N/A</p>	<p>This book addresses threats to school security and proactive school security and emergency preparedness as security continues to be an evolving field. When it comes to access control, it is easy for master keys to get lost or for key cards to not work, but districts can assign someone to monitor entry points or cameras. Practical strategies to reduce security risk include adequate supervision and staff, particularly at school events. There is strong advocacy of SROs on campus who are specially trained in school settings. Specially trained law enforcement officers certified to carry a firearm who also focus on counseling and education could lead to improved crime reporting and sharing of crime activity between the district and police.</p>

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Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
<p>U.S. Department of Justice. 2024. Critical incident review: Active shooter at Robb Elementary School. Washington, DC: Office of Community Oriented Policing Services. https://portal.cops.usdoj.gov/resourcecenter/content.ashx/cops-r1141-pub.pdf</p>	<p>Robb Elementary School; Critical Incident Report; School Safety; School Shooting</p>	<p>Doors Locks Active Shooter Response Emergency Alerts Drills and Exercises Threat Assessment</p>	<p>Yes - Critical Incident Review</p>	<p>UCISD Police department did not have an active shooter policy, but there was a district active shooter response protocol (implemented 2020). They had a Campus Safety Team designed to meet the needs of the campus. This included preventative security measures, documenting safety drills, fact sheets on response protocols such as evacuation, lockdown, and shelter in place. UCISD had 5 sworn members. Its small police department did not have enough officers to keep them present at each campus meaning they had to rotate between campuses and mostly did door checks. There were threat assessment teams in the district, but they were at the district level and not campus specific. Training provided only included a one-day training, and team members felt it left them with many questions rather than answers. The Threat Assessment Team did not have formalized policies at the time of the shooting. The school had policies regarding interior and exterior doors and locks. Upon investigation of the shooting, doors were often left unlocked or held open with a rock by staff. One of the buildings was in the process of being rekeyed which happened if a key went missing or was broken, posing another security risk. Additionally, not all police officers had master keys to all of the buildings and campuses, potentially causing delay in evacuation processes. There were issues with staff receiving emergency alerts as well due to poor reception. Drills at Robb elementary were generally practiced inside the classroom. Some teachers reported never practicing the drills when they had a class at recess, lunch, or somewhere else on campus. This happened the day of the shooting as well. Recommendations include: Law enforcement and other first responders should coordinate with school districts annually and participate in safety and security planning; adopt a multidisciplinary approach that includes police, school officials, mental health professionals, and other stakeholders; establish systematic procedures for identifying, assessing, and managing threat assessments that are under review by the threat assessment team; all staff should receive training on threat assessment processes; implement a system of door audits that are conducted routinely and documented; universal access boxes for first responders with master keys to avoid delays.</p>

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Study Citation	Key Terms	School Security Measure / Perspective	Evidence Supporting School Safety Measure	Key Finding(s)
Zhang, A., Wang, K., Zhang, J., Kemp, J., Diliberti, M., & Oudekerk, B. A. (2018). Indicators of School Crime and Safety: 2017. NCES 2018-036/NCJ 251413. <i>National Center for Education Statistics</i> .	Crime and Safety; Public School Shootings	Locked Doors	N/A	This report includes percentages of school use for a variety of school safety measures. Locked doors increased from 38% to 78% between 1999-2015. SROs and security guards increased from 54% to 70%. Metal detectors increased from 9% to 12%. The main way schools controlled access to buildings was by locking and monitoring doors (94%). Cameras were also used (81%)