United States Government Accountability Office

Report to Congressional Requesters

June 2020

K-12 EDUCATION

Characteristics of School Shootings

GAO-20-455

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K-12 EDUCATION

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GAO Highlights

Highlights of GAO-20-455, a report to congressional requesters

Why GAO Did This Study

In addition to the potential loss of life, school shootings can evoke feelings of profound fear and anxiety that disturb a community's sense of safety and security. Questions have been raised about whether schools' approaches to addressing student behavior are a factor in school shootings. These approaches include discipline that removes the offending students from the classroom or school, and preventative approaches meant to change student behaviors before problems arise.

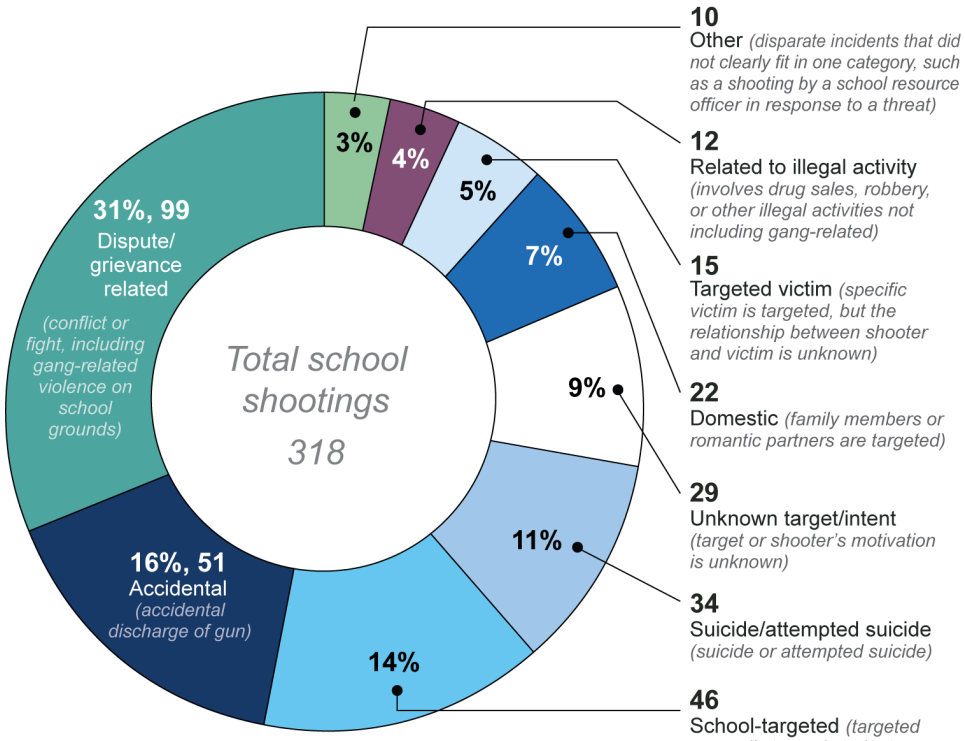
GAO was asked to examine school shootings, including the link between discipline and shootings. This report examines 1) the characteristics of school shootings and affected schools, and 2) what is known about the link between discipline and school shootings. To do so, GAO analyzed data on school shootings and school characteristics for school years 2009-10 through 2018-19; and conducted a literature review to identify empirical research from 2009 to 2019 that examined discipline approaches in school, and the effects of these approaches on outcomes of school gun violence, school violence, or school safety. GAO also interviewed selected researchers to gather perspectives about challenges and limitations in conducting research on school discipline and school shootings.

View GAO-20-455. For more information, contact Jacqueline M. Nowicki at (617) 788-0580 or nowickij@gao.gov.

What GAO Found

GAO found that shootings at K-12 schools most commonly resulted from disputes or grievances, for example, between students or staff, or between gangs, although the specific characteristics of school shootings over the past 10 years varied widely, according to GAO's analysis of the Naval Postgraduate School's K-12 School Shooting Database. (See figure.) After disputes and grievances, accidental shootings were most common, followed closely by school-targeted shootings, such as those in Parkland, Florida and Santa Fe, Texas.

K-12 School Shootings by Kind, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

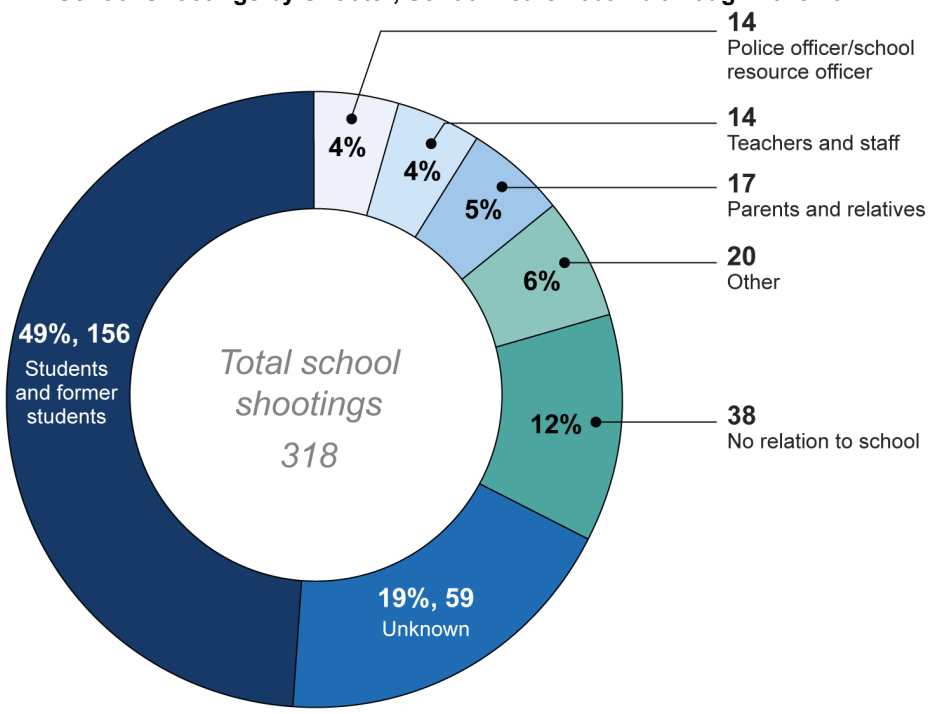
The shooter in about half of school shootings was a student or former student; in the other half, the shooter had no relationship to the school, was a parent, teacher, or staff, or his or her relationship to the school was unknown, according to the data. When the shooting was accidental, a suicide, or school-targeted, the shooter was more often a student or former student. However, when the shooting was the result of a dispute or grievance, the shooter was someone other than a student in the majority of cases. For about one-fifth of cases, the shooter's relationship to the school was not known. (See figure.)

The characteristics of schools where shootings occurred over the past 10 years also varied by poverty level and racial composition. Urban, poorer, and high minority schools had more shootings overall, with more characterized as a dispute or grievance. Suburban and rural, wealthier, and low minority schools had more suicides and school-targeted shootings, which had the highest fatalities per incident. Overall, more than half of the 166 fatalities were the result of school-targeted shootings.

The location of the shootings more often took place outside the school building than inside the school building, but shootings inside were more deadly, according to the data. Shootings resulting from disputes occurred more often outside school buildings, whereas accidents and school-targeted shootings occurred more often inside school buildings. (See figure.)

GAO found no empirical research in the last 10 years (2009-2019) that directly examined the link between school discipline and school shootings. According to literature GAO examined and five study authors GAO interviewed, various factors contribute to the lack of research examining this particular link, including that multiple and complex factors affect an individual's propensity toward violence, making it difficult to isolate the effect of any one factor, including school discipline.

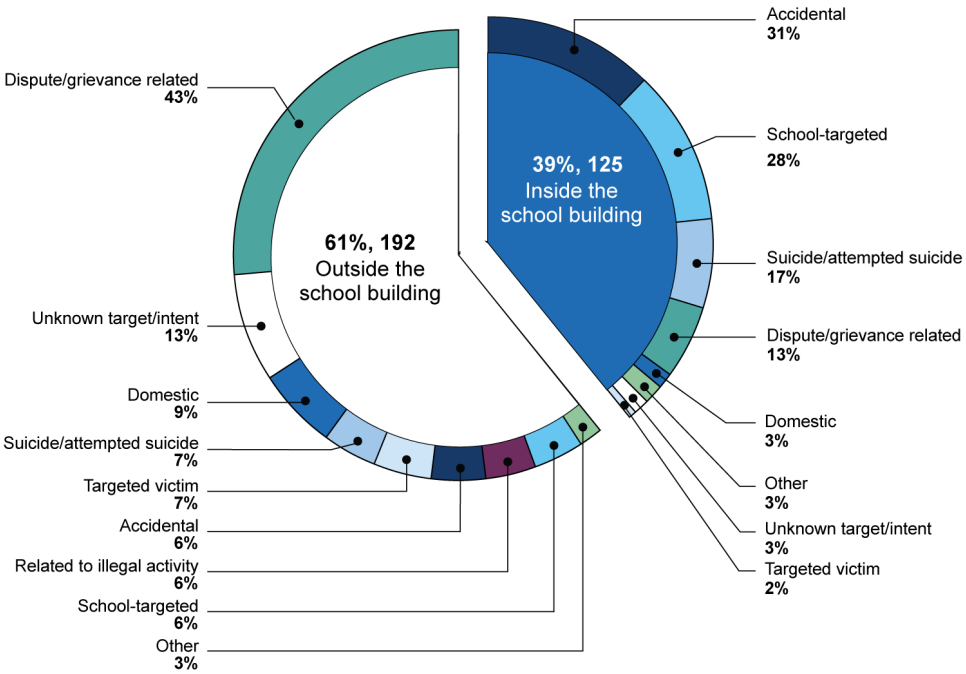
K-12 School Shootings by Shooter, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

Notes: Percentages do not add to 100 percent, due to rounding. "Unknown," as recorded in the K-12 School Shooting Database, includes incidents in which the shooter was identified but the shooter's relationship to the school could not be determined. "Other" combines four categories from the K-12 School Shooting Database: intimate relationship with victim, multiple shooters, students from a rival school, and non-students using athletic facilities/attending game.

K-12 School Shootings by Shooting Location and Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

Notes: The location of one of the 318 incidents was unknown, and therefore, excluded from this analysis. As a result, the total incidents in this analysis is 317. GAO combined three categories from the K-12 School Shooting Database into an "Outside the school building" category: outside on school property, off school property, and on school bus.

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U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

June 9, 2020

The Honorable Robert C. “Bobby” Scott
Chairman
Committee on Education and Labor
House of Representatives

The Honorable Jerrold Nadler
Chairman
Committee on the Judiciary
House of Representatives

According to a 2018 Pew Research Center Survey, a majority of American teenagers—especially those who are not white or are from lower income families—are worried about the possibility of a shooting happening at their school.[1] Since the 1999 shooting at Columbine High School, almost all K-12 public school districts have developed and adopted procedures to follow in the event of a shooting, and most currently conduct active shooter drills, as we reported in 2016.[2] In addition to the loss of life often resulting from school shootings, a shooting that occurs in school can profoundly disturb a community’s sense of safety and security and may have lasting effects for students, teachers, principals, and parents. As a result of their trauma, students can experience fear, anxiety, worry, difficulty concentrating, angry outbursts, and aggression.[3] Students who experience the trauma of a school shooting might also perform poorly in school or attempt to harm themselves.[4] Further, questions have been raised about whether schools’ approaches to addressing student behavior are a factor in school shootings. These approaches include discipline that removes the

[1] The survey of teens was conducted in March and April of 2018, shortly after the shooting at a high school in Parkland, Florida, on February 14, 2018. Nikki Graff, *A majority of U.S. teens fear a shooting could happen at their school, and most parents share their concern* (Pew Research Center, Apr. 18, 2018).

[2] GAO, *Emergency Management: Improved Federal Coordination Could Better Assist K-12 Schools Prepare for Emergencies*, GAO-16-144 (Washington, D.C.: Mar. 10, 2016).

[3] K. Guarino and E. Chagnon, *Trauma-sensitive schools training package.* (Washington, D.C.: National Center on Safe Supportive Learning Environments, 2018).

[4] K. Guarino and E. Chagnon.

offending students from the classroom or school, and preventative approaches meant to change student behaviors before problems arise.

You asked us to provide information on school shootings, including information on whether the way students are disciplined in schools might be a factor in school shootings. This report examines (1) the characteristics of K-12 school shooting incidents and the characteristics of affected schools, and (2) what is known about whether different approaches to discipline in school play a role in school shootings.

For the first objective, we developed a definition of school shootings to create a list of school shootings based on existing datasets, and matched the list of shootings with Department of Education (Education) data on school characteristics. Specifically:

- Because there is no uniform definition of a school shooting, we developed a definition of school shootings for the purposes of our analysis, by reviewing research on the topic of school shootings, and by reviewing and comparing definitions used in various datasets, such as the National Center for Education Statistics School Survey on Crime and Safety and Education's Civil Rights Data Collection. To ensure we focused on instances where students or staff were at risk, we defined a school shooting as "any time a gun is fired on school grounds, on a bus, during a school event, during school hours, or right before or after school."[5,6] Appendix I provides more information on how we developed our definition.
- Although the dataset we used captures school shooting incidents from 1970 to the present, we focused our analysis on the past 10 school years (2009-10 through 2018-19) to reflect the types of shootings occurring in today's schools. To develop a list of shootings, we applied our definition by comparing it to the description of each shooting occurring within this 10-year period in the Naval

[5] For our analysis, we included four incidents in which a gun was brandished due to the severity of the incidents. For example, the shooter initially made threatening gestures with a firearm, but was stopped prior to a shot being fired; for example, if the shooter was tackled.

[6] This definition includes instances in which the gun was fired onto school grounds or at a school bus, even if the shooter was outside of school grounds or outside of the school bus when they fired. In addition, this definition includes all times where school staff and teachers, including support and custodial staff, were on school grounds in their official capacity with the school (e.g. on duty, at school meeting).

Postgraduate School's K-12 School Shooting Database[7]—the dataset on which we primarily relied-—and the Federal Bureau of Investigation (FBI) Active Shooter reports.[8] We primarily relied on the K-12 School Shooting Database because we determined it to be the most widely inclusive database of K-12 school shootings (i.e., compiling every instance a gun is brandished, is fired, or a bullet hits school property for any reason, regardless of the number of victims, time of day, or day of week), and therefore most appropriate for our purpose. We included on our list, all shootings that met our criteria regardless of the shooter's intent (e.g., accidents and suicides). For purposes of our report, we categorized shootings identified in the FBI's Active Shooter reports as "school-targeted."[9] See appendix I for details on the categories of school shootings we identified.

- To develop our unique dataset on characteristics of schools that experienced school shootings, we used Education's Common Core of Data (CCD), which is the agency's primary database on public elementary and secondary education in the United States. We matched and then merged the school characteristics from the CCD, such as grade level and locale (urban, suburban, town, and rural), with our list of school shootings.
- To assess the reliability of the data in the K-12 School Shooting Database, we interviewed the researchers who developed and

[7] The K-12 School Shooting Database was developed by the Naval Postgraduate School's Center for Homeland Defense and Security which conducts a wide range of programs to develop policies, strategies, programs and organizational elements to address terrorism, natural disasters and public safety threats. The programs are developed in partnership with and sponsored by the National Preparedness Directorate at the Federal Emergency Management Agency (FEMA). The K-12 School Shooting Database (https://www.chds.us/ssdb/) is an open-source database of information from various sources including peer-reviewed studies, government reports, and media sources.

[8] The FBI defines an active shooter as one or more individuals actively engaged in killing or attempting to kill people in a populated area. The FBI compiles active shooter incidents to assist law enforcement in preventing and responding to these incidents. For example, see: Advanced Law Enforcement Rapid Response Training (ALERRT) Center at Texas State University and the Federal Bureau of Investigation, U.S. Department of Justice, *Active Shooter Incidents in the United States in 2018* (Washington, D.C.: 2018).

[9] We define school-targeted incidents as shootings that were targeted generally toward school staff or students on school premises, but that were generally indiscriminate in terms of specific victims. These include incidents of hostage standoffs, indiscriminate shootings targeting the school staff and personnel, and active shooter incidents as categorized by the FBI. School-targeted shootings may also include incidents in which a specific victim was targeted because of their relationship to the school (e.g., student, principal, staff, school resource officer, etc.).

maintain the K-12 School Shooting Database and compared that data to other databases with similar data on school shootings. To assess the reliability of the CCD data, we reviewed technical documentation and interviewed officials from Education's Institute of Education Sciences. We found these data sufficiently reliable for our purposes.

To address the second objective, we conducted a literature review to identify empirical research generally published in peer reviewed journals or by government agencies over a 10-year period, from January 2009 to June 2019 (see app. I for criteria used in screening studies). We included studies that examined exclusionary approaches to discipline, like suspension (both in and out of school), expulsion, and zero tolerance; as well as nonexclusionary approaches such as those intended to prevent behaviors that may lead to discipline.[10] These approaches include social emotional learning and positive behavior supports, and interventions like threat assessment. We searched for studies that examined the effects of discipline approaches on outcomes of school gun violence, school violence, and school safety.[11]

We conducted this performance audit from May 2019 to June 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Research on Youth Violence

Research suggests that a young person's propensity to commit an act of violence, like a school shooting, is influenced by the interplay of multiple risk factors and protective factors.[12] These factors, according to the

[10] A school may use exclusionary and nonexclusionary approaches in combination. In addition, for the purposes of our literature review, "nonexclusionary" means approaches to address student behavior that focus on preventing behaviors that lead to a punitive disciplinary response. It does not include "time-out" or "detention", or other forms of discipline that may be used by teachers or schools.

[11] Because existing research was limited, we included literature that examined the outcome of violent behavior that was not always exclusive to school-based violent behaviors.

[12] C. David-Ferdon, et al, *A Comprehensive Technical Package for the Prevention of Youth Violence and Associated Risk Behaviors* (Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2016).

research, can affect a young person's development from early childhood through young adulthood. Risk factors, like a prior history of exposure to violence or abuse or to high levels of crime or gang activity, can increase the likelihood of a person becoming a perpetrator of violence. Protective factors, like stable connections to school, school personnel, and nonviolent peers, decrease the likelihood of a person becoming a perpetrator of violence. Risk factors and protective factors play a role on many levels, such as the interpersonal and community levels. Table 1 summarizes several of the risk and protective factors identified by research.

Table 1: Examples of Risk and Protective Factors That Influence Youth Violence

	Risk Factors	Protective Factors
Individual	• Impulsiveness • Substance abuse • Antisocial or aggressive beliefs and attitudes • Weak school achievement, peer conflict, or rejection • Prior history of exposure to violence or abuse • Unsupervised access to a firearm • Depression, anxiety, chronic stress and trauma • Prior history of arrest	• Development of healthy social, problem-solving, and emotional regulation skills • School readiness and academic achievement
Relationship	• Association with peers engaging in violent or delinquent behavior, including gang activity • Parental conflict and violence • Poor parental attachment and lack of appropriate supervision • Use of harsh or inconsistent discipline	• Strong parent-child attachment • Consistent, developmentally appropriate limits at home • Stable connections to school and school personnel • Feelings of connectedness to prosocial, nonviolent peers
Community	• Residential instability and crowded housing • Density of alcohol-related businesses • Poor economic growth or stability • Concentrated poverty • High levels of crime or gang activity • High levels of unemployment • High levels of drug use or sales	• Residences and neighborhoods that are regularly repaired and maintained, and are designed to increase visibility and control access (parks, schools, businesses) • Policies related to the density of alcohol outlets and sales • Stable housing and household financial security • Economic opportunities (e.g., employment) • Access to services and social support

Source: GAO analysis of C. David-Ferdon, et al, *A Comprehensive Technical Package for the Prevention of Youth Violence and Associated Risk Behaviors* (Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2016); and C. David-Ferdon and T.R. Simon, *Preventing Youth Violence: Opportunities for Action* (Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2014). | GAO-20-455

According to the Centers for Disease Control and Prevention (CDC), identifying risk factors and protective factors–a public health approach to

violence prevention—is an important step in understanding where to focus prevention efforts.[13] Risk factors are cumulative, meaning the more risk factors youth are exposed to, the greater likelihood they will develop violent behaviors. It is important to note that not everyone exposed to risk factors will develop violent behaviors.[14]

The CDC's resources on evidence-based youth violence prevention efforts include strategies that help ameliorate risk factors and bolster protective factors, such as strategies that enhance safe environments in communities, strengthen communication and problem solving skills of caregivers and parents, and educate students on violence in schools.[15] In addition, according to a 2007 meta-analysis, school-based prevention programs involving both psychological and social aspects of behavior, generally had positive effects for reducing aggressive and disruptive student behaviors in school settings, such as fighting with and intimidating others.[16]

Targeted Violence in Schools

These risk factors are often evident, for example, in the significant amount of analyses that have been done on the characteristics of attackers who have specifically targeted schools, like the shootings that happened at Columbine, and at Marjory Stoneman Douglas High School in Parkland, Florida and Santa Fe High School in Santa Fe, Texas in 2018. These shootings are particularly concerning because the shooter often indiscriminately targets victims in the school, and because of the high numbers of killed or wounded victims in a single incident. A 2019 joint report by Education and the Department of Justice (Justice) found that these kinds of shootings often involved a single, male shooter, mostly

[13] CDC. See: https://www.cdc.gov/violenceprevention/publichealthissue/publichealthapproach.html (downloaded March 4, 2020).

[14] C. David-Ferdon and T.R. Simon, *Preventing Youth Violence: Opportunities for Action* (Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2014).

[15] C. David-Ferdon and T.R. Simon.

[16] S.J. Wilson and M.W. Lipsey, "School-Based Interventions for Aggressive and Disruptive Behavior. Update of a Meta-analysis," *American Journal of Prevention Medicine,* vol. 33, no. 2S (2007).

between the ages of 12 and 18.[17] Further, in 2019, a U.S. Secret Service study of targeted school violence using firearms or other weapons found that most of these attackers were motivated by grievances with classmates and some were motivated by grievances involving school staff, romantic relationships, or other personal issues.[18] The Secret Service reported that all of these attackers experienced social stressors involving their relationships with peers and or romantic partners, nearly all experienced negative home life factors, most were victims of bullying, most had a history of disciplinary actions in school, and half had prior contact with law enforcement. Even so, experts warn against any attempts to profile shooters in school-targeted shootings because the vast number of students who have the same or similar characteristics and life and school experiences, do not commit school shootings. Experts warn that trying to develop a detailed profile of a shooter who specifically targets schools risks stigmatizing students who match the profile as well as ruling out students who are deeply troubled but do not match the profile.

Federal and State Response to School Shootings

For nearly two decades, state and federal commissions have studied and made recommendations to schools and communities in the aftermath of shootings. Following the shooting at Columbine, a state commission made recommendations for schools about how to respond to a crisis, communicate and plan for critical emergencies, and identify potential shooters.[19] In response to the 2012 shooting at Sandy Hook Elementary School, the Sandy Hook commission recommended that the state of Connecticut create a work group to help develop safe school design standards that would guide renovations and expansions of existing schools and the construction of new schools throughout the state.[20]

[17] L. Musu, et al., *Indicators of School Crime and Safety: 2018*, NCES 2019-047/NCJ 252571 (Washington, D.C.: National Center for Education Statistics, U.S. Department of Education, and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice, 2019).

[18] The U.S. Secret Service analyzed 41 incidents of targeted violence at K-12 schools of which 25 involved the use of firearms. Department of Homeland Security, U.S. Secret Service, National Threat Assessment Center*, Protecting America's Schools: A U.S. Secret Service Analysis of Targeted School Violence* (2019).

[19] Report of Governor Bill Owens' Columbine Review Commission, Colorado Governor's Columbine Review Commission, May 2001.

[20] Final Report of the Sandy Hook Advisory Commission, Presented to Governor Dannel P. Malloy, State of Connecticut (Mar. 6, 2015).

Also following the Sandy Hook shooting, the White House developed a plan in 2013, called "Now is the Time".[21] Among other things, the plan included steps to encourage schools to hire more school resource officers and school counselors, ensure every school has a comprehensive emergency plan, and improve mental health services in schools. The plan also directed federal agencies—Education, Justice, Department of Homeland Security (DHS), and Department of Health and Human Services (HHS)—to develop a set of model plans for communities on how to plan for and recover from emergency situations. In 2013, these agencies collaborated to produce comprehensive guidance on planning for school emergencies, including shootings.[22] The guidance advises schools on how to improve their psychological first aid resources, information-sharing practices, and school climate, among other things. In our 2016 report on school safety, we reported that, based on our nationally generalizable survey of school districts, nearly all districts had emergency operations plans.[23]

Most recently, in 2018, the President formed the Federal Commission on School Safety after the school shooting in Parkland, Florida.[24] The Commission made several recommendations to the federal government and state and local communities aimed at mitigating the effects of violence and responding to and recovering from such acts. For example, the Commission recommended that all appropriate state and local agencies should continue to increase awareness of mental health issues among students and improve and expand ways for students to seek needed care. The Commission also recommended that the federal government develop a clearinghouse to assess, identify, and share best practices related to school security measures, technologies, and

[21] The White House*, Now is the Time: The President's Plan to Protect our Children and our Communities by Reducing Gun Violence* (Washington, D.C.: Jan. 16, 2013).

[22] U.S. Department of Education, Office of Elementary and Secondary Education, Office of Safe and Healthy Students, *Guide for Developing High-Quality School Emergency Operations Plans* (Washington, D.C.: 2013).

[23] GAO, *Emergency Management: Improved Federal Coordination Could Better Assist K-12 Schools Prepare for Emergencies,* GAO-16-144 (Washington, D.C.: Mar. 10, 2016).

[24] Final Report of the Federal Commission on School Safety, Presented to the President of the United States (Dec. 18, 2018).

innovations.[25] It also made recommendations to specific federal agencies, including that the Substance Abuse and Mental Health Services Administration (SAMHSA) and the Centers for Medicare & Medicaid Services (CMS) provide information to states on how they can fund comprehensive school-based mental health care services. The Commission also recommended that Education identify resources and best practices to help schools improve school climate and learning outcomes, and protect the rights of students with disabilities during the disciplinary process while maintaining overall student safety. Finally, the Commission also recommended rescinding the federal "Rethink School Discipline" guidance, citing the Commission's concerns with the legal framework upon which the guidance was based, and its conclusion that the guidance may have contributed to making schools less safe.[26]

Approaches to Addressing Student Behavior in School

There are a range of ways school officials might respond to students whose behavior in school is deemed unacceptable or inappropriate. Suspension and expulsion, for example, have been long established as traditional approaches to discipline used by schools to manage student behavior. These approaches remove the offending students from the classroom, and are therefore sometimes known as "exclusionary discipline." Schools that enforce "zero tolerance" policies require that offending students be removed from the classroom regardless of any mitigating factors or context, such as a student who was engaged in self-defense. The philosophy of zero tolerance is that removing students who engage in disruptive behavior in violation of the student code of conduct will create a better learning environment by deterring other students from

[25] In response to this recommendation, DHS, Education, Justice, and HHS created the SchoolSafety.gov website to share actionable recommendations to help schools prevent, protect, mitigate, respond to, and recover from emergency situations. See *https://www.schoolsafety.gov/*.

[26] On January 8, 2014, Education and Justice jointly issued a Dear Colleague Letter and related guidance documents (collectively referred to in the Commission report as the "Rethink School Discipline" guidance). The purpose of the Dear Colleague Letter was to assist public K-12 schools in administering student discipline without discriminating on the basis of race, color, or national origin. The Dear Colleague Letter stated that in their enforcement of federal civil rights laws, the Departments would examine whether school discipline policies resulted in an adverse impact on students of a particular race. It also included recommendations for school districts, administrators, teachers, and staff that, among other things, emphasized the use of "positive interventions over student removal." Education and Justice withdrew the Rethink School Discipline guidance on December 21, 2018.

engaging in unacceptable or inappropriate behavior.[27] We have previously reported that exclusionary discipline disproportionately affects boys, black students, and students with disabilities.[28]

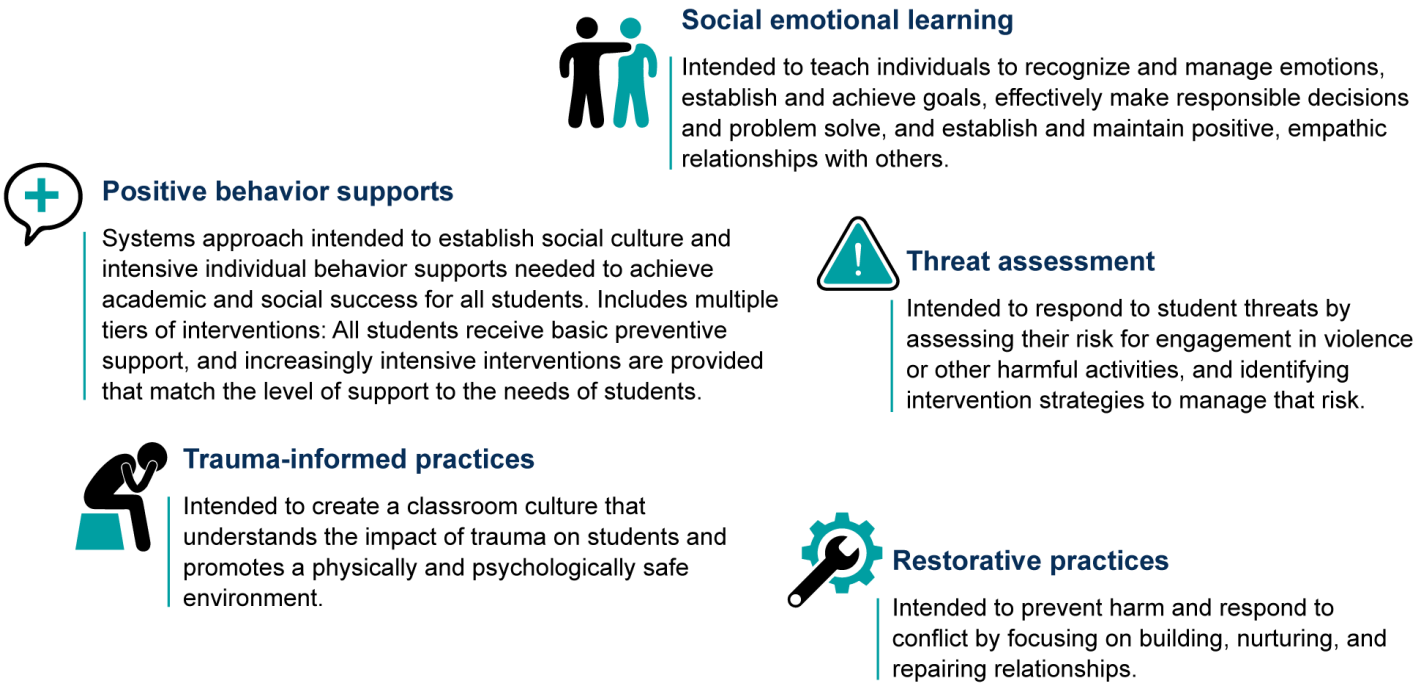
A growing body of research has highlighted concerns associated with the use of exclusionary discipline and, in particular, zero tolerance policies. For example, as we have previously reported, research has shown that students who are suspended from school lose important instructional time, are less likely to graduate on time, and are more likely to repeat a grade, drop out of school, and become involved in the juvenile justice system.[29] Some experts, parents, and school staff have called on schools to consider nonexclusionary approaches to addressing problematic behavior. Some of these nonexclusionary approaches, such as social emotional learning, are designed to change students' mindsets and behaviors before problem behaviors arise. Other approaches address the concerning behavior but seek to avoid using exclusionary discipline. For example, with a threat assessment approach, a multidisciplinary team assesses the threat of violence and develops a plan to manage such risk. With restorative practices, schools engage the student in relationship building and rectifying the consequences of the problematic behavior. Figure 1 describes several nonexclusionary approaches for addressing student behavior. According to researchers, nonexclusionary approaches do not eliminate the need for suspensions and expulsions, but may help reduce reliance on them. These approaches may use systemic school-wide practices, curriculum-based classroom lessons, and individual, as-needed interventions and supports; further, they may be used in combination with each other or with exclusionary approaches.

[27] American Psychological Association Zero Tolerance Task Force, *Are Zero Tolerance Policies Effective in the Schools? An Evidentiary Review and Recommendations* (2008).

[28] GAO, K-12 *Education: Discipline Disparities for Black Students, Boys, and Students with Disabilities*, GAO-18-258 (Washington, D.C: Mar. 22, 2018).

[29] GAO-18-258.

Figure 1: Nonexclusionary Approaches to Address to Student Behavior



Source: GAO analysis of literature on approaches to discipline. | GAO-20-455

A number of resources provide information on how to implement such approaches, as well as for information on outcomes associated with the use of such approaches. For example, Education's What Works Clearinghouse of evidence-based practices identifies programs for managing student behavior. The privately and publicly funded Collaborative for Academic, Social, and Emotional Learning (CASEL) provides information on social and emotional learning implementation, and research on outcomes.[30] Education also funds a technical assistance center to provide support to states, school districts, and schools to build their frameworks of positive behavior supports.[31] In addition, Education funds the National Center on Safe Supportive Learning Environments,

[30] The Collaborative for Academic, Social, and Emotional Learning. See: https://casel.org/

[31] Funded by Education's Office of Special Education Programs and Office of Elementary and Secondary Education. The Technical Assistance Center on Positive Behavioral Interventions and Supports can be found at: www.pbis.org.

which provides information on improving student supports and academic enrichment, including resources on restorative and trauma-sensitive practices.[32]

Characteristics of Shooting Incidents and Schools Varied

Shootings in K-12 schools most commonly resulted from disputes or grievances, such as between students or staff or between gangs, according to our analysis of 10 years of data from the Naval Postgraduate School's K-12 School Shooting Database. The shooters were students or former students in about half of the school shootings. More of the shootings took place outside than inside the school building, though shootings inside were more deadly. The frequency and type of shooting varied across a range of characteristics, such as school grade level, school demographic composition, poverty level, and location.

[32] See The National Center on Safe Supportive Learning Environments: https://safesupportivelearning.ed.gov/

Differences Exist in Characteristics of School Shootings, Shooters, and School Location

Disputes, Such as Fights, Were the Most Common Kind of School Shooting

At-a-Glance: kinds of school shootings

Dispute/grievance – conflict or fight, including gang-related violence on school grounds

Accidental – accidental discharge of a gun

School-targeted – targeted generally toward students or staff on school premises, but generally indiscriminate in terms of specific victims

Suicide/attempted suicide – suicide or attempted suicide

Domestic – family members or romantic partners are targeted

Unknown target/Intent – target or shooter's motivation is unknown

Targeted victim – specific victim is targeted, but the relationship between shooter and victim is unknown

Related to illegal activity – involves drug sales, robbery, or other illegal activities (not including gang-related violence)

Other – does not fit into any of the above categories

See appendix I for full definitions.

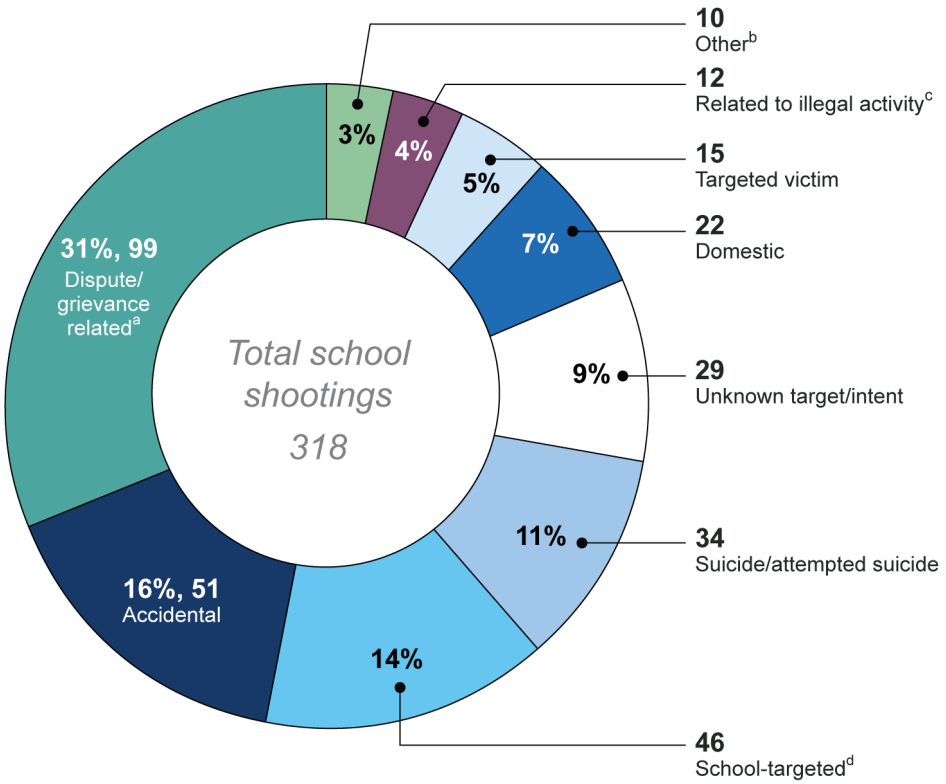
Source: GAO analysis of incidents in the Naval Postgraduate School's K-12 School Shooting Database. | GAO-20-455

Various kinds of shootings occurred in K-12 schools, according to our analysis of 318 incidents over the past 10 school years from the Naval Postgraduate School's K-12 School Shooting Database.[33] Shootings arising from disputes or grievances, such as conflicts between students, school staff, or gangs, were the most common kinds of shootings, making up almost a third of school shootings (see fig. 2). Accidents, such as unintentional discharges from guns, were the next most common kind of shooting (16 percent). School-targeted shootings, such as the 2018 school shootings in Parkland, Florida and Santa Fe, Texas, made up about 14 percent of school shootings. Suicides were the next most common kind (11 percent).[34]

[33] Our analysis includes incidents in which a gun is fired on school grounds (regardless of intent), on a school bus, or during a school event (such as a sporting practice or event, school dance, school play); and during, immediately before, or immediately after school hours or a school event. See appendix I for more details on our scope and methodology. For our analysis, we also included four incidents in which a gun was brandished due to the severity of the incidents. For example, when the shooter initially made threatening gestures with a firearm, but was stopped prior to a shot being fired; for example, if the shooter was tackled. Of the 318 incidents in our dataset, four are instances of a gun being brandished and 314 of a gun being fired.

[34] For 9 percent of the incidents in our dataset, information about the shooter or the motive of the shooting was unknown.

Figure 2: School Shootings by Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

[a]Dispute/grievance-related: Shooting occurred in relation to a dispute or grievance between the victim and the shooter (that was not domestic in nature), for example: as an escalation of an argument, in retaliation for perceived bullying, in relation to gang-violence, or anger over a grade/disciplinary action (including disputes between staff).

[b]Other: Disparate incidents that did not clearly fit in one category, such as a shooting by a school resource officer in response to a threat.

[c]Related to illegal activity: Shooting related to an illegal offense, such as drug sales or possession, robbery, or intentional property damage (not including gang-related violence).

[d]School-targeted: Shootings that were targeted generally toward school staff or students on school premises, but that were generally indiscriminate in terms of specific victims. These include incidents of a hostage standoff, indiscriminate shootings targeting the school staff and personnel, and active shooter incidents as categorized by the FBI. Such shootings may also include incidents where a specific victim was targeted because of his or her relationship to the school (e.g. student, principal, staff, SRO, etc.).

Three examples of dispute/grievance-related shootings:

A gang member waited outside the gates of a high school homecoming football game and opened fire when he saw rival gang members leaving the field.

A teacher shot at the principal and assistant principal when they told him that his contract would not be renewed for the following year.

Two students were fighting in the hallway when one pulled out a gun and shot the other.

Source: GAO analysis of incidents in the Naval Postgraduate School's K-12 School Shooting Database. | GAO-20-455

While shootings related to disputes/grievances occurred most often, school-targeted shootings resulted in far more individuals killed or wounded per incident than any other type of shooting (see table 2). Specifically, of the nearly 500 people killed or wounded in school shootings over the past 10 years, over half of those killed and more than one-third of those wounded were victims in school-targeted shootings. Additionally, school-targeted shootings resulted in almost three times as many individuals killed or wounded per incident than the average number of individuals killed or wounded per incident overall.

Table 2: School Shootings and Fatalities/Casualties by Kind of Shooting, School Years 2009-10 through 2018-19

	Total incidents	Total killed (includes shooter)	Average killed per incident	Total wounded	Average wounded per incident	Total wounded or killed	Average wounded or killed per incident
All	318	166	0.52	330	1.04	496	1.56
School-targeted	46	89	1.93	122	2.65	211	4.59
Suicide/attempted suicide	34	29	0.85	5	0.15	34	1.00
Domestic	22	16	0.73	13	0.59	29	1.32
Other	10	5	0.50	7	0.70	12	1.20
Related to illegal activity	12	4	0.33	8	0.67	12	1.00
Targeted victim	15	4	0.27	16	1.07	20	1.33
Dispute/grievance-related	99	17	0.17	101	1.02	118	1.19
Unknown target/intent	29	1	0.03	15	0.52	16	0.55
Accidental	51	1	0.02	43	0.84	44	0.86

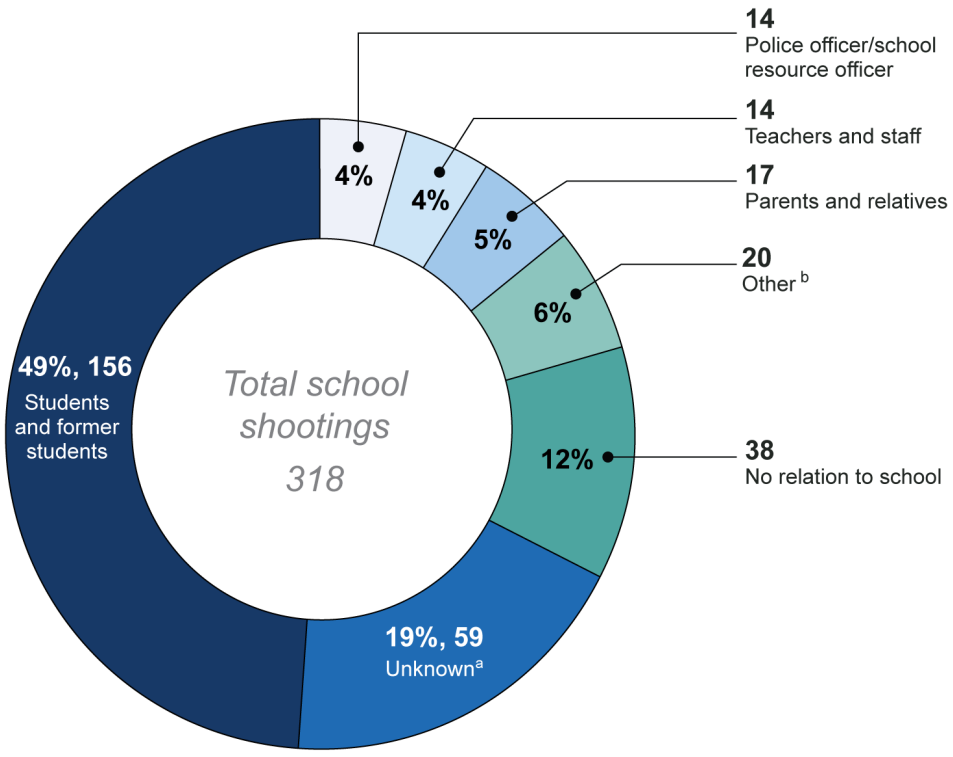
Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

Students Committed Half of School Shootings, While Those Unknown, No Relationship to the School, And Others Committed the Other Half

The shooter's relationship to the school was unknown in almost 20 percent of all school shootings that have occurred over the past 10 years (such as when an unidentified shooter walked onto school grounds and

fired at a victim).[35] The shooters were students or former students in about half of the school shootings during the same time period. The other roughly 30 percent of shootings were committed by parents and relatives (such as when a husband shot his wife as she was picking up her children from school), teachers and staff, and people who had no relationship with the school (such as a shooting during a basketball game involving rival gang members who had no relationship with the school) (see fig. 3).

Figure 3: School Shootings by Shooter's Relationship to School, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

Note: Percentages do not add to 100, due to rounding.

[a]"Unknown," as recorded in the K-12 School Shooting Database, includes incidents in which the shooter's relationship to the school was not identifiable in the original source material used by the K-

[35] "Unknown," as recorded in the K-12 School Shooting Database, includes incidents in which the shooter's relationship to the school was not identifiable in the original source material used by the K-12 School Shooting Database researchers. This may include incidents in which the shooter's name was identified but the shooter's relationship to the school could not be determined.

12 School Shooting Database researchers. This may include incidents in which the shooter's name was identified but the shooter's relationship to the school could not be determined.

[b]We combined four categories from the K-12 School Shooting Database into an "Other" category: intimate relationship with victim, multiple shooters, students from a rival school, and non-students using athletic facilities/attending game.

Characteristics of shooters differed by the kind of shooting. For example, students or former students were the shooters in the majority of school-targeted shootings (over 80 percent). In contrast, parents or relatives of someone in the school were the shooters in almost a third of the shootings that involved some sort of domestic dispute (table 3).

Table 3: Shooter Relationship to School by Kind of Shooting, School Years 2009-10 through 2018-19

	All	Student/ former student	Unknown[a]	No relation	Parent/ relative	Police officer/ school resource officer	Teacher/ staff	Other[b]
All	318	156	59	38	17	14	14	20
Accidental	51	33	1	2	5	5	5	0
Dispute/grievance-related	99	37	22	19	4	0	4	13
Domestic	22	5	0	4	7	0	0	6
Related to illegal activity	12	1	5	2	0	3	1	0
School-targeted	46	37	2	5	0	0	1	1
Suicide/attempted suicide	34	30	1	0	0	1	2	0
Targeted victim	15	4	9	2	0	0	0	0
Unknown target/intent	29	7	18	2	1	0	1	0
Other	10	2	1	2	0	5	0	0

Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

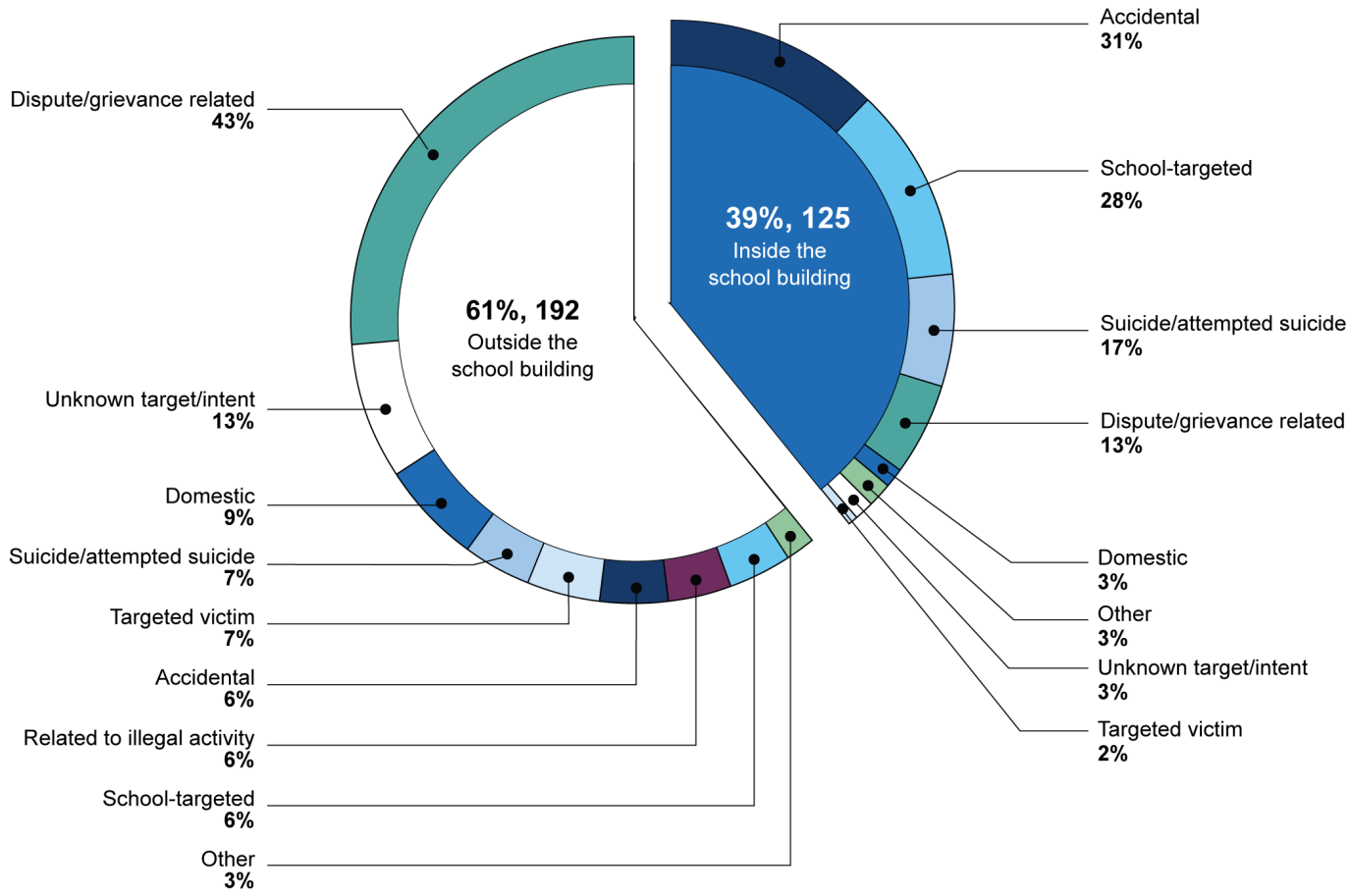
[a]"Unknown," as recorded in the K-12 School Shooting Database, includes incidents in which the shooter's relationship to the school was not identifiable in the original source material used by the K-12 School Shooting Database researchers. This may include incidents in which the shooter's name was identified but the shooter's relationship to the school could not be determined.

[b]We combined four categories from the K-12 School Shooting Database into an "Other" category: intimate relationship with victim, multiple shooters, students from a rival school, and non-students using athletic facilities/attending game.

Over Half of School Shootings Occurred Outside the School Building, but Shootings Inside the Building Were More Deadly

About 60 percent of school shootings occurred outside of the school building, like in a parking lot or on a school bus; in some cases, bullets hit school property when the shooter was not on school property (such as when a stray bullet from a neighborhood shooting broke a window in a school building). The remaining roughly 40 percent occurred inside the school building, such as in a classroom, hallway, or bathroom (see fig. 4).

Figure 4: School Shootings by Shooting Location and Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

Notes: There is one incident where the location of the shooting was unknown. This incident was excluded from our analysis of location. Therefore, the total number of incidents in this analysis totals 317.

We combined three categories from the K-12 School Shooting Database into an “Outside the school building” category: outside on school property, off school property, and on school bus.

When shootings occurred outside the school building, about 70 percent of the shooters were people other than students or former students, like parents of students, people who had no relation to the school, or people whose relationship to the school was unknown (see table 4). Further, certain kinds of shootings occurred more often outside the school building, such as those related to disputes/grievances, domestic disputes, illegal activities, and those in which the target or intent was unknown. In addition, of the shootings that occurred during school sporting events, like

basketball games or football games, nearly all—93 percent—occurred outside the school building.[36]

Table 4: Number of Shootings Inside and Outside the School Building by Shooter's Relationship to School, School Years 2009-10 through 2018-19

Location	All	Student/ former student	Unknown[a]	No relation	Parent/ relative	Police officer/ school resource officer	Teacher/ staff	Other[b]
All	318	156	59	38	17	14	14	20
Inside the school building	125	98	1	4	2	8	11	1
Outside the school building[c]	192	58	58	34	15	5	3	19
Unknown	1	0	0	0	0	1	0	0

Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

[a]"Unknown," as recorded in the K-12 School Shooting Database, includes incidents in which the shooter's relationship to the school was not identifiable in the original source material used by the K-12 School Shooting Database researchers. This may include incidents in which the shooter's name was identified but the shooter's relationship to the school could not be determined.

[b]We combined four categories from the K-12 School Shooting Database into an "Other" category: intimate relationship with victim, multiple shooters, students from a rival school, and non-students using athletic facilities/attending game.

[c]We combined three categories from the K-12 School Shooting Database into an "Outside the school building" category: outside on school property, off school property, and on school bus.

Two examples of accidental shootings:

When an elementary school student sat down for lunch in the cafeteria, a handgun fell out of the student's pocket and discharged, injuring three other students.

A gun discharged in a teacher's pocket inside a classroom, injuring one student.

Source: GAO analysis of incidents in the Naval Postgraduate School's K-12 School Shooting Database. | GAO-20-455

In contrast, when shootings occurred inside the school building, the majority of the shooters—over three-quarters—were students or former students (see table 4). Accidental and school-targeted shootings occurred more often inside the school building than outside the school building, and together these two kinds of shootings made up the majority of shootings that occurred inside school buildings (see fig. 4). Shootings that occurred inside the school building were on average three times deadlier per incident than shootings that occurred outside the school building (see app.II).

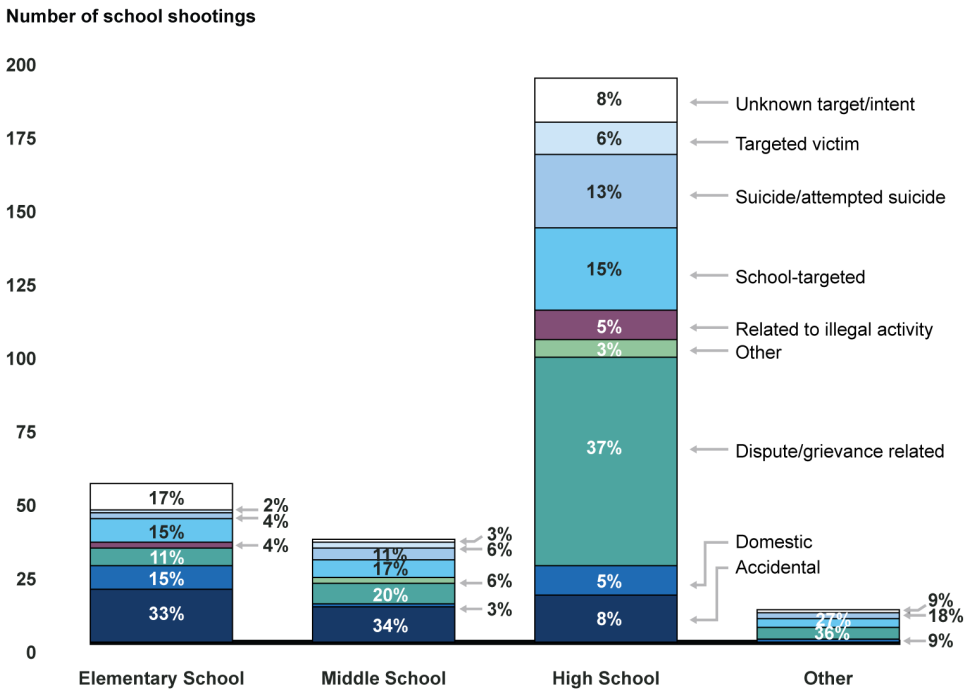
[36] Thirteen percent of all school shootings occurred in relation to a sporting event.

Certain Kinds of Shootings Were More Prevalent at Certain Types of Schools

High Schools Had More School Shootings Overall, and Elementary Schools Had More Accidental Shootings

Our analysis also showed that school shootings occurred across schools with a range of different characteristics, but certain kinds of shootings were more prevalent at certain types of schools.[37] High schools had the most school shootings (about two-thirds of all shootings) over the past 10 years. In high schools, shootings related to disputes/grievances, school-targeted shootings, and suicides were the most prevalent. In middle schools, accidental shootings and shootings related to disputes/grievances were the most prevalent. In elementary schools, accidental shootings were the most prevalent (see fig. 5).

Figure 5: School Shootings by School Level and Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database and Department of Education's Common Core of Data for school years 2009-10 through 2018-19. | GAO-20-455

[37] We matched 297 of the 318 incidents to corresponding data on school characteristics from the U.S. Department of Education's Common Core of Data. The remaining 21 schools could not be matched due to either missing information or because they were private schools, which are not included in the CCD.

Notes: Percentages may not add to 100, due to rounding. At the time of this analysis, the Common Core of Data (CCD) variables were available only through the 2017-2018 school year, and were not available for the 2018-2019 school year. We matched school shootings from the 2018-2019 school year to CCD variables for the 2017-2018 school year for this analysis.

Of the 318 school shootings in our analysis, 21 could not be matched to data from the CCD due to missing information or because they were private schools, which are not included in the CCD. An additional 5 incidents were missing school level data in the CCD and were therefore excluded from this analysis. Therefore, the number of incidents in this analysis totals 292.

Further, although shootings occurred at all different times of day and throughout the school year, nearly 40 percent of shootings occurred in the morning and most frequently occurred in either January or September. Also, certain kinds of shootings occurred more often during different times of the day; for example, school-targeted shootings and suicides occurred more often in the morning, whereas shootings related to disputes/grievances occurred more often in the afternoon and evening (see app. II).

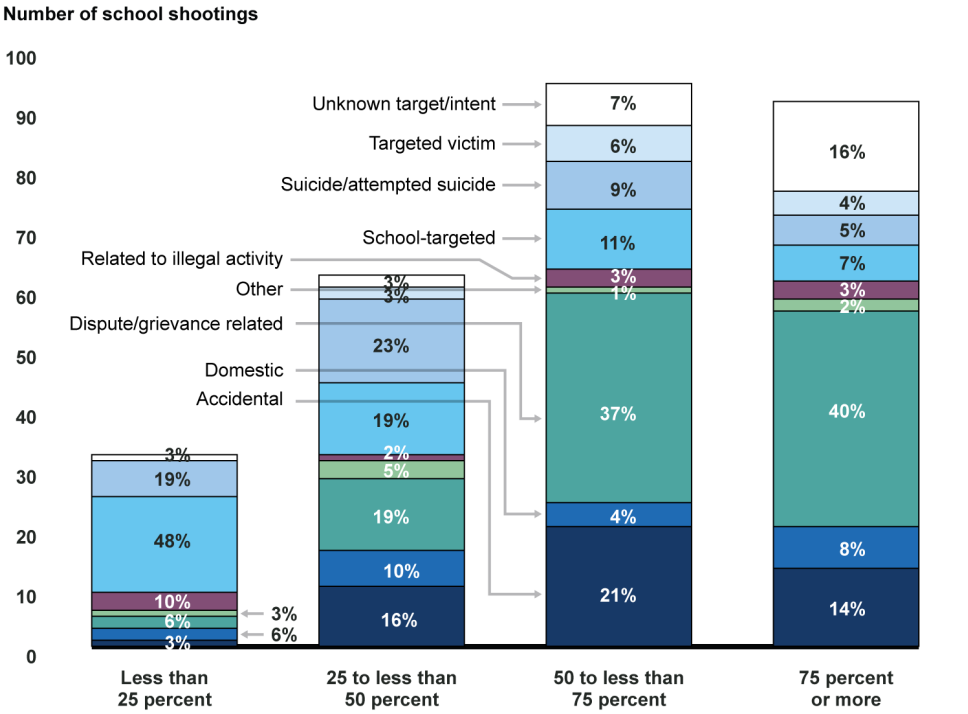
Poorer Schools Had More School Shootings Overall, but Wealthier Schools Had More School-Targeted Shootings and Suicides

As figure 6 shows, the number of shootings generally increased relative to school poverty level.[38,39] Poorer schools—those in which 50 percent or more of the students were eligible for free or reduced price lunch—had the most, or nearly two-thirds of all shootings. The wealthiest schools—those in which 25 percent or fewer of the students were eligible for free or reduced priced lunch—had the fewest with just over one-tenth of all shootings. Additionally, certain kinds of shootings increased with poverty, like shootings related to disputes/grievances and shootings in which the target or intent was unknown (see fig. 6). In contrast, certain kinds of shootings were more prevalent in wealthier schools, like school-targeted shootings and suicides.

[38] For our poverty level analyses, we grouped schools into four categories based on the percent of students enrolled who were eligible for free or reduced-price lunch (FRPL), according to the CCD data. The categories we used in our analysis are as follows: schools with 0 to 24.9 percent of students eligible for FRPL (the wealthiest schools), schools with 25 to 49.9 percent of students eligible, schools with 50 to 74.9 percent of students eligible, and schools with 75 to 100 percent of students eligible (the poorest schools).

[39] The number of school shootings generally increased relative to poverty level, defined by the percentage of students eligible for free or reduced-priced lunch (FRPL), but declined slightly in the highest poverty category. Specifically, there were 94 shootings at schools with between 50 percent and less than 75 percent students eligible for FRPL, and 91 shootings at schools with 75 percent or more students eligible for FRPL.

Figure 6: School Shootings by Free or Reduced Price Lunch Eligibility and Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database and Department of Education's Common Core of Data for school years 2009-10 through 2018-19. | GAO-20-455

Notes: Percentages may not add to 100, due to rounding. For our analysis, we grouped schools into four categories based on the percent of students enrolled who were eligible for free or reduced-price lunch (FRPL). The categories are as follows: schools with 0 to 24.9 percent of students eligible for FRPL, schools with 25 to 49.9 percent of students eligible, schools with 50 to 74.9 percent of students eligible, and schools with 75 to 100 percent of students eligible.

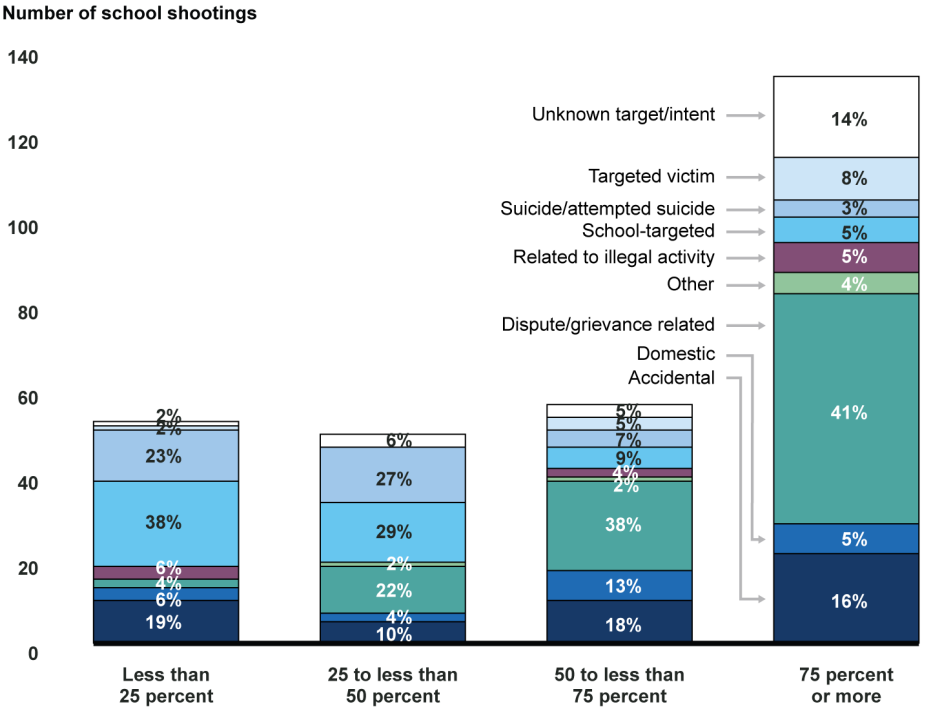
At the time of this analysis, the Common Core of Data (CCD) variables were available only through the 2017-2018 school year, and were not available for the 2018-2019 school year. We matched school shootings from the 2018-2019 school year to CCD variables for the 2017-2018 school year for this analysis.

Of the 318 school shootings in our analysis, 21 could not be matched to data from the CCD due to missing information or because they were private schools, which are not included in the CCD. An additional 19 incidents were missing FRPL data in the CCD and were therefore excluded from this analysis. Therefore, the number of incidents in this analysis totals 278.

Schools with the highest percentages of minority students had more shootings overall and proportionally more shootings related to disputes/grievances and shootings in which the target or intent was unknown. On the other hand, schools with the lowest percentages of minority students had fewer shootings overall, but proportionally more school-targeted shootings (see fig. 7). Further, as shown in table 3, for shootings related to disputes/grievances, which were most prevalent at

high minority and poorer schools, the shooter was more often someone other than a student or the shooter was unknown. In contrast, for school-targeted shootings and suicides, which were most prevalent at low-minority and wealthier schools, the shooter was more often a student or former student.

Figure 7: School Shootings by Minority Enrollment and Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database and Department of Education's Common Core of Data for school years 2009-10 through 2018-19. | GAO-20-455

Notes: Percentages may not add to 100, due to rounding. For our analysis, we define minority enrollment as the enrollment of all students who are not white.

At the time of this analysis, the Common Core of Data (CCD) variables were available only through the 2017-2018 school year, and were not available for the 2018-2019 school year. We matched school shootings from the 2018-2019 school year to CCD variables for the 2017-2018 school year for this analysis.

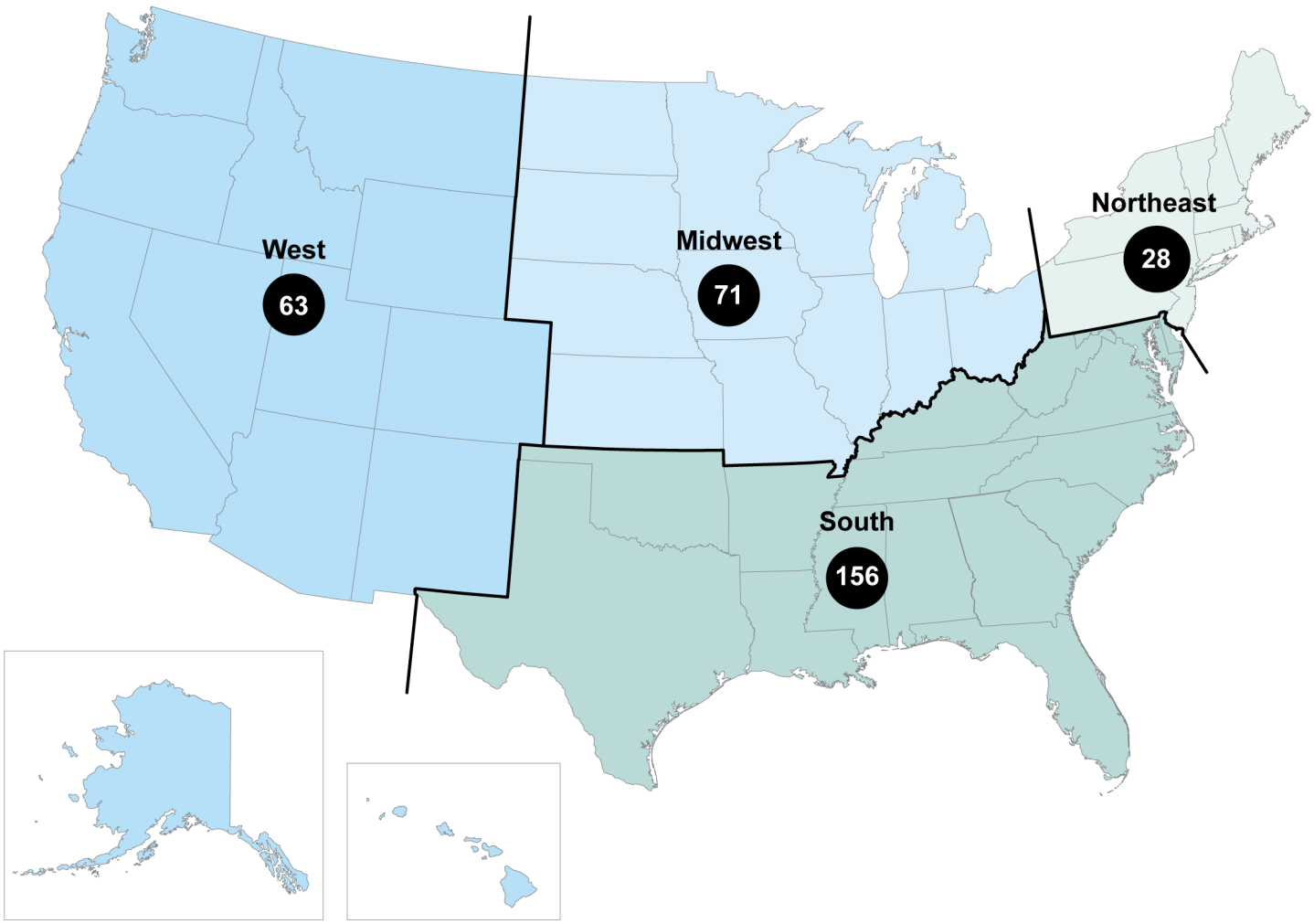
Of the 318 school shootings in our analysis, 21 could not be matched to data from the CCD due to missing information or because they were private schools, which are not included in the CCD. An additional 7 incidents were missing minority enrollment data in the CCD and were therefore excluded from this analysis. Therefore, the number of incidents in this analysis totals 290.

School Shootings Occurred Nationwide, but About Half Were in the South

School shootings occurred all across the country in all but two states (West Virginia and Wyoming). About half of school shootings in the past 10 years occurred in the South, according to our analysis, with the

greatest number of shootings in Florida (24), Texas (24), and Georgia (23) (see fig. 8). See appendix II for data on shootings over time, which shows an uptick in shootings in school years 2017-18 and 2018-19, as compared to earlier in the 10-year period.

Figure 8: Map of K-12 School Shootings in the United States, School Years 2009-10 through 2018-19

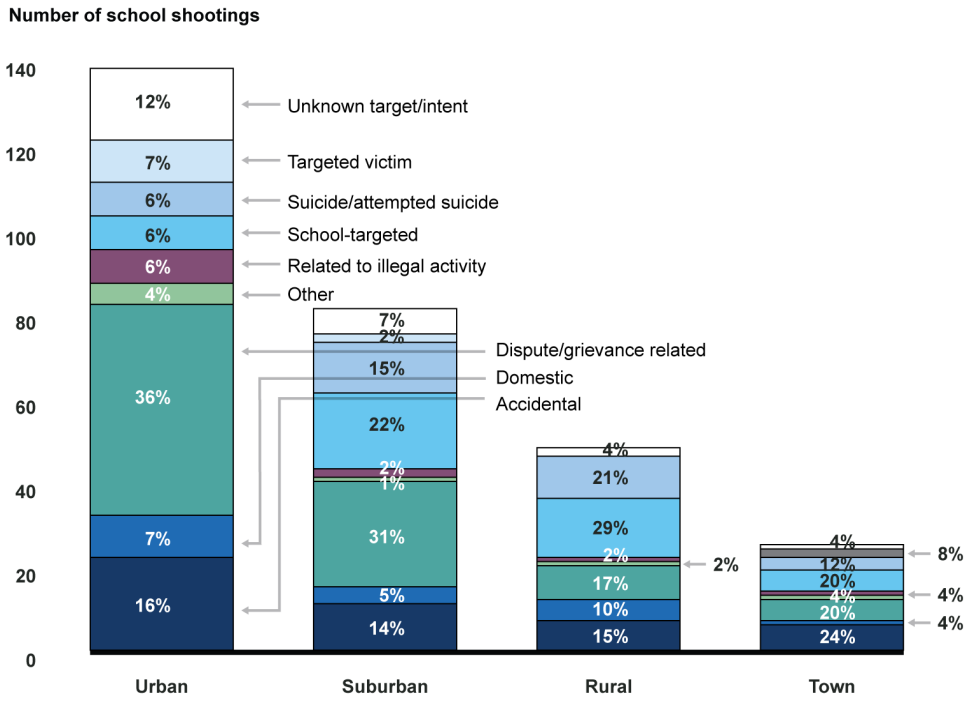


Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting database for school years 2009-10 through 2018-19. Regions of the United States as defined by the U.S. Census Bureau. Map (National Atlas). | GAO-20-455

School shootings also occurred across locations with varying population densities, but almost half of all shootings occurred in urban schools (47

percent).[40] However, while urban schools had more school shootings overall, suburban and rural schools had the most school-targeted shootings – the deadliest type of shooting. Specifically, 6 percent of shootings in urban schools were school-targeted, while 22 percent of shootings in suburban schools, and 29 percent of shootings in rural schools were school-targeted (see fig. 9).

Figure 9: School Shootings by Locale and Kind of Shooting, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database and Department of Education's Common Core of Data for school years 2009-10 through 2018-19. | GAO-20-455

Notes: Percentages may not add to 100, due to rounding. At the time of this analysis, the Common Core of Data (CCD) variables were available only through the 2017-2018 school year, and were not available for the 2018-2019 school year. We matched school shootings from the 2018-2019 school year to CCD variables for the 2017-2018 school year for this analysis.

Of the 318 school shootings in our analysis, 21 could not be matched to data from the CCD due to missing information or because they were private schools, which are not included in the CCD. An additional 5 incidents were missing locale data in the CCD and were therefore excluded from this analysis. Therefore, the number of incidents in this analysis totals 292.

[40] We used information from the U.S. Department of Education's Common Core of Data to determine a school's locale. Urban schools have a locale designation of "city," suburban schools have a locale designation of "suburb," town schools have a locale designation of "town," and rural schools have a locale designation of "rural."

Empirical Research Does Not Directly Examine Link between Discipline and School Shootings

No Empirical Research Directly Examines the Link between Discipline and School Shootings

We found no empirical research in the last 10 years (2009-2019) that directly examines the link between approaches to school discipline—whether exclusionary (like suspensions and expulsions) or nonexclusionary approaches—and school shootings specifically.[41] We also reviewed 27 studies meeting our selection criteria that examined the link between discipline approaches and broader concepts of violent behavior and perceptions of school safety; however, none of these studies examined shootings specifically in school (see appendix I for detailed information on our overarching inclusion criteria we used to select the studies). One of the 27 studies examined shootings in which students of selected Chicago public schools were the victims, but were not necessarily on school grounds. The study examined a nonexclusionary approach to school discipline that used social media monitoring to identify and intervene with high school students who were engaging in potentially dangerous behaviors and offered them wrap-around services such as school-based social emotional support.[42] The study found that students who initially attended high schools that used the

[41] Our literature review was designed to capture studies using empirical research methods to examine the effects of approaches to school discipline—including exclusionary and nonexclusionary—on school gun violence, school violence, and school safety. See appendix I for details of our scoping parameters used for our literature review.

[42] University of Chicago Crime Lab. *Connect & Redirect to Respect: Final Report* (January 2019). The study defined student shooting victimization as instances in which Chicago Public School students were the physical victims of gunfire, both fatal and non-fatal. This study was funded through an award by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice, and was made publically available through the Office of Justice Programs' National Criminal Justice Reference Service. It was not published by the U.S. Department of Justice.

approach experienced fewer shooting incidents compared to students who attended schools that did not use the approach.[43]

There are characteristics of school shootings themselves that likely contribute to the lack of research that specifically examines the link between approaches to school discipline and school shootings, according to literature we examined and study authors we interviewed. It is difficult to isolate the effect of any one variable in a school shooting, such as the role of school discipline, because multiple and complex factors affect an individual's propensity toward violence, shootings have many types of shooters and many possible causes, and researchers have so few comparable cases to study. More specifically:

- ***Violence has multiple causes:*** Research suggests there are many complex factors that influence youth violence, like a prior history of exposure to violence or abuse, antisocial or aggressive beliefs, peer conflict or rejection, or parental conflict and violence.
- ***School shooters and school shootings vary considerably:*** We found that, in the past 10 years, the shooters were students or former students in about half of the incidents, and parents, teachers, or others were the shooters in the other half. Further, the reason for the shooting or kind of shooting varied from suicides and disputes to school-targeted shootings and the factors that precipitate these different kinds of shootings likely vary considerably.
- ***School shootings are rare events:*** Our analysis identified 318 school shootings that occurred over a 10-year period. In school year 2016-17, there were approximately 98,000 public K-12 schools in the U.S. Such rarity, coupled with the above factors, makes it difficult to design a study examining a direct causal relationship between a discipline approach and its effects on school shootings.

With respect to the 27 studies we reviewed, drawing bottom-line conclusions about the overall effectiveness of any given approach to school discipline is difficult because these studies varied in terms of their research methodologies, outcomes measured, populations studied, and research objectives. However, these studies can help illustrate some of the types of approaches currently being used. Among the approaches

[43] The results from this study were marginally significant with p-values of 0.13 and 0.14 in the second and third year respectively. The study used a partially randomized control design.

addressed in the studies we reviewed were social emotional learning, threat assessment, and exclusionary discipline.

Some of the research on social emotional learning—which includes teaching students how to manage emotions and solve problems—found that using this approach reduces violent behaviors in students, particularly elementary school students. For example, a study employing random assignment of 20 elementary schools in Hawaii, found significantly fewer reports of violent behavior for students in schools using a social emotional learning program compared to students in schools that did not.[44] However, other studies—particularly those that included middle school aged youth and studies where measures of aggression included both physical violence and non-violent behaviors—were less likely to demonstrate positive effects. For example, a quasi-experimental study found no significant effects on student-reported aggressive behaviors among 6th-8th grade middle schools students in two rural counties in North Carolina.[45]

Two studies we reviewed involved threat assessment, in which a multidisciplinary team assesses a threat of violence and develops a plan to manage such risk. Both studies found evidence that this approach resulted in fewer instances of violent behavior among students when compared to schools using another form of threat assessment or no threat assessment. One was a quasi-experimental retrospective study across 280 urban, suburban, and rural high schools that found lower levels of violent behavior (ranging from theft of personal property to being physically attacked) among ninth graders in schools using the Virginia Student Threat Assessment Guidelines compared to students in schools using no form of threat assessment.[46] The other was a quasi-experimental retrospective study of over 300 Virginia middle schools that found lower levels of student violent behavior in the form of verbal or

[44] Michael W. Beets, et al., "Use of Social and Character Development Program to Prevent Substance Use, Violent Behaviors, and Sexual Activity Among Elementary-School Students in Hawaii," *American Journal of Public Health*, vol. 99, no. 8 (2009).

[45] Shenyang Guo, et al., "A Longitudinal Evaluation of the Positive Action Program in a Low-Income, Racially Diverse, Rural County: Effects on Self-Esteem, School Hassles, Aggression, and Internalizing Symptoms," *Journal of Youth and Adolescence*, 44 (2015): pp. 2337–2358.

[46] Dewey Cornell, et al., "A Retrospective Study of School Safety Conditions in High Schools Using the Virginia Threat Assessment Guidelines Versus Alternative Approaches," *School Psychology Quarterly, vol. 24, no.2* (2009): pp.119-129.

physical aggression, and higher feelings of safety among teachers at middle schools using the Virginia Student Threat Assessment Guidelines compared to schools with no threat assessment or another model of threat assessment.[47]

We also reviewed studies that examined how exclusionary approaches to discipline—or changes in policies affecting use of these approaches—may influence school violence and perceptions of safety more broadly. These studies differed in approach and findings. For example, one examined whether higher suspension rates and other factors are associated with students' perception of safety at school. In this study of elementary and middle school students in a large Maryland school district, schools with higher suspension rates were associated with decreased perceptions of safety as reported by middle school students; however, suspension rates were not significantly associated with perceptions of safety for elementary schools students.[48] Another study used a quasi-experimental method to examine whether a school district's limitations on out-of-school suspension reduced serious misconduct, including acts of violence and weapon possession as well as non-violent acts, among students. It compared these infractions in the Philadelphia school district after it ended its zero tolerance policy, to nearly all other school districts in Pennsylvania and found that serious incidents of student misconduct, including violence, increased after the zero tolerance policy was rolled back.[49]

For more details on the studies we reviewed, see appendix III.

[47] Erin K. Nekvasil and Dewey G. Cornell, "Student Threat Assessment Associated with Safety in Middle Schools," *Journal of Threat Assessment and Management*, vol. 2, no. 2 (2015): pp. 98–113.

[48] Catherine P. Bradshaw, Anne L. Sawyer, and Lindsey M. O'Brennan, "A Social Disorganization Perspective on Bullying-Related Attitudes and Behaviors: The Influence of School Context," *American Journal of Community Psychology*, 43 (2009): pp. 204–220. The study examined whether indicators of school disorder, as measured by suspension rates and other factors, are associated with increased risk of victimization, feeling unsafe, having retaliatory attitudes, and perpetrating bullying.

[49] Johanna Lacoe and Matthew P. Steinberg, "Rolling Back Zero Tolerance: The Effect of Discipline Policy Reform on Suspension Usage and Student Outcomes," *Peabody Journal of Education*, vol. 93, issue 2 (2018). The revised discipline code of conduct eliminated out-of-school suspensions for less severe conduct infractions and gave school administrators greater discretion in handling more serious disciplinary infractions.

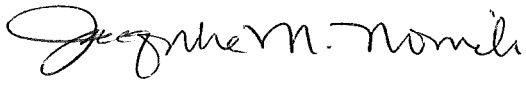
Agency Comments

We provided a draft of this report to the Departments of Education, Homeland Security, and Justice for review and comment. Education and Justice provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the appropriate congressional committees, the Secretary of Education, the Secretary of Homeland Security, and the Attorney General. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (617) 788-0580 or nowickij@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.

Sincerely yours,



Jacqueline M. Nowicki, Director
Education, Workforce, and Income Security Issues

Appendix I: Objectives, Scope, and Methodology

Overview

This report examines (1) the characteristics of K-12 school shooting incidents and the characteristics of affected schools, and (2) what is known about whether different approaches to discipline in school play a role in school shootings.

To conduct this work, we developed a unique dataset of school shootings by analyzing data on K-12 school shootings over a 10-year period, from school year 2009-10 through 2018-19, and data on school characteristics. We also conducted a literature review to identify empirical research generally published in peer reviewed journals or by government agencies from 2009 to 2019 examining the role of discipline approaches (both exclusionary approaches, like suspensions and expulsions, and nonexclusionary approaches that attempt to prevent or intervene to address behavior) in school shootings. To inform all aspects of our work, we interviewed academic researchers and federal agency officials from the Departments of Education, Homeland Security, and Justice; conducted literature searches to identify existing literature on characteristics of school shootings; and reviewed relevant federal agency documentation. The following sections contain detailed information about the scope and methodology for this report.

Analysis of School Shooting Incidents

To develop our dataset of school shootings, we developed a definition of school shootings (as described below) and applied that criteria to a list of school shootings identified in the Naval Postgraduate School's K-12 School Shooting Database.[1] The K-12 School Shooting Database is an open-source dataset that is carried out as a research product of the Center for Homeland Defense and Security at the Naval Postgraduate School. [2,3] The K-12 School Shooting Database was compiled from other databases and media sources about school shooting incidents from 1970

[1] We downloaded the K-12 School Shooting Database dataset on August 12, 2019.

[2] The Center for Homeland Defense and Security's programs are developed in partnership with and sponsored by the National Preparedness Directorate at the Federal Emergency Management Agency.

[3] In selecting the K-12 School Shooting Database for our analysis, we identified and considered other data sources. For example, we explored drawing on a variable detailing firearm use collected by the U.S. Department of Education's (Education) Civil Rights Data Collection (CRDC) for our analysis of K-12 school shooting data; however, after performing an assessment of the data's reliability, we determined it was unreliable for our purposes.

to the present, and it is updated regularly.[4] According to its website, the K-12 School Shooting Database includes each and every instance a gun is brandished, is fired, or a bullet hits school property for any reason, regardless of the number of victims, time of day, or day of week. The K-12 School Shooting Database includes detailed information about each school shooting incident, including the name and location of the school, a summary of the incident, and a score that indicates the reliability of the information, among other things.

To analyze school shooting incidents that occurred recently, we limited our analysis to the past 10 school years, from school year 2009-10 through school year 2018-19. To ensure that our analysis focused on school shootings in which students and staff were typically present, we defined a school year as running from July through June to ensure we captured shooting incidents throughout the whole year, as long as the incidents fit our criteria. Therefore, we excluded all incidents that occurred before July 2009 and after June 2019 from our dataset.

Because there is no uniform definition of a school shooting, we developed a definition of school shootings for the purposes of our analysis by reviewing research on the topic of school shootings. We also included an element of the time of the shooting in relation to the school day or event, which allowed us to focus on school shootings in which students and staff were typically present. To ensure we focused on instances where students or staff were at risk, we developed the following definition of a school shooting:

- Any time a gun is fired:[5]

[4] The K-12 School Shooting Database is an open-source database of information from various sources including peer-reviewed studies, government reports, and media sources. For purposes of our analyses, we relied on information about each shooting as it was recorded in the K-12 School Shooting Database, and did not independently review the sources used by the researchers. For a description of the steps we took to assess the reliability of the data, see the section on Data Reliability below.

[5] For our analysis, we included four incidents in which a gun was brandished due to the severity of the incidents. For example, when the shooter initially made threatening gestures with a firearm, but was stopped prior to a shot being fired; for example, if the shooter was tackled.

- on school grounds, on a school bus, or during a school event (*such as sporting practice or event, school dance, school play*);[6] and
- during school hours or a school event or immediately before or after school hours or school event.[7]

- "Any time a gun is fired" includes all incidents that meet the criteria above, including accidents and suicides, regardless of intent.[8]

To determine if an incident met our criteria for inclusion in our review, two analysts independently reviewed each incident identified in the K-12 School Shooting Database. When the analysts disagreed about including an incident in our review, a third analyst reviewed the incident to determine if it should be included in our dataset. As a result of this selection process, we identified 320 incidents that met our definition of a school shooting. We dropped two incidents from this list because they had a reliability score of one.[9] Our final dataset of school shootings contained 318 incidents.

Analysis by Kind of Shooting

The K-12 School Shooting Database contains 19 categories of shootings; however, after reviewing the types of incidents in these categories, we developed our own categories to better reflect the type or nature of the school shooting. The categories of school shootings we developed for our review are described in table 5. To determine the category for each incident, two analysts independently reviewed each incident in the dataset and assigned the incident to only one category based on the

[6] This includes instances in which the gun was fired onto school grounds or within or at a school bus, even if the shooter was outside of school grounds or outside of the school bus when they fired.

[7] This includes all times when school staff and teachers, including support and custodial staff, were on school grounds in their official capacity with the school (e.g., on duty, at school meeting).

[8] In developing this definition, we reviewed and compared definitions used in existing datasets, such as the National Center for Education Statistics School Survey on Crime and Safety and Education's Civil Rights Data Collection. Our definition includes shooting incidents regardless of intent.

[9] A reliability score of one indicated that the information came from a privately operated blog which we determined was unreliable for our purposes. A reliability score of two indicated that the information came from a single newspaper or online news report, a score of three indicated multiple news sources, a score of four indicated hundreds of news sources or a statement from a law enforcement official, and a score of five indicated court records or police report sources.

analysts' best judgement. When the analysts disagreed about incidents' category assignments, eight additional analysts independently reviewed the incidents to identify the most applicable category. When the analysts did not reach a majority decision, we categorized the incident as "Other." By having multiple analysts review each incident, we attempted to eliminate any bias due to the subjective nature of this task. Additionally, we used the FBI Active Shooter reports to identify all shootings considered active shooter incidents by the FBI and we categorized these active shooter incidents as school-targeted to reflect the nature of the shooting.[10] For all additional variables in the K-12 School Shooting Database, like the month of the shooting, location of the shooting, or the shooter's relationship to the school, we relied on the determinations of the researchers and did not independently verify their data. However, we took multiple steps to assess the reliability of the K-12 School Shooting Database—such as by comparing it to other databases with similar data on school shootings—as we describe in more detail in the Data Reliability section below.

Table 5: GAO Categories of School Shootings

Category	Description
Accidental	Shooter did not intend to fire the weapon (e.g., showing off gun and it went off; gun in backpack went off).
Dispute/grievance-related	Shooting occurred in relation to a dispute or grievance between the victim and the shooter (that was not domestic in nature), for example: as an escalation of an argument, in retaliation for perceived bullying, in relation to gang-violence, or anger over a grade/disciplinary action (including disputes between staff).
Domestic	Shooter had a current or former familial or romantic relationship (real or imagined) with the intended target; or intended target was in a romantic relationship with a former partner of the shooter (includes incidents of stalking).
Related to illegal activity	Shooting related to an illegal offense, such as drug sales or possession, robbery, or intentional property damage (not including gang-related violence).
School-targeted	Shootings that were targeted generally toward school staff or students on school premises, but that were generally indiscriminate in terms of specific victims. These include incidents of a hostage standoff, indiscriminate shootings targeting the school staff and personnel, and active shooter incidents as categorized by the FBI. Such shootings may also include incidents where a specific victim was targeted because of his or her relationship to the school (e.g. student, principal, staff, school resource office (SRO), etc.).
Suicide/ attempted suicide	Shooter committed or attempted suicide; shooter's only intended target was himself or herself (this does not include incidents of homicide/suicide in which the shooter kills himself or herself after shooting or attempting to shoot others).

[10] The FBI defines an active shooter as one or more individuals actively engaged in killing or attempting to kill people in a populated area. The FBI compiles active shooter incidents to assist law enforcement in preventing and responding to these incidents.

Category	Description
Targeted victim	Shooter likely specifically targeted the victim but no other information is available on the relationship between the shooter and the victim; incident does not fit into another category of shooting and likely was not random.
Unknown target/ intent	Unable to determine if school, including school staff and students, was the intended target. Includes incidents in which target is unclear and shooter is unknown, and the shots fired appear to be stray or random.
Other	Shooting does not fit clearly into any of the other identified categories based on the available information.

Source: GAO analysis of incidents in the Naval Postgraduate School's K-12 School Shooting Database. | GAO-20-455

For all 318 shootings in our dataset, we analyzed the number of shootings that fell within each category, the location of the shooting on school grounds (i.e., inside or outside of school buildings), and the time of day of the shooting, among others.

Analysis by School Year

We used the date of each shooting to determine the school year in which it occurred. We defined a school year as running from July through June of the next year. Therefore, a shooting that occurred in June 2010 happened in the 2009-10 school year, and a shooting that occurred in July 2010 happened in the 2010-11 school year.

Analysis by Region

We analyzed the shootings by region. We defined each region by aggregating state level data as defined in table 6.

Table 6: Regions in the U.S. by State

Northeast	Midwest	South	West
Connecticut	Illinois	Alabama	Alaska
Maine	Indiana	Arkansas	Arizona
Massachusetts	Iowa	Delaware	California
New Hampshire	Kansas	District of Columbia	Colorado
New Jersey	Michigan	Florida	Hawaii
New York	Minnesota	Georgia	Idaho
Pennsylvania	Missouri	Kentucky	Montana
Rhode Island	Nebraska	Louisiana	Nevada
Vermont	North Dakota	Maryland	New Mexico
	Ohio	Mississippi	Oregon
	South Dakota	North Carolina	Utah
	Wisconsin	Oklahoma	Washington
		South Carolina	Wyoming
		Tennessee	
		Texas	
		Virginia	
		West Virginia	

Source: Regions of the United States as defined by the U.S. Census Bureau. | GAO-20-455

Analysis by Time Period

Using the original variable, “time period,” from the K-12 School Shooting Database, we consolidated the categories of time, to facilitate our analysis as shown in table 7.

Table 7: GAO Consolidation of Time Period from the K-12 School Shooting Database

Time Period (GAO Category)	Time Period (K-12 School Shooting Database)
Morning	Before school
	As school is opening
	Morning classes
Lunch	Lunch
Afternoon	Afternoon classes
	Dismissal
Evening	After school
	Evening
	Night
Not a school day	Not a school day
Unknown	Unknown

Source: GAO analysis of variables from the Naval Postgraduate School’s K-12 School Shooting Database. | GAO-20-455

Analysis by Shooter Relationship to School

Using the original variable, "shooter affiliation," from the K-12 School Shooting Database, we consolidated the categories of a shooter's relationship to the school to facilitate our analysis. Table 8 shows how we combined the categories. The K-12 School Shooting Database also contained information on shooter ethnicity; however, we found those data unreliable for our use.

Table 8: GAO Consolidation of Shooter Relationship to School from the K-12 School Shooting Database

Shooter Relationship To School (GAO Category)	Shooter Affiliation (K-12 School Shooting Database)
Student/former student	Student
	Former student
Parent/relative	Parent
	Relative
Teacher/staff	Teacher
	Former teacher
	Other staff
Police officer/SRO	Police officer/SRO
No relation	No relation
Unknown	Unknown
Other	Intimate relationship with victim
	Multiple shooters
	Students from rival school
	Non-student using athletic facilities/attending game

Source: GAO analysis of variables from the Naval Postgraduate School's K-12 School Shooting Database. | GAO-20-455

Analysis by Location

Using the original variable, "location," from the K-12 School Shooting Database, we consolidated the categories of a shooting's location to facilitate our analysis. Table 9 shows how we combined the categories.

Table 9: GAO Consolidation of Location from the K-12 School Shooting Database

Location (GAO Category)	Location (K-12- School Shooting Database)
Outside the school building	Outside on school property
	Off school property
	School bus
Inside the school building	Inside school building
Unknown	Unknown

Source: GAO analysis of variables from the Naval Postgraduate School's K-12 School Shooting Database. | GAO-20-455

Analysis by Common Core of Data Variables

To analyze characteristics of the schools affected by shootings, we matched the K-12 School Shooting Database with the U.S. Department of Education's Common Core of Data (CCD) for information on grade level and locale (urban, suburban, and rural), among other characteristics. The CCD is administered by Education's National Center for Education Statistics, and annually collects data about all public schools in the nation. We matched 297 of the 318 school shootings in our dataset to their associated school and analyzed the school characteristics for the year in which the shooting occurred.[11] The remaining 21 school shootings could not be matched to a school or to school characteristics due to missing information about a school in the CCD or because the school was a private school, and was therefore not included in the CCD. Once we matched 297 shootings to the associated schools, we analyzed the schools by their characteristics as assigned in the CCD and also disaggregated this information by other variables from the K-12 School Shooting Database, such as the category of the shooting. Upon conducting this analysis, we found that in addition to the 21 schools with missing information, there were additional schools with missing variable-level data. As a result, the total number of schools we analyzed varied by each CCD variable. We specifically note the total number of schools analyzed for each CCD variable in the figure notes in the body of the report.

Analysis by School Locale

To determine a school's locale, we used the NCES locale type from the CCD. The locale variable in the CCD is primarily based on a school's location relative to populous areas. The locale variable is divided into four main types: City, Suburb, Town, and Rural (see table 10).

Table 10: Locale Variables Used from the Common Core of Data (CCD)

GAO category	NCES Locale Type
City	City, Large
	City, Mid-size
	City, Small
Suburban	Suburb, Large
	Suburb, Mid-size
	Suburb, Small

[11] At the time of this analysis, the CCD variables were only available through the 2017-2018 school year, and were not available for the 2018-2019 school year. We matched school shootings from the 2018-2019 school year to CCD variables for the 2017-2018 school year in this dataset.

GAO category	NCES Locale Type
Town	Town, Fringe
	Town, Distant
	Town, Remote
Rural	Rural, Fringe
	Rural, Distant

Source: GAO analysis of variables from the U.S. Department of Education's Common Core of Data. | GAO-20-455

Analysis by Poverty Level

For our analysis of school shootings by poverty level, we analyzed data on free or reduced-price lunch (FRPL) eligibility from the CCD. A student is generally eligible for free or reduced-price lunch based on federal income eligibility guidelines that are tied to the federal poverty level and size of the family.[12] State educational agencies supply these data for their schools and school districts. We then sorted schools into poverty quartiles based on the percentage of students eligible for free or reduced-price lunch as follows: schools with 0 to 24.9 percent of students that are FRPL eligible, schools with 25 to 49.9 percent of students that are FRPL eligible, schools with 50 to 74.9 percent of students that are FRPL eligible, and schools with 75 to 100 percent of students that are FRPL eligible.

Analysis by Minority Enrollment

To determine the minority enrollment of the school, we analyzed data on ethnicity enrollment from the CCD. We defined minority students as those who were Black, Hispanic, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native, or two or more races. We then sorted schools into minority enrollment quartiles by the percentage of their enrollment that is comprised of minority students. When analyzing minority enrollment, we defined the quartiles as follows: 0 to 24.9 percent, 25 to 49.9 percent, 50 to 74.9 percent, and 75 to 100 percent.

[12] Education's National Center for Education Statistics uses eligibility for free or reduced-price lunch as a measure of poverty. The National School Lunch Program, administered at the federal level by the U.S. Department of Agriculture, provides reduced-cost or free lunches to eligible children in schools. Students are eligible for free lunches if their household income is at or below 130 percent of the federal poverty guidelines or if they meet certain other eligibility criteria, such as eligibility for the Supplemental Nutrition Assistance Program. Students are eligible for reduced-price lunch if their household income is between 130 percent and 185 percent of the federal poverty guidelines.

Data Reliability

K-12 School Shooting Database

To assess the reliability of the data, (1) we interviewed the researchers who developed and maintained the K-12 School Shooting Database, (2) reviewed technical documentation, and (3) compared the data in the K-12 School Shooting Database to other databases with similar data on school shootings. In addition, after reviewing the K-12 School Shooting Database's reliability score ratings, we determined that incidents assigned a reliability score of one were unreliable for our purposes because the data for these incidents primarily came from blog posts and may not have included source citations. Therefore, incidents with a reliability score of one were dropped from our dataset. After taking these steps, we determined the data were reliable for our purposes. Our final dataset included 318 incidents.

Common Core of Data

We determined that the data we used from the CCD were sufficiently reliable for our purposes by reviewing technical documentation and interviewing officials from Education's Institute of Education Sciences.

Literature Review

To identify what is known about whether different approaches to discipline in school play a role in school shootings, we conducted a literature review to identify recent empirical research generally published in peer reviewed journals or by government agencies over a 10 year period. Specifically, we searched for relevant studies published from January 2009 through June 2019. We employed research databases such as ProQuest, DIALOG, EBSCO, and Scopus which cover a range of disciplines including education, psychology, sociology, criminology, and health. We searched the titles, abstracts, and subjects or keywords for concepts related to school discipline approaches (both exclusionary approaches, like suspensions and expulsions, and nonexclusionary disciplinary approaches that attempt to prevent or intervene to address behavior) occurring in conjunction with terms related to gun violence or school safety. Discipline terms we searched for included variants of expulsion, suspension, exclusionary, zero tolerance, positive behavioral intervention, social emotional learning, trauma informed, restorative justice, threat assessment, and discipline reform. Articles addressing gun violence as it possibly relates to discipline were identified using variants of gun, handgun, rifle, automatic weapon, semi-automatic, pistol, firearm, or shooting. To identify how discipline might relate to school safety more generally, we added to our search terms variants of safety, violence, homicide, suicide, physical security, threat assessment, as well as factor, characteristic, trigger, prevention, postvention, risk, or protective. In both

searches, we also used terms denoting school settings, including schools, K-12, primary or secondary education, or classroom.

We also identified relevant literature cited in articles we screened. In addition, we asked officials from the Departments of Education, Homeland Security, and Justice, for recommendations of research. We identified 215 articles that were potentially relevant based on our search terms, literature screening, and interviews with federal officials.

We systematically reviewed the abstracts and, as necessary, full text of these studies to determine which studies met our inclusion criteria, as shown in table 11.

Table 11: Criteria Used to Screen Literature on the Role of Approaches to Discipline in School Shootings

Subject matter inclusion criteria:	Subject matter exclusion criteria:

• school-based exclusionary discipline (suspension, expulsion, “zero tolerance”)
• school-based nonexclusionary discipline:
  • social emotional learning,
  • positive behavior supports/positive behavior intervention supports,
  • trauma-informed/trauma-based practices,
  • restorative justice/practices
  • threat assessment
• studies examining effects or perceptions of the effects of the above approaches on:
  • school gun violence,
  • school violence, and
  • school safety
	• youth violence that does not reference schools
	• articles examine a treatment rather than a discipline approach

Methodological inclusion criteria:	**Methodological exclusion criteria:**
• generally published in a journal with a peer review process or paper published by a government agency • original research including meta-analysis of research data examining the above subject matter • published in the last 10 years (2009-2019) • school setting (K-12)	• location is outside of the United States • book reviews • editorials and commentaries • summaries • blogs

Source: GAO. | GAO-20-455

When screening the studies we found from our search by key terms and interviews, we only included in our review those studies that (1) examined exclusionary discipline approaches (suspension, expulsion, zero tolerance) and nonexclusionary approaches (social emotional learning, positive behavior supports, threat assessment), and (2) examined the effects of these approaches on outcomes of school gun violence, school violence, and school safety including perceptions of school safety. Our literature review was not designed to capture studies that examined the effects of violence prevention programs unless they specifically included the approaches to discipline described above. Because existing research on the intersection of school discipline and school shootings was scarce, we included literature that examined the outcome of violent behavior that was not always exclusive to school-based violent behaviors. In addition, while there are numerous risk factors and protective factors that may affect the likelihood of youth violence, our literature review was not designed to capture research that examined whether discipline approaches affect risk factors and protective factors.[13] Our literature review also was not designed to capture studies that examined the overall effectiveness of different types of discipline approaches in improving school climate broadly or students' social, emotional, or academic behaviors.

To ensure the studies met our inclusion criteria, one analyst and one methodologist independently screened the titles and abstracts, and when necessary the full text, of the studies we identified. We reconciled any differences in screening decisions by reviewing and discussing documentation from our screening and, in some cases, by reviewing the full text of the study.

Next, we examined the methodologies of the studies that met our inclusion criteria to determine whether studies were sufficiently reliable for our purposes. After taking these steps, we identified 27 studies that met our inclusion criteria.

We reviewed the 27 studies to determine the types of approaches examined, outcomes measured, methodologies used, pertinent findings

[13] Risk factors may include low levels of school achievement, antisocial or aggressive beliefs and attitudes, and depression and anxiety, among others. Protective factors may include school readiness, academic achievement, and problem-solving skills, among others. C. David-Ferdon, et al., *A Comprehensive Technical Package for the Prevention of Youth Violence and Associated Risk Behaviors* (Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 2016).

reported, and any limitations identified. We focused on how the studies addressed the effects of school-based approaches on the following broad outcomes: school gun violence, school violence, and school safety. See appendix III, table 15 which identifies the 27 studies, as well as the approaches to school discipline and the relevant outcomes the studies examined.

We also interviewed five authors selected from the final list of 27 research studies in our literature review to gather perspectives about the challenges and limitations in conducting empirical social science research on different approaches to school discipline and the role of these approaches in school shootings. We selected the five researchers because they studied different discipline approaches, including social emotional learning, threat assessment, and exclusionary discipline; and represented a range of social science disciplines, such as psychology, sociology, and criminology.

We conducted this performance audit from May 2019 to June 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Additional Data Tables and Figure

This appendix contains several tables and a figure that show the underlying data used throughout this report, using the K-12 School Shooting Database of the Center for Homeland Defense and Security at the Naval Postgraduate School and our following definition of a school shooting:

- Any time a gun is fired:[1]
  - on school grounds, on a school bus, or during a school event (*such as sporting practice or event, school dance, school play*);[2] and
  - during school hours or a school event or immediately before or after school hours or school event.[3]
- "Any time a gun is fired" includes all incidents that meet the criteria above, including accidents and suicides, regardless of intent.[4]

See appendix I for more details on our scope and methodology. The following tables and figure are included in this appendix:

- Table 12: School shootings and fatalities/casualties by shooting location.
- Table 13: Time of day of school shootings by kind of shooting.
- Table 14: Month of shooting by kind of shooting.
- Figure 10: Number of school shootings incidents over time.

[1] For our analysis, we included four incidents in which a gun was brandished due to the severity of the incidents. For example, when the shooter initially made threatening gestures with a firearm, but was stopped prior to a shot being fired; for example, if the shooter was tackled.

[2] This includes instances in which the gun was fired onto school grounds or within or at a school bus, even if the shooter was outside of school grounds or outside of the school bus when they fired.

[3] This includes all times where school staff and teachers, including support and custodial staff, were on school grounds in their official capacity with the school (e.g. on duty, at school meeting).

[4] In developing this definition, we reviewed and compared definitions used in existing datasets, such as the National Center for Education Statistics School Survey on Crime and Safety and Education's Civil Rights Data Collection. Our definition includes shooting incidents regardless of intent.

Table 12: School Shootings and Fatalities/Casualties by Shooting Location, School Years 2009-10 through 2018-19

	Total Incidents	Total Killed (includes shooter)	Average Killed per Incident	Total Wounded	Average Wounded per Incident	Total Wounded or Killed	Average Wounded or Killed per Incident
All	318	166	0.52	330	1.04	496	1.56
Inside the school building	125	110	0.88	136	1.09	246	1.97
Outside the school building[a]	192	56	0.29	192	1.00	248	1.29
Unknown	1	0	0.00	2	2.00	2	2.00

Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

[a]We combined three categories from the K-12 School Shooting Database into an "Outside the school building" category: outside on school property, off school property, and on school bus.

Table 13: Time of Day of School Shootings by Kind of Shooting, School Years 2009-10 through 2018-19

	All	Morning	Lunch	Afternoon	Evening	Not a school day[a]	Unknown
All	318	122	25	78	79	8	6
Accidental	51	25	4	14	4	2	2
Dispute/ grievance-related	99	16	7	30	42	3	1
Domestic	22	12	0	6	3	1	0
Related to illegal activity	12	2	1	1	7	1	0
School targeted	46	28	8	7	2	0	1
Suicide/attempted suicide	34	24	3	4	3	0	0
Targeted victim	15	4	0	3	7	0	1
Unknown target/intent	29	7	2	10	10	0	0
Other	10	4	0	3	1	1	1

Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school years 2009-10 through 2018-19. | GAO-20-455

[a]"Not a school day" includes incidents that met our scoping definition and occurred on a Saturday, Sunday, holiday, summer break, or other non-school day during the school hours (not evening or night). This includes incidents occurring at sporting events not held on school days or other school events, such as prom or registration for classes.

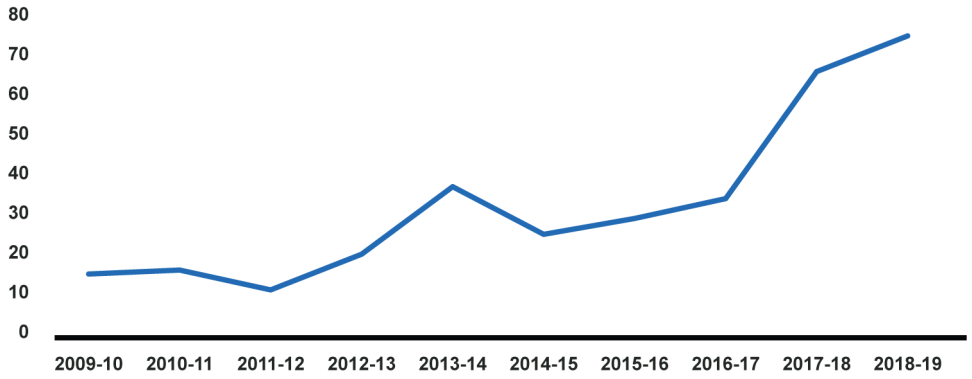
Table 14: Month of Shooting by Kind of Shooting, School Years 2009-10 through 2018-19

	All	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
All	318	0	18	42	34	21	22	47	35	22	31	32	14
Accidental	51	0	3	2	4	8	3	5	5	5	4	11	1
Dispute/ grievance-related	99	0	6	11	14	3	7	22	12	6	8	6	4
Domestic	22	0	1	1	2	0	1	4	5	3	3	2	0

	All	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Related to illegal activity	12	0	0	2	1	0	0	4	1	1	0	0	3
School-targeted	46	0	4	9	4	3	5	5	4	1	5	5	1
Suicide/ attempted suicide	34	0	2	6	2	5	2	1	3	3	6	3	1
Targeted victim	15	0	1	3	3	0.	1	0	1	1	1	3	1
Unknown target/intent	29	0	1	7	3	1	1	2	4	2	4	2	2
Other	10	0	0	1	1	1	2	4	0	0	0	0	1

Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting Database for school year 2009-10 through 2018-19. | GAO-20-455

Figure 10: Number of School Shooting Incidents Over Time, School Years 2009-10 through 2018-19



Source: GAO analysis of the Naval Postgraduate School's K-12 School Shooting database for school years 2009-10 through 2018-19. | GAO-20-455

Appendix III: Summary and Table of Studies Included in Literature Review

Our literature review found no empirical research from the last decade that directly examines the link between school shootings and approaches to school discipline. However, our literature review did find empirical research that examines the link between differing definitions of violent behavior and perceptions of school safety and discipline approaches among the 27 studies that met our overarching criteria.[1] See appendix I for more information on our inclusion criteria. These studies used a variety of methods, measures, and outcomes of interest, making it difficult to draw conclusions about the overall effectiveness of any one approach. In addition, it is unclear from the studies whether and to what extent the approaches examined were used in conjunction with other discipline or violence prevention efforts. For example, nonexclusionary discipline approaches may not entirely replace exclusionary discipline approaches, but may be used in conjunction with suspension and expulsion. Further, as many of the studies note, schools may have implemented the approaches examined with varying consistency. Finally, some schools may have put in place physical security measures or may have employed school resource officers, or support staff such as guidance counselors and psychologists. Such efforts may have interacted with the discipline approaches to impact the study results.

See table 15 below for the full list of the 27 studies we reviewed.

Table 15: Studies Meeting Inclusion Criteria for Literature Review

Study	Approach examined	Outcomes of relevance	School level of sample
Catherine H. Augustine, et al., *Can Restorative Practices Improve School Climate and Curb Suspensions? An Evaluation of the Impact of Restorative Practices in a Mid-Sized Urban School District* (RAND Corporation, 2018)[a]	Restorative practice	Violent behavior	Elementary, middle, high school
Michael W. Beets, et al., "Use of Social and Character Development Program to Prevent Substance Use, Violent Behaviors, and Sexual Activity Among Elementary-School Students in Hawaii," *American Journal of Public Health*, vol. 99, no. 8 (2009)	Social emotional learning	Violent behavior; perceptions of school safety	Elementary

[1] Our literature review was designed to identify studies examining the effects of these approaches on school gun violence, school violence, and school safety. Our literature review was not designed to identify studies examining the effects of these approaches on other student outcomes, such as academic achievement, or on school climate. In addition, while some of the studies we included in our literature review may have also examined these other outcomes, we only report on outcomes most directly related to school gun violence, school violence, and school safety.

Study	Approach examined	Outcomes of relevance	School level of sample
Catherine P. Bradshaw, et al., "Maryland's Evolving System of Social, Emotional, and Behavioral Interventions in Public Schools: The Maryland Safe and Supportive Schools Project, "*Adolescent Psychiatry*, 4 (2014): pp. 194-206	Positive behavior supports	Weapons; perceptions of school safety	High school
Catherine P. Bradshaw; Anne L. Sawyer; and Lindsey M. O'Brennan, "A Social Disorganization Perspective on Bullying-Related Attitudes and Behaviors: The Influence of School Context," *American Journal of Community Psychology*, 43 (2009): pp. 204–220	Exclusionary	Perceptions of school safety	Elementary and middle school
Dewey Cornell, et al., "A Retrospective Study of School Safety Conditions in High Schools Using the Virginia Threat Assessment Guidelines Versus Alternative Approaches," *School Psychology Quarterly*, vol. 24, no.2 (2009): pp.119-129	Threat assessment	Violent behavior*	High school
Dorothy L. Espelage, et al., "The Impact of a Middle School Program to Reduce Aggression, Victimization, and Sexual Violence," *Journal of Adolescent Health,* 53 (2013): pp. 180-186	Social emotional learning	Violent behavior**	Middle school
Shenyang Guo, et al., "A Longitudinal Evaluation of the Positive Action Program in a Low-Income, Racially Diverse, Rural County: Effects on Self-Esteem, School Hassles, Aggression, and Internalizing Symptoms," *Journal of Youth and Adolescence*, 44 (2015): pp. 2337–2358	Social emotional learning	Violent behavior*,**	Middle school
Rebecca Hinze-Pifer and Lauren Sartain, "Rethinking Universal Suspension for Severe Student Behavior," *Peabody Journal of Education*, 93:2 (2018): pp. 228-243	Exclusionary	Perceptions of school safety	High school
Robert H. Horner, et al., "A Randomized, Wait-List Controlled Effectiveness Trial Assessing School-Wide Positive Behavior Support in Elementary Schools," *Journal of Positive Behavior Interventions*, vol. 11, no. 3 (2009): pp. 1330144	Positive behavior supports	Perceptions of school safety*	Elementary school
Johanna Lacoe and Matthew P. Steinberg, "Rolling Back Zero Tolerance: The Effect of Discipline Policy Reform on Suspension Usage and Student Outcomes," *Peabody Journal of Education*, vol. 93, issue 2 (2018)	Exclusionary	Violent behavior*	Elementary, middle, high school
Kendra M. Lewis, et al., "Problem Behavior and Urban, Low-Income Youth: A Randomized Controlled Trial of Positive Action in Chicago," *American Journal of Preventive Medicine*, 44(6) (2013): pp. 622–630	Social emotional learning	Violent behavior**	Elementary school
Kin-Kit Li, et al., "Effects of the Positive Action programme on problem behaviors in elementary school students: A match-pair randomised control trial in Chicago," *Psychology and Health*, vol. 26, no. 2 (2011): pp. 187–204	Social emotional learning	Violent behavior**	Elementary school
David Maimon; Olena Antonaccio; and Michael T. French, "Severe Sanctions, Easy Choice? Investigating the Role of School Sanctions in Preventing Adolescent Violent Offending," *Criminology*, 50(2) (2012): pp. 495-524	Exclusionary	Violent behavior**	Middle and high school
Barry McCurdy, et al., "School-Wide Positive Behavioral Interventions and Supports for Students with Emotional and Behavioral Disorders," *Psychology in the Schools*, vol. 53(4) (2016)	Positive behavior supports	Violent behavior*	Elementary, middle, high school
Laura McNeal and Christopher Dunbar, Jr., "In the Eyes of the Beholder: Urban Student Perceptions of Zero Tolerance Policy," *Urban Education*, 45(3) (2010): pp. 293–311	Exclusionary	Perceptions of school safety	High school

Study	Approach examined	Outcomes of relevance	School level of sample
Gregory Moy, et al., "International Adoption of the 'Second Step' Program: Moderating Variables in Treatment Effects," *School Psychology International*, vol. 39(4) (2018): pp. 333–359	Social emotional learning	Violent behavior**	Elementary and middle school
Erin K. Nekvasil and Dewey G. Cornell, "Student Threat Assessment Associated with Safety in Middle Schools," *Journal of Threat Assessment and Management*, vol. 2, no. 2 (2015): pp. 98–113	Threat assessment	Perceptions of school safety; violent behavior*	Middle school
David Osher, et al., "Avoid Simple Solutions and Quick Fixes: Lessons Learned From a Comprehensive Districtwide Approach to Improving Student Behavior and School Safety," *Journal of Applied Research on Children*, vol. 5, issue 2, article 16 (2014)	Social emotional learning	Violent behavior; perceptions of school safety	Elementary, middle, high school
Arthur H. Owora, et al., "Culturally congruent mentorship can reduce disruptive behavior among elementary school students: results from a pilot study," *Pilot and Feasibility Studies*, 4:147 (2018)	Other	Violent behavior*	Elementary school
Lawrence Shulman and Eugene Maguin, "The VISA Center: An Interdisciplinary Collaboration Serving Students Suspended from School for Violent or Aggressive Behavior, Substance Abuse, or Weapons Possession," *Children & Schools*, vol.39, no. 4 (2017)	Other	Violent behavior	Middle and high school
Suyapa Silvia, et al., I*mpacts of a Violence Prevention Program for Middle Schools: Findings After 3 Years of Implementation*, NCEE 2011-4017 (Washington, D.C: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education, 2011)	Other	Violent behavior**	Middle school
Paul R. Smokowski, et al., "The North Carolina Youth Violence Prevention Center: Using a Multifaceted, Ecological Approach to Reduce Youth Violence in Impoverished, Rural Areas," *Journal of the Society for Social Work and Research*, vol. 9, no. 4 (2018)	Social emotional learning	Violent behavior*,**	Middle school
Paul R. Smokowski, et al., "Evaluating Dosage Effects for the Positive Action Program: How Implementation Impacts Internalizing Symptoms, Aggression, School Hassles, and Self-Esteem," *American Journal of Orthopsychiatry*, 86(3) (2016): pp. 310–322	Social emotional learning	Violent behavior*,**	Middle school
Frank J. Snyder, et al., "Preventing Negative Behaviors Among Elementary-School Students Through Enhancing Students' Social-Emotional and Character Development," *American Journal of Health Promotion*, 28(1) (2013): pp. 50– 58	Social emotional learning	Violent behavior	Elementary school
Katie Cotter Stalker, et al., "The impact of the positive action program on substance use, aggression, and psychological functioning: Is school climate a mechanism of change?" *Children and Youth Services Review*, 84 (2018): pp. 143-151	Social emotional learning	Violent behavior*,**	Middle and high school
University of Chicago Crime Lab, *Connect & Redirect to Respect: Final Report* (January 2019)[b]	Other	Shooting victimization[c] *,**	High school
Lacey N. Wallace, "Illicit juvenile weapon possession: The role of serious sanctioning in future behavior," *The Social Science Journal,* 54 (2017): pp. 319-328.	Exclusionary	Weapon carrying; violent behavior**	Middle and high school

Source: GAO literature searches and analysis of reviewed studies. | GAO-20-455

*Indicates outcome measure is not scoped exclusively to the outcome of interest for this engagement. For example, an outcome measure of violent behavior may also include non-violent behavior.

**Indicates outcome measure is not scoped only to the school-setting.

Note: School level was directly reported by most studies. For articles where school level was not directly reported, schools were coded based on reported student grade levels. As grade level ranges vary for school level across different districts, context was used to inform coding decisions. For example, some studies coded as having an elementary school sample included grade levels ranging from pre-K through grade 8 while others had a smaller grade range. Similarly, some middle schools and even high schools included grade 8 students.

[a]This study was funded by the National Institute for Justice as part of its Comprehensive School Safety Initiative, but was published by the RAND Corporation.

[b]This study was funded through an award by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice, and was made publically available through the Office of Justice Programs' National Criminal Justice Reference Service. It was not published by the U.S. Department of Justice.

[c]The study defined student shooting victimization as instances in which Chicago Public School students were the physical victims of gunfire, both fatal and non-fatal.

Appendix IV: GAO Contact and Staff Acknowledgments

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Staff Acknowledgments

In addition to the contact named above, Sherri Doughty (Assistant Director), Cady S. Panetta (Analyst-in-Charge), Morgan Jones, Suzanne Kaasa, John Mingus, Amy Moran Lowe, Patricia Powell, Lauren Shaman, and Walter Vance made key contributions to this report. Also contributing were Sarah Cornetto, Holly Dye, Eric Erdman, Sarah Gilliland, Gina Hoover, Lara Laufer, Sheila R. McCoy, Samuel Portnow, Curtia Taylor, and Elaine Vaurio.