



# An Examination of US School Mass Shootings, 2017–2022: Findings and Implications

Antonis Katsiyannis<sup>1</sup> · Luke J. Rapa<sup>2</sup> · Denise K. Whitford<sup>3</sup> · Samantha N. Scott<sup>4</sup>

Accepted: 30 July 2022 / Published online: 19 August 2022

© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2022, corrected publication 2023

## Abstract

**Objectives** Gun violence in the USA is a pressing social and public health issue. As rates of gun violence continue to rise, deaths resulting from such violence rise as well. School shootings, in particular, are at their highest recorded levels. In this study, we examined rates of intentional firearm deaths, mass shootings, and school mass shootings in the USA using data from the past 5 years, 2017–2022, to assess trends and reappraise prior examination of this issue.

**Methods** Extant data regarding shooting deaths from 2017 through 2020 were obtained from the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, the web-based injury statistics query and reporting system (WISQARS), and, for school shootings in particular (2017–2022), from Everytown Research & Policy.

**Results** The number of intentional firearm deaths and the crude death rates increased from 2017 to 2020 in all age categories; crude death rates rose from 4.47 in 2017 to 5.88 in 2020. School shootings made a sharp decline in 2020—understandably so, given the onset of the COVID-19 pandemic and subsequent government or locally mandated school shutdowns—but rose again sharply in 2021.

**Conclusions** Recent data suggest continued upward trends in school shootings, school mass shootings, and related deaths over the past 5 years. Notably, gun violence disproportionately affects boys, especially Black boys, with much higher gun deaths per capita for this group than for any other group of youth. Implications for policy and practice are provided.

**Keywords** Guns · Firearm deaths · Mass shootings · School shootings · School mass shootings · Violence

On May 24, 2022, an 18-year-old man killed 19 students and two teachers and wounded 17 individuals at Robb Elementary School in Uvalde, TX, using an AR-15-style rifle. Outside the school, he fired shots for about 5 min before entering the school through an unlocked side door and locked himself

inside two adjoining classrooms killing 19 students and two teachers. He was in the school for over an hour (78 min) before being shot dead by the US Border Patrol Tactical Unit, though police officers were on the school premises (Sandoval, 2022).

The Robb Elementary School mass shooting, the second deadliest school mass shooting in American history, is the latest calamity in a long list of tragedies occurring on public school campuses in the USA. Regrettably, these tragedies are both a reflection and an outgrowth of the broader reality of gun violence in this country. In 2021, gun violence claimed 45,027 lives (including 20,937 suicides), with 313 children aged 0–11 killed and 750 injured, along with 1247 youth aged 12–17 killed and 3385 injured (Gun Violence Archive, 2022a). Mass shootings in the USA have steadily increased in recent years, rising from 269 in 2013 to 611 in 2020. Mass shootings are typically defined as incidents in which four or more people are killed (Katsiyannis et al., 2018a). However, the Gun Violence Archive considers mass shootings to be incidents in which four or more people are

✉ Antonis Katsiyannis  
antonis@clemson.edu

<sup>1</sup> Department of Education and Human Development, College of Education, Clemson University, 101 Gantt Circle, Room 407 C, Clemson, SC 29634, USA

<sup>2</sup> Department of Education and Human Development, College of Education, Clemson University, 101 Gantt Circle, Room 409 F, Clemson, SC 29634, USA

<sup>3</sup> Steven C. Beering Hall of Liberal Arts and Education, Purdue University, 100 N. University Street, BRNG 5154, West Lafayette, IN 47907-2098, USA

<sup>4</sup> Department of Education and Human Development, College of Education, Clemson University, 101 Gantt Circle, Room G01A, Clemson, SC 29634, USA

injured (Gun Violence Archive, 2022b). Regardless of these distinctions in definition, in 2020, there were 19,384 gun murders, representing a 34% increase from the year before, a 49% increase over a 5-year period, and a 75% increase over a 10-year period (Pew Research Center, 2022). Regarding school-based shootings, to date in 2022, there have been at least 95 incidents of gunfire on school premises, resulting in 40 deaths and 76 injuries (Everytown Research & Policy, 2022b). Over the past few decades, school shootings in the USA have become relatively commonplace: there were more in 2021 than in any year since 1999, with the median age of perpetrators being 16 (Washington Post, 2022; see also, Katsiyannis et al., 2018a). Additionally, analysis of Everytown's Gunfire on School Grounds dataset and related studies point to several key observations to be considered in addressing this challenge. For example, 58% of perpetrators had a connection to the school, 70% were White males, 73 to 80% obtained guns from home or relatives or friends, and 100% exhibited warning signs or showed behavior that was of cause for concern; also, in 77% of school shootings, at least one person knew about the shooter's plan before the shooting events occurred (Everytown Research & Policy, 2021a).

The USA has had 57 times as many school shootings as all other major industrialized nations combined (Rowhani-Rahbar & Moe, 2019). Guns are the leading cause of death for children and teens in the USA, with children ages 5–14 being 21 times and adolescents and young adults ages 15–24 being 23 times more likely to be killed with guns compared to other high-income countries. Furthermore, Black children and teens are 14 times and Latinx children and teens are three times more likely than White children to die by guns (Everytown Research & Policy, 2021b). Children exposed to violence, crime, and abuse face a host of adverse challenges, including abuse of drugs and alcohol, depression, anxiety, post-traumatic stress disorder, school failure, and involvement in criminal activity (Cabral et al., 2021; Everytown Research and Policy, 2022b; Finkelhor et al., 2013).

Yet, despite gun violence being considered a pressing social and public health issue, federal legislation passed in 1996 has resulted in restricting funding for the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC). The law stated that no funding earmarked for injury prevention and control may be used to advocate or promote firearm control (Kellermann & Rivara, 2013). More recently, in June 2022, the US Supreme Court struck down legislation restricting gun possession and open carry rights (*New York State Rifle & Pistol Assn., Inc. v. Bruen*, 2021), broadening gun rights and increasing the risk of gun violence in public spaces. Nonetheless, according to Everytown Research & Policy (2022a), states with strong gun laws experience fewer deaths per capita. In the aggregate, states with weaker gun laws (i.e., laws that are more permissive) experience 20.0 gun deaths

per 100,000 residents versus 7.4 per 100,000 in states with stronger laws. The association between gun law strength and per capita death is stark (see Table 1).

Notwithstanding the publicity involving gun shootings in schools, particularly mass shootings, violence in schools has been steadily declining. For example, in 2020, students aged 12–18 experienced 285,400 victimizations at school and 380,900 victimizations away from school; an annual decrease of 60% for school victimizations (from 2019 to 2020) (Irwin et al., 2022). Similarly, youth arrests in general in 2019 were at their lowest level since at least 1980; between 2010 and 2019, the number of juvenile arrests fell by 58%. Yet, arrests for murder increased by 10% (Puzzanchera, 2021).

In response to school violence in general, and school shootings in particular, schools have increasingly relied on increased security measures, school resource officers (SROs), and zero tolerance policies (including exclusionary and aversive measures) in their attempts to curb violence and enhance school safety. In 2019–2020, public schools reported controlled access (97%), the use of security cameras (91%), and badges or picture IDs (77%) to promote safety. In addition, high schools (84%), middle schools (81%), and elementary schools (55%) reported the presence of SROs (Irwin et al., 2022). Research, however, has indicated that the presence of SROs has not resulted in a

**Table 1** Gun law strength and gun law deaths per 100,000 residents

State	Gun law strength	Gun deaths per 100,000 residents
Top eight in gun law strength		
1. California	84.5	8.5
2. Hawaii	79.5	3.4
3. New York	78	5.3
4. Massachusetts	77	3.7
5. Connecticut	75.5	6.0
6. Illinois	74	14.1
7. Maryland	71.5	13.5
8. New Jersey	71	5.0
Bottom eight in gun law strength		
43. Arizona	8.5	16.7
44. Oklahoma	7.5	20.7
45. Wyoming	6	25.9
46. South Dakota	5.5	13.6
47. Arkansas	5	22.6
48. Montana	5	20.9
49. Idaho	5	17.6
50. Mississippi	3	28.6

Accounting for the top eight and the bottom eight states in gun law strength, gun law strength and gun deaths per 100,000 are correlated at  $r = -0.85$ . Stronger gun laws are thus meaningfully linked with fewer deaths per capita. Data obtained from Everytown Research & Policy (2022a)

reduction of school shooting severity, despite their increased prevalence. Rather, the type of firearm utilized in school shootings has been closely associated with the number of deaths and injuries (Lemieux, 2014; Livingston et al., 2019), suggesting implications for reconsideration of the kinds of firearms to which individuals have access.

Zero tolerance policies, though originally intended to curtail gun violence in schools, have expanded to cover a host of incidents (e.g., threats, bullying). Notwithstanding these intentions, these policies are generally ineffective in preventing school violence, including school shootings (American Psychological Association Zero Tolerance Task Force, 2008; Losinski et al., 2014), and have exacerbated the prevalence of youths' interactions with law enforcement in schools. From the 2015–2016 to the 2017–2018 school years, there was a 5% increase in school-related arrests and a 12% increase in referrals to law enforcement (U.S. Department of Education, 2021); in 2017–18, about 230,000 students were referred to law enforcement and over 50,000 were arrested (The Center for Public Integrity, 2021). Law enforcement referrals have been a persistent concern aiding the school-to-prison pipeline, often involving non-criminal offenses and disproportionately affecting students from non-White backgrounds as well as students with disabilities (Chan et al., 2021; The Center for Public Integrity, 2021).

The consequences of these policies are thus far-reaching, with not only legal ramifications, but social-emotional and academic ones as well. For example, in 2017–2018, students missed 11,205,797 school days due to out-of-school suspensions during that school year (U.S. Department of Education, 2021), there were 96,492 corporal punishment incidents, and 101,990 students were physically restrained, mechanically restrained, or secluded (U.S. Department of Education, Office of Civil Rights, 2020). Such exclusionary and punitive measures have long-lasting consequences for the involved students, including academic underachievement, dropout, delinquency, and post-traumatic stress (e.g., Cholewa et al., 2018). Moreover, these consequences disproportionately affect culturally and linguistically diverse students and students with disabilities (Skiba et al., 2014; U.S. General Accountability Office, 2018), often resulting in great societal costs (Rumberger & Losen, 2017).

In the USA, mass killings involving guns occur approximately every 2 weeks, while school shootings occur every 4 weeks (Towers et al., 2015). Given the apparent and continued rise in gun violence, mass shootings, and school mass shootings, we aimed in this paper to reexamine rates of intentional firearm deaths, mass shootings, and school mass shootings in the USA using data from the past 5 years, 2017–2022, reappraising our analyses given the time that had passed since our earlier examination of the issue (Katsiyannis et al., 2018a, b).

## Method

As noted in Katsiyannis et al., (2018a, b), gun violence, mass shootings, and school shootings have been a part of the American way of life for generations. Such shootings have grown exponentially in both frequency and mortality rate since the 1980s. Using the same criteria applied in our previous work (Katsiyannis et al., 2018a, b), we evaluated the frequency of shootings, mass shootings, and school mass school shootings from January 2017 through mid-July 2022. Extant data regarding shooting deaths from 2017 through 2020 were obtained from the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, utilizing the web-based injury statistics query and reporting system (WISQARS), and for school shootings from 2017 to 2022 from Everytown Research & Policy (<https://everytownresearch.org>), an independent non-profit organization that researches and communicates with policymakers and the public about gun violence in the USA. Intentional firearm death data were classified by age, as outlined in Katsiyannis et al., (2018a, b), and the crude rate was calculated by dividing the number of deaths times 100,000, by the total population for each individual category.

## Results

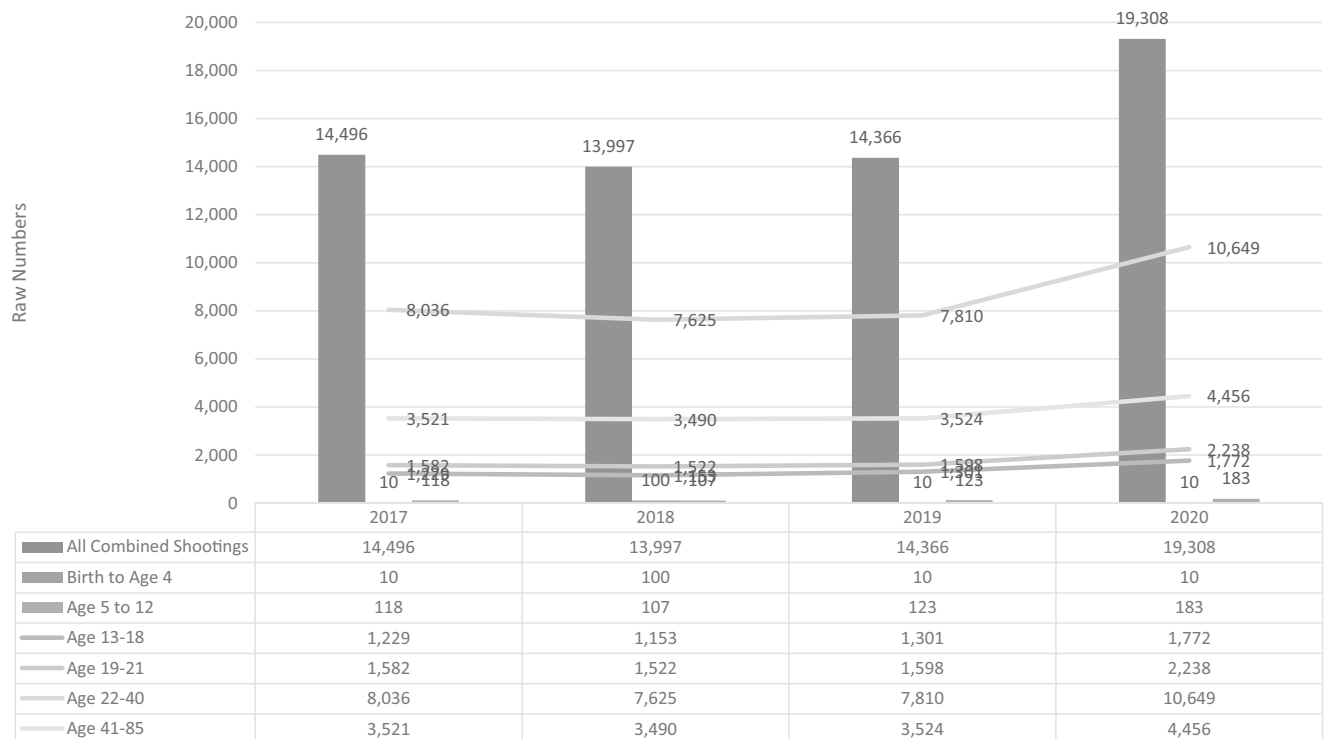
The number of intentional firearm deaths and the crude death rates increased from 2017 to 2020 in all age categories. In absolute terms, the number of deaths rose from 14,496 in 2017 to 19,308 in 2020. In accord with this rise in the absolute number of deaths, crude death rates rose from 4.47 in 2017 to 5.88 in 2020. Table 2 provides the crude death rate in 2017, 2018, 2019, and 2020, the most current years with data available. Figure 1 provides the raw number of deaths across the same time period.

As expected, in 2020, the number of fatal firearm injuries increased sharply from age 0–11 years, roughly elementary school age, to age 12–18 years, roughly middle school and high school age. Table 3 provides the crude death rates of children in 2020 who die from firearms. Males outnumbered females in every category of firearm deaths, including homicide, police violence, suicide, and accidental shootings, as well as for undetermined reasons for firearm discharge. Black males drastically surpassed all other children in the number of firearm deaths (2.91 per 100,000 0–11-year-olds; 57.10 per 100,000 12–18-year-olds). Also, notable is the high number of Black children 12–18 years killed by guns (32.37 per 100,000), followed by American Indian and Alaska Native children (18.87 per 100,000), in comparison to White children

**Table 2** Intentional firearm deaths across the USA (2017–2020)

	Rate per 100,000 people			
	2017	2018	2019	2020
Birth to age 4	0.28	0.30	0.29	0.44
Age 5 to 12	0.36	0.33	0.38	0.56
Age 13–18	4.89	4.59	5.19	7.06
Age 19–21	12.34	11.89	12.40	17.35
Age 22–40	9.57	9.02	9.19	12.49
Age 41–85	2.34	2.30	2.30	2.89
Total	4.47	4.27	4.39	5.88

Data obtained from WISQARS (2022)



**Fig. 1** Intentional firearm deaths across the USA (2017–2020). *Note.* Data obtained from WISQARS (2022)

(12.40 per 100,000 children), Hispanic/Latinx children (8.16 per 100,000), and Asian and Pacific Islander children (2.95 per 100,000). A disproportionate number of gun deaths were also seen for Black girls relative to other girls (1.52 per 100,000 0–11-year-olds; 7.01 per 100,000 12–18-year-olds).

Mass shootings and mass shooting deaths increased from 2017 to 2019, decreased in 2020, and then increased again in 2021. School shootings made a sharp decline in 2020—understandably so, given the onset of the COVID-19 pandemic and subsequent government or locally mandated school shutdowns—but rose again sharply in 2021. Current rates reveal a continued increase, with numbers at the beginning of 2022 already exceeding those of 2017. School mass shooting counts were relatively low between

2017 through 2022, with four total during that time frame. Figure 2 provides raw numbers for mass shootings, school shootings, and school mass shootings from 2017 through 2022. With the recent Uvalde, TX school mass shooting at Robb Elementary School included in the reporting, 2022 was one of the deadliest years for school mass shootings in the past 5 years.

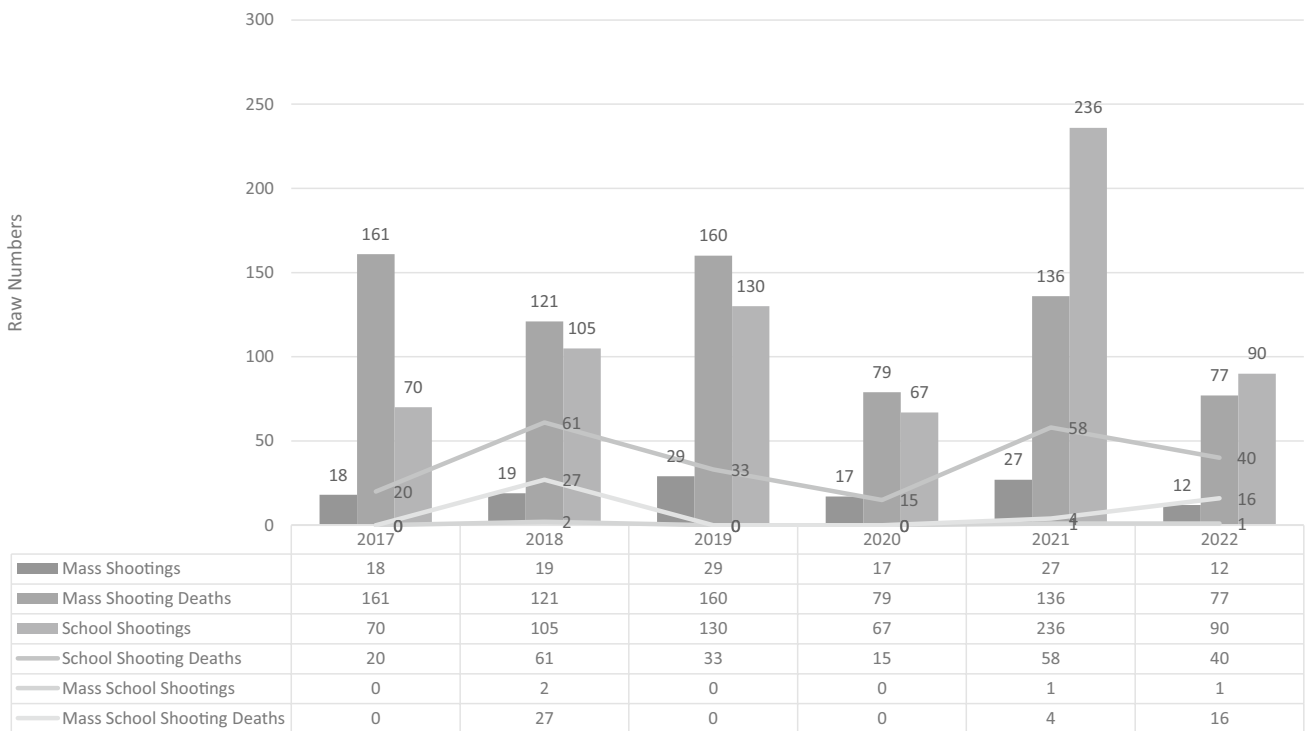
### Discussion

Gun violence in the USA, particularly mass shootings on the grounds of public schools, continues to be a pressing social and public health issue. Recent data suggest continued upward

**Table 3** Fatal firearm injuries for children age 0–18 across the USA in 2020

	Rate per 100,000 people									
	Age 0–11			Age 12–18			Age 0–18			
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
<b>Non-law enforcement homicide</b>										
American Indian/AN	–	–	–	–	–	–	–	–	–	–
Asian/Pacific Islander	–	–	–	–	–	–	–	–	–	–
Black/African American	1.82	1.35	1.59	47.27	5.74	26.80	18.75	2.99	10.99	
Hispanic/Latinx	–	–	0.23	10.06	2.09	6.39	3.26	0.59	1.95	
White/Caucasian	0.43	0.22	0.33	2.47	0.70	1.61	1.22	0.40	0.82	
Total	0.57	0.39	0.48	10.37	1.86	5.88	4.37	0.85	2.65	
<b>Law enforcement</b>										
American Indian/AN	–	–	–	–	–	–	–	–	–	–
Asian/Pacific Islander	–	–	–	–	–	–	–	–	–	–
Black/African American	–	–	–	0.59	–	0.30	–	–	–	–
Hispanic/Latinx	–	–	–	0.48	–	0.27	–	–	–	–
White/Caucasian	–	–	–	0.32	–	0.16	–	–	–	–
Total	–	–	–	0.37	0.01	0.01	–	–	–	–
<b>Suicide</b>										
American Indian/AN	–	–	–	17.18	1.98	9.65	6.63	–	4.03	
Asian/Pacific Islander	–	–	–	3.12	0.42	1.76	0.97	–	1.43	
Black/African American	–	–	–	7.74	0.90	4.25	1.56	–	0.95	
Hispanic/Latinx	–	–	–	12.26	2.83	7.46	1.26	0.24	0.76	
White/Caucasian	–	–	–	15.80	2.44	9.96	2.81	0.37	1.62	
Total	–	–	0.04	12.48	1.79	7.37	2.15	0.33	1.26	
<b>Unintentional</b>										
American Indian/AN	–	–	–	–	–	–	–	–	–	–
Asian/Pacific Islander	–	–	–	–	–	–	–	–	–	–
Black/African American	0.72	–	0.42	0.55	–	0.31	0.70	–	0.41	
Hispanic/Latinx	–	–	–	62.66	20.31	37.76	–	–	–	
White/Caucasian	0.21	–	0.13	0.29	0.04	0.16	0.27	–	0.16	
Total	0.25	–	0.14	0.42	–	0.23	0.31	–	0.18	
<b>Undetermined</b>										
American Indian/AN	–	–	–	–	–	–	–	–	–	–
Asian/Pacific Islander	–	–	–	–	–	–	–	–	–	–
Black/African American	–	–	–	0.42	–	0.23	0.44	–	0.24	
Hispanic/Latinx	–	–	–	1.38	0.59	0.95	–	–	–	
White/Caucasian	–	–	–	0.17	0.05	0.11	0.11	–	0.06	
Total	–	–	0.05	0.30	–	0.16	0.16	–	0.09	
<b>All causes</b>										
American Indian/AN	–	–	–	32.80	4.98	18.87	11.93	–	7.52	
Asian/Pacific Islander	–	–	–	5.00	0.84	2.95	1.46	–	0.97	
Black/African American	2.91	1.52	2.23	57.10	7.01	32.37	21.55	3.44	12.64	
Hispanic/Latinx	0.42	–	0.33	13.74	1.95	8.16	4.87	0.86	2.90	
White/Caucasian	0.78	0.28	0.53	19.73	3.73	12.40	4.43	0.83	2.67	
Total	0.98	0.45	0.72	23.72	3.75	13.73	7.03	1.24	4.20	

AN Alaska Native; – indicates 20 or fewer cases



**Fig. 2** Mass shootings, school shootings, and mass school shootings across the USA (2017–2022). *Note.* Data obtained from Everytown Research and Policy. Overlap present between all three categories

trends in school shootings, school mass shootings, and related deaths over the past 5 years—patterns that disturbingly mirror general gun violence and intentional shooting deaths in the USA across the same time period. The impacts on our nation’s youth are profound. Notably, gun violence disproportionately affects boys, especially Black boys, with much higher gun deaths per capita for this group than for any other group of youth. Likewise, Black girls are disproportionately affected compared to girls from other ethnic/racial groups. Moreover, while the COVID-19 pandemic and school shutdowns tempered gun violence in schools at least somewhat during the 2020 school year—including school shootings and school mass shootings—trend data show that gun violence rates are still continuing to rise. Indeed, gun violence deaths resulting from school shootings are at their highest recorded levels ever (Irwin et al., 2022).

**Implications for Schools: Curbing School Violence**

In recent years, the implementation of Multi-Tier Systems and Supports (MTSS), including Positive Behavioral Interventions and Supports (PBIS) and Response to Intervention (RTI), has resulted in improved school climate and student engagement as well as improved academic and behavioral

outcomes (Elrod et al., 2022; Santiago-Rosario et al., 2022; National Center for Learning Disabilities, n.d.). Such approaches have implications for reducing school violence as well. PBIS uses a tiered framework intended to improve student behavioral and academic outcomes; it creates positive learning environments through the implementation of evidence-based instructional and behavioral interventions, guided by data-based decision-making and allocation of students across three tiers. In Tier 1, schools provide universal supports to all students in a proactive manner; in Tier 2, supports are aimed to students who need additional academic, behavioral, or social-emotional intervention; and in Tier 3, supports are provided in an intensive and individualized manner (Lewis et al., 2010). The implementation of PBIS has resulted in an improved school climate, fewer office referrals, and reductions in out-of-school suspensions (Bradshaw et al., 2010; Elrod et al., 2010, 2022; Gage et al., 2018a, 2018b; Horner et al., 2010; Noltemeyer et al., 2019). Likewise, RTI aims to improve instructional outcomes through high-quality instruction and universal screening for students to identify learning challenges and similarly allocates students across three tiers. In Tier 1, schools implement high-quality classroom instruction, screening, and group interventions; in Tier 2, schools implement targeted



interventions; and in Tier 3, schools implement intensive interventions and comprehensive evaluation (National Center for Learning Disabilities, [n.d.](#)). RTI implementation has resulted in improved academic outcomes (e.g., reading, writing) (Arrimada et al., [2022](#); Balu et al., [2015](#); Siegel, [2020](#)) and enhanced school climate and student behavior.

In order to support students' well-being, enhance school climate, and support reductions in behavioral issues and school violence, schools should consider the implementation of MTSS, reducing reliance on exclusionary and aversive measures such as zero tolerance policies, seclusion and restraints, corporal punishment, or school-based law enforcement referrals and arrests (see Gage et al., [in press](#)). Such approaches and policies are less effective than the use of MTSS, exacerbate inequities and enhance disproportionality (particularly for youth of color and students with disabilities), and have not been shown to reduce violence in schools.

### Implications for Students: Ensuring Physical Safety and Supporting Mental Health

Students should not have to attend school and fear becoming victims of violence in general, no less gun violence in particular. Schools must ensure the physical safety of their students. Yet, as the substantial number of school shootings continues to rise in the USA, so too does concern about the adverse impacts of violence and gun violence on students' mental health and well-being. Students are frequently exposed to unavoidable and frightening images and stories of school violence (Child Development Institute, [n.d.](#)) and are subject to active shooter drills that may not actually be effective and, in some cases, may actually induce trauma (Jetelina, [2022](#); National Association of School Psychologists & National Association of School Resources Officers, [2021](#); Wang et al., [2020](#)). In turn, students struggle to process and understand why these events happen and, more importantly, how they can be prevented (National Association of School Psychologists, [2015](#)). School personnel should be prepared to support the mental health needs of students, both in light of the prevalence of school gun violence and in the aftermath of school mass shootings.

Research provides evidence that traumatic events, such as school mass shootings, can and do have mental health consequences for victims and members of affected communities, leading to an increase in post-traumatic stress syndrome, depression, and other psychological systems (Lowe & Galea, [2017](#)). At the same time, high media attention to such events indirectly exposes and heightens feelings of fear, anxiety, and vulnerability in students—even if they did not attend the school where the shooting occurred (Schonfeld & Demaria, [2020](#)). Students of all ages may experience adjustment difficulties and engage in avoidance behaviors (Schonfeld &

Demaria, [2020](#)). As a result, school personnel may underestimate a student's distress after a shooting and overestimate their resilience. In addition, an adult's difficulty adjusting in the wake of trauma may also threaten a student's sense of well-being because they may believe their teachers cannot provide them with the protection they need to remain safe in school (Schonfeld & Demaria, [2020](#)).

These traumatic events have resounding consequences for youth development and well-being. However, schools continue to struggle to meet the demands of student mental health needs as they lack adequate funding for resources, student support services, and staff to provide the level of support needed for many students (Katsiyannis et al., [2018a](#)). Despite these limiting factors, children and youth continue to look to adults for information and guidance on how to react to adverse events. An effective response can significantly decrease the likelihood of further trauma; therefore, all school personnel must be prepared to talk with students about their fears, to help them feel safe and establish a sense of normalcy and security in the wake of tragedy (National Association of School Psychologists, [2016](#)). Research suggests a number of strategies can be utilized by educators, school leaders, counselors, and other mental health professionals to support the students and staff they serve.

### Recommendations for Educators

The National Association of School Psychologists ([2016](#)) recommends the following practices for educators to follow in response to school mass shootings. Although a complex topic to address, the issue needs to be acknowledged. In particular, educators should designate time to talk with their students about the event, and should reassure students that they are safe while validating their fears, feelings, and concerns. Recognizing and stressing to students that all feelings are okay when a tragedy occurs is essential. It is important to note that some students do not wish to express their emotions verbally. Other developmentally appropriate outlets, such as drawing, writing, reading books, and imaginative play, can be utilized. Educators should also provide developmentally appropriate explanations of the issue and events throughout their conversations. At the elementary level, students need brief, simple answers that are balanced with reassurances that schools are safe and that adults are there to protect them. In the secondary grades, students may be more vocal in asking questions about whether they are truly safe and what protocols are in place to protect them at school. To address these questions, educators can provide information related to the efforts of school and community leaders to ensure school safety. Educators should also review safety procedures and help students to identify at least one adult in the building to whom they can go if they feel threatened or at risk. Limiting exposure to media and social media is also

important, as developmentally inappropriate information can cause anxiety or confusion. Educators should also maintain a normal routine by keeping a regular school schedule.

### Recommendations for School Leaders

Superintendents, principals, and other school administrative personnel are looked upon to provide leadership and comfort to staff, students, and parents during a tragedy. Reassurance can be provided by reiterating safety measures and student supports that are in place in their district and school (The National Association of School Psychologists, 2015). The NASP recommends the following practices for school leaders regarding addressing student mental health needs directly. First, school leaders should be a visible, welcoming presence by greeting students and visiting classrooms. School leaders should also communicate with the school community, including parents and students, about their efforts to maintain safe and caring schools through clear behavioral expectations, positive behavior interventions and supports, and crisis planning preparedness. This can include the development of press releases for broad dissemination within the school community. School leaders should also provide crisis training and professional development for staff, based upon assessments of needs and targeted toward identified knowledge or skill gaps. They should also ensure the implementation of violence prevention programs and curricula in school and review school safety policies and procedures to ensure that all safety issues are adequately covered in current school crisis plans and emergency response procedures.

### Recommendations for Counselors and Mental Health Professionals

School counselors offer critical assistance to their buildings' populations as they experience crises or respond to emergencies (American School Counselor Association, 2019; Brown, 2020). Two models that stand out in the literature utilized by counselors in the wake of violent events are the Preparation, Action, Recovery (PAR) model and the Prevent and prepare; Reaffirm; Evaluate; provide interventions and Respond (PREPaRE) model. PREPaRE is the only comprehensive, nationally available training curriculum created by educators for educators (The National Association of School Psychologists, n.d.). Although beneficial, neither the PAR nor PREPaRE model directly addresses school counselors' responses to school shootings when their school is directly affected (Brown, 2020). This led to the development of the School Counselor's Response to School Shootings-Framework of Recommendations (SCRSS-FR) model, which includes six stages, each of which has corresponding components for school counselors who have lived through a school mass

shooting. Each of these models provides the necessary training to school-employed mental health professionals on how to best fill the roles and responsibilities generated by their membership on school crisis response teams (The National Association of School Psychologists, n.d.).

### Other Implications: Federal and State Policy

Recent events at Robb Elementary School in Uvalde, TX, prompted the US Congress to pass landmark legislation intended to curb gun violence, enhancing background checks for prospective gun buyers who are under 21 years of age as well as allowing examination of juvenile records beginning at age 16, including health records related to prospective gun buyers' mental health. Additionally, this legislation provides funding that will allow states to implement "red flag laws" and other intervention programs while also strengthening laws related to the purchase and trafficking of guns (Cochrane, 2022). Yet, additional legislation reducing or eliminating access to assault rifles and other guns with large capacity magazines, weapons that might easily be deemed "weapons of mass destruction," is still needed (Interdisciplinary Group on Preventing School & Community Violence, 2022; see also Flannery et al., 2021). In 2019, the US Congress started to appropriate research funding to support research on gun violence, with \$25 million in equal shares provided on an annual basis from both the Centers for Disease Control and Prevention and the National Institutes of Health (Roubein, 2022; Wan, 2019). Additional research is, of course, still needed.

Despite legislative progress, and while advancements in gun legislation are meaningful and have the potential to aid in the reduction of gun violence in the USA, school shootings and school mass shootings are something schools and students will contend with in the months and years ahead. This reality has serious implications for schools and for students, points that need serious consideration. Therefore, it is imperative that gun violence is framed as a pressing national public health issue deserving attention, with drastic steps needed to curb access to assault rifles and guns with high-capacity magazines, based on extensive and targeted research. As noted, Congress, after many years of inaction, has started to appropriate funds to address this issue. However, the level of funding is still minimal in light of the pressing challenge that gun violence presents. Furthermore, the messaging of conservative media, the National Rifle Association (NRA) and republican legislators framing access to all and any weapons—including assault rifles—as a constitutional right under the second amendment bears scrutiny. Indeed, the second amendment denotes that "A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed." Security of the nation is arguably the



intent of the amendment, an intent that is clearly violated as evidenced in the ever-increasing death toll associated with gun violence in the USA.

Whereas federal legislation would be preferable, the possibility of banning assault weapons is remote (in light of recent Congressional action). Similarly, state action has been severely curtailed in light of the US Supreme Court's decision regarding New York state law. However, data on gun fatalities and injuries, the correspondence of gun violence to laws regulating access across the world and states, and failed security measures such as armed guards posted in schools (e.g., Robb Elementary School) must be consistently emphasized. Additionally, the widespread sense of immunity for gun manufacturers should be tested in the same manner that tobacco manufacturers and opioid pharmaceuticals have been. The success against such tobacco and opioid manufacturers, once unthinkable, is a powerful precedent to consider for how the threat of gun violence against public health might be addressed.

**Author Contribution** AK conceived of and designed the study and led the writing of the manuscript. LJR collaborated on the study design, contributed to the writing of the study, and contributed to the editing of the final manuscript. DKW analyzed the data and wrote up the results. SNS contributed to the writing of the study.

## Declarations

**Conflict of Interest** The authors declare no competing interests.

## References

- American Psychological Association Zero Tolerance Task Force. (2008). Are zero tolerance policies effective in the schools? An evidentiary review and recommendations. *The American Psychologist*, 63(9), 852–862. <https://doi.org/10.1037/0003-066x.63.9.852>
- American School Counselor Association (2019). *ASCA national model: A framework for school counseling programs* (4th edn.). Alexandria, VA: Author.
- Arrimada, M., Torrance, M., & Fidalgo, R. (2022). Response to intervention in first-grade writing instruction: A large-scale feasibility study. *Reading and Writing: An Interdisciplinary Journal*, 35(4), 943–969.
- Balu, R., Zhu, P., Doolittle, F., Schiller, E., Jenkins, J., & Gersten, R. (2015). *Evaluation of response to intervention practices for elementary school reading (NCEE 2016–4000)*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Bradshaw, C. P., Mitchell, M. M., & Leaf, P. J. (2010). Examining the effects of schoolwide positive behavioral interventions and supports on student outcomes: Results from a randomized controlled effectiveness trial in elementary schools. *Journal of Positive Behavior Interventions*, 12(3), 133–148. <https://doi.org/10.1177/1098300709334798>
- Brown, C. H. (2020). School counselors' response to school shootings: Framework of recommendations. *Journal of Educational Research and Practice*, 10(1), 18. <https://doi.org/10.5590/jerap.2020.10.1.18>
- Cabral, M., Kim, B., Rossin-Slater, M., Schnell, M., & Schwandt, H. (2021). *Trauma at school: The impacts of shootings on students' human capital and economic outcomes*. A working paper from the National Bureau of Economic Research. Retrieved June 21, 2022, from <https://www.nber.org/papers/w28311>
- Chan, P., Katsiyannis, A., & Yell, M. (2021). Handcuffed in school: Legal and practice considerations. *Advances in Neurodevelopmental Disorders*, 5(3), 339–350.
- Child Development Institute. (n.d.). How to talk to kids about violence. Retrieved July 22, 2022, from <https://childdevelopmentinfo.com/how-to-be-a-parent/communication/talk-to-kids-violence/>
- Cholewa, B., Hull, M. F., Babcock, C. R., & Smith, A. D. (2018). Predictors and academic outcomes associated with in-school suspension. *School Psychology Quarterly*, 33(2), 191–199. <https://doi.org/10.1037/spq0000213>
- Cochrane, E. (2022). *Congress passes bipartisan gun legislation, clearing it for Biden*. The New York Times. Retrieved July 27, 2022 from <https://www.nytimes.com/2022/06/24/us/politics/gun-control-bill-congress.html>
- Elrod, B. G., Rice, K. G., Bradshaw, C. P., Mitchell, M. M., & Leaf, P. J. (2010). Examining the effects of schoolwide positive behavioral interventions and supports on student outcomes: Results from a randomized controlled effectiveness trial in elementary schools. *Journal of Positive Behavior Interventions*, 12(3), 133–148. <https://doi.org/10.1177/1098300709334798>
- Elrod, B. G., Rice, K. G., & Meyers, J. (2022). PBIS fidelity, school climate, and student discipline: A longitudinal study of secondary schools. *Psychology in the Schools*, 59(2), 376–397. <https://doi.org/10.1002/pits.22614>
- Everytown Research & Policy. (2021a). Keeping our schools safe: A plan for preventing mass shootings and ending all gun violence in American schools. Retrieved July 17, 2022, from <https://everytownresearch.org/report/preventing-gun-violence-in-american-schools/>
- Everytown Research & Policy. (2021b). *The impact of gun violence on children and teens*. Retrieved, June 21, 2022, from <https://everytownresearch.org/report/the-impact-of-gun-violence-on-children-and-teens/>
- Everytown Research & Policy. (2022a). *Gun law rankings*. Retrieved July 19, 2022, from <https://everytownresearch.org/rankings/>
- Everytown Research & Policy. (2022b). *Gunfire on school grounds in the United States*. Retrieved July 19, 2022, from <https://everytownresearch.org/maps/gunfire-on-school-grounds/>
- Finkelhor, D., Turner, H. A., Shattuck, A. M., & Hamby, S. L. (2013). Violence, crime, and abuse exposure in a national sample of children and youth: An update. *JAMA Pediatrics*, 167(7), 614–621.
- Flannery, D. J., Fox, J. A., Wallace, L., Mulvey, E., & Modzeleski, W. (2021). Guns, school shooters, and school safety: What we know and directions for change. *School Psychology Review*, 50(2-3), 237–253.
- Gage, N. A., Lee, A., Grasley-Boy, N., & Peshak, G. H. (2018a). The impact of school-wide positive behavior interventions and supports on school suspensions: A statewide quasi-experimental analysis. *Journal of Positive Behavior Interventions*, 20(4), 217–226. <https://doi.org/10.1177/1098300718768204>
- Gage, N. A., Rapa, L. J., Whitford, D. K., & Katsiyannis, A. (Eds.) (in press). *Disproportionality and social justice in education*. Springer
- Gage, N., Whitford, D. K., & Katsiyannis, A. (2018b). A review of schoolwide positive behavior interventions and supports as a framework for reducing disciplinary exclusions. *The Journal of*

- Special Education*, 52, 142–151. <https://doi.org/10.1177/0022466918767847>
- Gun Violence Archive. (2022a). Gun violence archives 2021. Retrieved June 23, 2022, from <https://www.gunviolencearchive.org/past-tolls>
- Gun Violence Archive. (2022b). Charts and maps. Retrieved June 23, 2022, from <https://www.gunviolencearchive.org/>
- Horner, R. H., Sugai, G., & Anderson, C. M. (2010). Examining the evidence base for schoolwide positive behavior support. *Focus on Exceptional Children*, 42(8), 1–14. <https://doi.org/10.17161/fec.v42i18.6906>
- Interdisciplinary Group on Preventing School and Community Violence. (2022). *Call for action to prevent gun violence in the United States of America*. Retrieved July 15, 2022, from <https://www.dropbox.com/s/006naaah5be23qk/2022%20Call%20To%20Action%20Press%20Release%20and%20Statement%20COMBINED%205-27-22.pdf?dl=0>
- Irwin, V., Wang, K., Cui, J., & Thompson, A. (2022). *Report on indicators of school crime and safety: 2021* (NCES 2022–092/NCJ 304625). National Center for Education Statistics, U.S. Department of Education, and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice. Washington, DC. Retrieved July 21, 2022 from <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2022092>
- Jetelina, K. (2022). Firearms: What you can do right now. Retrieved July 15, 2022, from <https://yourlocalepidemiologist.substack.com/p/firearms-what-you-can-do-right-now>
- Katsiyannis, A., Whitford, D., & Ennis, R. (2018a). Historical examination of United States school mass shootings in the 20<sup>th</sup> and 21<sup>st</sup> centuries: Implications for students, schools, and society. *Journal of Child and Family Studies*, 27, 2562–2573.
- Katsiyannis, A., Whitford, D., & Ennis, R. (2018b). Firearm violence across the lifespan: Relevance and theoretical impact on child and adolescent educational prospects. *Journal of Child and Family Studies*, 27, 1748–1762.
- Kellermann, A. L., & Rivara, F. P. (2013). Silencing the science on gun research. *Journal of the American Medical Association*, 309(6), 549–550.
- Lemieux, F. (2014). Effect of gun culture and firearm laws on firearm violence and mass shootings in the United States: A multi-level quantitative analysis. *International Journal of Criminal Justice Sciences*, 9(1), 74–93.
- Lewis, T., Jones, S., Horner, R., & Sugai, G. (2010). School-wide positive behavior support and students with emotional/behavioral disorders: Implications for prevention, identification and intervention. *Exceptionality*, 18, 82–93. <https://doi.org/10.1080/09362831003673168>
- Livingston, M. D., Rossheim, M. E., & Stidham-Hall, K. (2019). A descriptive analysis of school and school shooter characteristics and the severity of school shootings in the United States, 1999–2018. *Journal of Adolescent Health*, 64(6), 797–799.
- Losinski, M., Katsiyannis, A., Ryan, J., & Baughan, C. (2014). Weapons in schools and zero-tolerance policies. *NASSP Bulletin*, 98(2), 126–141. <https://doi.org/10.1177/0192636514528747>
- Lowe, S. R., & Galea, S. (2017). The mental health consequences of mass shootings. *Trauma, Violence, & Abuse*, 18(1), 62–82. <https://doi.org/10.1177/1524838015591572>
- National Association of School Psychologists. (n.d.). *About PRE-PARE*. Retrieved July 22, 2022, from <https://www.nasponline.org/professional-development/prepare-training-curriculum/aboutprepare#:~:text=Specifically%2C%20the%20PRE%20PARE,E%2%80%94Evaluate%20psychological%20trauma%20risk>
- National Association of School Psychologists. (2015). *Responding to school violence: Tips for administrators*. Retrieved July 22, 2022, from [https://www.nasponline.org/resources-and-podcasts/school-safety-and-crisis/school-violence-resources/school-violence-prevention/responding-to-school-violence-tips-for-administrators](https://www.nasponline.org/resources-and-publications/resources-and-podcasts/school-safety-and-crisis/school-violence-resources/school-violence-prevention/responding-to-school-violence-tips-for-administrators)
- National Association of School Psychologists. (2016). *Talking to children about violence: Tips for parents and teachers*. Retrieved July 22, 2022, from <https://www.nasponline.org/resources-and-publications/resources-and-podcasts/school-safety-and-crisis/school-violence-resources/talking-to-children-about-violence-tips-for-parents-and-teachers>
- National Association of School Psychologists & National Association of School Resource Officers (2021). *Best practice considerations for armed assailant drills in schools*. Bethesda, MD: Author. Retrieved July 22, 2022, from <https://www.nasponline.org/resources-and-publications/resources-and-podcasts/school-safety-and-crisis/systems-level-prevention/best-practice-considerations-for-armed-assailant-drills-in-schools>
- National Center for Learning Disabilities. (n.d.). *What is RTI?* Retrieved July 21, 2022 from <http://www.rtinetwork.org/learn/what/whatisrti>
- New York State Rifle & Pistol Assn., Inc. v. Bruen, 20–843. (United States Supreme Court, 2021). Retrieved July 27, 2022, from [https://www.supremecourt.gov/opinions/21pdf/20-843\\_7j80.pdf](https://www.supremecourt.gov/opinions/21pdf/20-843_7j80.pdf)
- Noltmeyer, A., Palmer, K., James, A. G., & Wiechman, S. (2019). School-wide positive behavioral interventions and supports (SWPBIS): A synthesis of existing research. *International Journal of School & Educational Psychology*, 7, 253–262. <https://doi.org/10.1080/21683603.2018.1425169>
- Pew Research Center. (2022). What the data says about gun deaths in the U.S. Retrieved June 21, 2022 from <https://www.pewresearch.org/fact-tank/2022/02/03/what-the-data-says-about-gun-deaths-in-the-u-s/>
- Puzzanchera, C. (2021). *Juvenile arrests, 2019*. U.S. Department of Justice Office of Justice Programs. Juvenile Justice Statistics National Report Series Bulletin. Retrieved July 27, 2022, from <https://ojjdp.ojp.gov/publications/juvenile-arrests-2019.pdf>
- Roubin, R. (2022). *Now the government is funding gun violence research, but it's years behind*. The Washington Post. Retrieved July 17, 2022 from <https://www.washingtonpost.com/politics/2022/05/26/now-government-is-funding-gun-violence-research-it-years-behind/>
- Rowhani-Rahbar, A., & Moe, C. (2019). School shootings in the U.S.: What is the state of evidence? *Journal of Adolescent Health*, 64(6), 683–684.
- Rumberger, R. W., & Losen, D. J. (2017). *The hidden costs of California's harsh school discipline: And the localized economic benefits from suspending fewer high school students*. California Dropout Research Project: The Civil Rights Project. Retrieved July 27, 2022, from <https://www.civilrightsproject.ucla.edu/resources/projects/center-for-civil-rights-remedies/school-to-prison-folder/summary-reports/the-hidden-cost-of-californias-harsh-discipline/CostofSuspensionReportFinal-corrected-030917.pdf>
- Sandoval, E. (2022). *Inside a Uvalde classroom: A taunting gunman and 78 minutes of terror*. The New York Times. Retrieved July 27, 2022, from <https://www.nytimes.com/2022/07/10/us/ualde-injured-teacher-reyes.html>
- Santiago-Rosario, M. R., McIntosh, K., & Payno-Simmons, R. (2022). *Centering equity within the PBIS framework: Overview and evidence of effectiveness*. Center on PBIS, University of Oregon. Retrieved July 27, 2022 from [www.pbis.org](http://www.pbis.org)
- Schonfeld, D. J., & Demaria, T. (2020). Supporting children after school shootings. *Pediatric Clinics*, 67(2), 397–411. <https://doi.org/10.1016/j.pcl.2019.12.006>
- Skiba, R. J., Arredondo, M. L., & Williams, N. T. (2014). More than a metaphor: The contribution of exclusionary discipline to a school-to-prison pipeline. *Equity & Excellence in Education*, 47(4), 546–564. <https://doi.org/10.1080/10665684.2014.958965>

- Siegel, L. S. (2020). Early identification and intervention to prevent reading failure: A response to Intervention (RTI) initiative. *Educational and Developmental Psychologist*, 37(2), 140–146.
- The Center for Public Integrity. (2021). *When schools call police on kids*. Retrieved June 21, 2022 from <https://publicintegrity.org/education/criminalizing-kids/police-in-schools-disparities/>
- Towers, S., Gomez-Lievano, A., Khan, M., Mubayi, A., & Castillo-Chavez, C. (2015). Contagion in mass killings and school shootings. *PLoS One*, 10(7), e0117259. <https://doi.org/10.1371/journal.pone.0117259>
- U. S. Department of Education. (2021). *An overview of exclusionary discipline practices in public schools for the 2017–18 school year*. Civil Rights Data Collection. Retrieved June 21, 2022, from <https://ocrdata.ed.gov/estimations/2017-2018>
- U.S. Department of Education, Office of Civil Rights. (2020). 2017–18 civil rights data collection: The use of restraint and seclusion in children with disabilities in K-12 schools. Retrieved July 27, 2022 from <https://www2.ed.gov/about/offices/list/ocr/docs/restraint-and-seclusion.pdf>
- U.S. General Accountability Office (2018). *K-12 education: Discipline disparities for Black students, boys, and students with disabilities* (GAO-18–258). Washington, DC: Author. Retrieved July 27, 2022, from <https://www.gao.gov/products/GAO-18-258>
- Wan, W. (2019). *Congressional deal could fund gun violence research for first time since 1990s*. The Washington Post. Retrieved July 17, 2022 from <https://www.washingtonpost.com/health/2019/12/16/congressional-deal-could-fund-gun-violence-research-first-time-since-s/>
- Wang, K., Chen, Y., Zhang, J., & Oudekerk, B. A. (2020). *Indicators of school crime and safety: 2019* (NCES 2020–063/NCJ 254485). National Center for Education Statistics, U.S. Department of Education, and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice. Retrieved July 27, 2022, from <https://nces.ed.gov/pubs2020/2020063-temp.pdf>
- Washington Post. (2022). The Washington Post's database of school shootings. Retrieved June 21, 2022 from <https://www.washingtonpost.com/graphics/2018/local/school-shootings-database/>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.