Mass Trauma and School Shootings: A Review of the Literature

Andrew McCartney

University of Virginia

May 8, 2018

Though it was not the first of its kind, the shooting at Columbine High School in 1999 marked a watershed moment for American K-12 education. School shootings have been a persistent feature of American public education since then; such events captivate the national media and public discourse, even more than other venues of mass-shootings and especially if the shooter is male, ideologically motivated, or a racial minority (Silva & Capellan, 2018). Much research and public discussion has focused on the theoretical causes of such incidents, with variable focuses on individual qualities such as mental health or access to guns, community contexts such as bullying or inequality, and cultural contexts such as toxic masculinity, the media, or political contexts (Muschert, 2007). The main line of research and discourse has operated on the assumption that identifying the causes of such incidents can allow schools and policymakers to reduce their frequency.

Occasioned by the 19th anniversary of the shooting in Littleton, Colorado, the Washington Post published a dataset of every school shooting in the intervening two decades[[1]](#footnote-1). The data suggest that rather than being an increasing trend, as perhaps portrayed in the media and argued by some researchers (Cohen, Azrael, & Miller 2014), these data show that the frequency of such shootings has remained roughly constant, with about 11 (plus or minus 3) such incidents per year (see Figure 1). Neither have any prevention efforts made a reduction in the frequency of mass shootings: in fact, at the time of writing of this literature review, there have already been 13 such incidents, indicating that 2018 may be an outlier year for the phenomenon. School shootings are a consistent fact of life in American PK-12 education which must be considered on those terms. Unless and until they can effectively be reduced in number and severity, policy must be created around how schools and communities can react to them to mitigate their effects.

The data suggest that such shootings happen at all grade levels, with elementary schools represented (e.g. Buell Elementary School in 2000, when a six-year-old targeted and killed an individual at his school with a handgun) as well as shootings in post-secondary education such as the Virginia Tech incident in April, 2007. The greatest number of these incidents are coded as *targeted* *killings* of other individuals within the school; however, the greatest number of casualties come from incidents coded as *indiscriminate* *killings* with no apparent targets other than the school community itself (See Figure 2). As such, these school shootings can be considered to be a kind of *collective* or community trauma, impacting more than just those students who are physically victimized but also myriad school and community members who will experience varying levels of post-traumatic stress and psychological and mental health needs as a result of the incident. Nurmi, Räsänen, and Oksanen (2012) describes this kind of trauma as being created by a disaster that damages the bonds of the community, where the community itself is the victim. Mass shootings at schools are thus unique in two important ways: first, the target and by extension the victim is the community itself, and secondly, these incidents are an *acute* trauma rather than a *chronic* trauma. There is a large body of literature (e.g. Sharkey et al., 2014) on schooling in communities where violence is a quotidian problem, but mass shootings are a phenomenon with unique causes and effects, and policies must be considered which address them specifically.

It is on these terms that this paper will review the literature: it will engage with some literature on trauma and schooling in general but will focus on incidents of mass trauma with an emphasis on violence in and around schools. How much is known about the extent of psychological trauma experienced by those who survive incidents of school violence or crisis, and what programs and policies have been studied which attempt to lessen the impact of such events? Moreover, how do school districts attempt to resume normal operations of schooling and community functioning in the wake of such incidents?

What are the effects of violent trauma?

It is well-known that exposure to violence has numerous impacts on children’s wellbeing, both for their mental health and for their functioning within schools (Saltzman, 2001). Students who have been exposed to violence of any kind are more likely to exhibit behavioral and emotional difficulty such as oppositional behaviors or aggression (Ayer et al., 2017) and the effects of such violence tend to be more pronounced for groups who are already at risk: Males, African Americans, high school students, lower income students, and urban students are all at a greater than average risk for exposure to violence of any kind (Bowen & Bowen, 1999) and it has been shown that low-income students, racial minorities, or those with extant emotional and behavioral difficulties (Ayer et al., 2017, Sharkey et al., 2014) are more severely impacted by exposure to violence than other groups. However, in general, Bonanno (2005) notes that the most common response to trauma is in fact resilience; the kind of disruption in functioning characterized by much of the research, they report, represents at most about 40% of the population of trauma suffers.

For schooling, the effects of exposure to violence go beyond conduct and behavior. For example, Jaycox et al. (2006) note that students who have been exposed to violence have been associated with decreased IQ and reading ability (Delaney-Black et al., 2002) and lower GPAs (Hurt et al., 2002), as well as more frequent absences and decreased likelihood of graduation (Beers and DeBellis, 2002; Grogger, 1997). Students can be exposed to violence in the home, but even unrelated violence in a students’ neighborhood can decrease test scores or likelihood of passing (Sharkey et al., 2014). Exposure to violence in the form of war and civil conflict has even larger impacts on students’ access, attainment, and achievement (Burde & Linden 2013; Dabalen & Paul 2012; Shemyakina, 2011; Swee, 2015).

Unsurprisingly, mass shootings have been found to impact students’ mental health, attention, and ultimately school achievement. Strøm et al. (2016) details these effects in a study of students who were present at a shooting at a summer camp in Norway. While not strictly a school shooting case, the conditions were similar in that a large group of adolescents were victims of a mass shooting at a youth-organizing event from which escape was difficult. These students’ grades dropped in the year following the attack but had begun to recover by the second year. Additionally, they were more likely to be absent from school following the event. Dyb et al., (2014a) interviewed the same population of victims and found that the prevalence of PTS-levels were six times higher among these adolescents than in the general population. They also found that gender, ethnic minority status, level of exposure, peritraumatic reactions, interpersonal loss, and current pain were all significantly associated with PTS symptomology[[2]](#footnote-2) for survivors of the shooting.

Suomalainen et al. (2010) found that large proportions of a student population—roughly half—exhibited symptoms of PTS four months after one of two recent school shootings in Finland in which students targeted and killed peers before committing suicide. Specifically, survival of mass shootings seems to engage two particular PTS symptoms—re-experiencing of the event, and hyperarousal symptoms (Haravuori et al., 2016). These symptoms include distressing recollections, dreams, physical and psychological reactivity, difficulty sleeping, irritability, difficulty concentrating, hypervigilance, and exaggerated startle response. Lowe and Galea (2017) note that research has linked these symptoms not just to risk factors associated with demographics and exposure, but also with individual and personality factors, such as beliefs about violence, beliefs about punishment, and coping styles and processing.

Nurmi, Räsänen, and Oksanen (2012) used surveys and interviews to investigate community-level effects after one of these shootings. While the trauma did enhance feelings of solidarity with the community, students reported that their experiences with community *outsiders* were harmed. For example, one participant indicated that she believed that fewer students would seek to go on to the next level of schooling, which would require them to go to a nearby town, as she felt that her peers would wish to avoid exposure to students who may inquire about their experiences with the shooting. This finding is important, as it is known that processing and discussing traumatic events can be helpful; however, it appears to be important that such processing occurs within a community rather than with outsiders.

The effect of such incidents of violence in schools is not limited to mental health factors, but behavioral and academic ones as well. Liao et al. (2015) fit a two-piece growth-curve model to student disruptive behaviors and found that there was an increase in such behaviors in the time following a school shooting in their data set. Scrimin et al. (2009) found that students exposed to terrorist acts in school had decreased scores on attention, memory, and visual-spatial performance and that degree of exposure to violence, including traumatic loss, were associated with stronger effects on memory. There seem to be clear connections to PTS symptoms, particularly hyperarousal, wherein students experience difficulty sleeping and concentrating, which would seem to impair students’ ability to concentrate and attend to schoolwork.

Students who are exposed to mass school shootings are at increased risk for lower attendance in the wake of such incidents, which has obvious implications for attainment and achievement. As noted above, Nurmi, Räsänen, and Oksanen (2012) note that their participants avoided individuals from other communities as a method for avoiding discussing the incident, and thereby sought to avoid additional schooling, which might put them at risk of such conversations. Brener et al. (2002) found that students at Columbine high school reported occasionally being too fearful to attend school in the wake of the tragedy, an effect which was greatest for rural students.

To summarize, students who are exposed to mass school shootings are at increased risk for PTS symptoms; this increase is associated with gender, racial minority status, and most importantly with degree of exposure (Lowe & Galea, 2017; Smith et al., 2017). These are roughly consistent with prior research on what we might call quotidian community violence, though notably, Bowen & Bowen (1999) found that boys were at greater risk for psychological distress from this kind of violence. Lowe and Galea (2017) propose that the gender effect may result from a more “ruminative coping style” among women who are exposed to mass shootings.

The effects of such incidents are not limited solely to students who are injured or exposed to violence. As communities seem to be the target of mass shootings, communities also seem to suffer from them together. Hobfoll et al. (2007) theorize that mass trauma operates on communities through the primary infliction of injury and destruction, and through secondary elements such as the grotesque scenes witnessed by the community, the symbolic implications of certain scenarios, or the personal relevance of the trauma for how individuals may be impacted in the future. They further note that one key element of community trauma is that by its nature it impacts places where the community will have a resultant difficulty in supporting recovery due to depleted psychosocial (and economic) resources (Hobfoll et al., 2007).

After the Utøya shootings in Norway, researchers found that community residents beyond those in the immediate vicinity of the shootings (there was also a related bombing in Oslo) showed increased post-traumatic stress reactions, particularly among ethnic minorities (Thoresen et al., 2012). For most Norwegians, these effects were relatively short lived. For some, however, post-traumatic stress reactions lingered several months after the event. These effects underline the *community* aspect of the trauma and the importance for community-level interventions, as needed.

As sociology professors in the wake of the Virginia Tech shooting in 2007, Ryan and Hawdon (2008) provide an insider’s perspective on the process of framing an incident as a community tragedy beyond an individual tragedy. This message, they write, was inculcated quickly through media and university spokespersons, and was reinforced through ritualized event such as candlelight vigils and recitations that further reinforced the oneness of the community. Though a critical lens might question some of the narrative given around the causes of such incidents, they report that the process of framing the tragedy at a community-level allowed for students and other community members to fall back on social networks and use community ties to grieve and process. In this way, they write, tragedies can strengthen as well as damage communities. Similar observations were made in the wake of 9/11 and appear to be an important feature of community trauma. They observe that for communities to come together in this way, it must be the case that the community itself is perceived as an attack (rather than constituent members. They note that “when Henry Smith dies, we do not proclaim that, ‘Today, we are all Smiths’” (Ryan & Hawdon, 2008, p. 48).

As much as communities suffer in unison, the community aspect of mass trauma may be an inborn resilience factor, as well. Many studies in this review have noted that part of the process of recovery from community trauma is discussion with ingroup members (Lowe & Galea, 2017; Nurmi, Räsänen, & Oksanen, 2012; Ryan & Hawdon, 2008). This process has two important caveats: first, individuals with lower social capital are therefore more at risk in the aftermath of a community trauma (Lowe & Galea, 2017). Secondly, Nurmi, Räsänen, and Oksanen (2012) indicate that processing with peers was not as effective for students in the wake of a shooting as processing with teachers and parents; nevertheless, they note, this was the main source for students to begin the work of coping with the tragedy.

Interventions for individual and community level trauma

In a review of theories of intervention on responding to mass trauma, Hobfoll et al. (2007) note: “The heterogeneity of traumatic events and their aftermath defies any specific guidelines, and there is a need for flexibility of interventions and adaptations to specific circumstances” (p. 284). It may be truly impossible to categorically state best practices for intervention in cases of mass trauma and violence in schools; however, some research has been done on group-level interventions for traumatized children and adolescents, and the results of these studies indicate some possible directions for interventions while acknowledging that each case will have its own eccentricities.

Several specific programs for students who suffer post-traumatic stress symptomology resulting from violence or disaster have undergone trials, though the logistics of conducting such trials are nontrivial (Grolnik, et al., 2018). Stein et al. (2003) claim to have conducted the first Randomized Controlled Trial of mental health interventions for school aged children exposed to violence. They found that over the course of 10 sessions of Cognitive Behavioral Therapy, students in the treatment group had lower scores for PTS, depression, and dysfunction; however, problem behaviors, anxiousness, and learning were unaffected.

Beyond CBT, more formalized programs have been developed and subsequently tested. Ultimately, these programs are mostly based on CBT style group models (Nadeem et al., 2011), where individual processing takes a backseat to psychoeducation and a mental health strategies curriculum. One large and well-developed such curriculum is the Support for Students Exposed to Trauma (SSET) program (Jaycox, Langley, & Dean, 2009). This program was found to have only small-to-inconclusive effects on trauma symptoms, though program attendees reported high satisfaction with the curriculum (Jaycox et al., 2009).

Salloum and Overstreet (2012) test the Grief and Trauma Intervention for children after disaster (not necessarily violence) and find that treatment was associated with large decreases in distress-related symptoms (Cohen’s d above 1.5) and smaller, but significant, effects for improved social support (d approximately 0.50). This finding of increased sense of social support will be important for school shooting related traumas, which are not individualized but impact entire communities.

Hickman et al. (2013) provide a small meta-analysis of nine RCTs for a program for children exposed to violence (National Safe Start Promising Approaches for Children Exposed to Violence). They found that there was no measurable impact for Intent-to-Treat (ITT) models, but that Treatment-On-Treated (TOT) models had improvements in cooperation and assertion. A related team of researchers, Cross et al. (2013) report predictors for study retention which indicate that if children were exposed to less trauma relative to their peers or if parents perceived their children were in a control group, retention was significantly decreased—this result makes perfect sense, as parents and students are likely to seek out therapy if and when they need it. This result also may explain why ITT effects are hard to determine or are small for studies of programs for students with PTS.

Langley et al. (2015) report on a trauma program called *Bounce Back*, which operates similarly to CBT-based programs: 10 sessions of psychoeducation along with small amounts of individual and family therapy. They find that students reported improvements related to PTS, anxiety, and depression. Another such approach (Jensen, Holt, & Ormhaug, 2017) tested TF-CBT (Trauma Focused CBT) and discovered that it produced a more efficient treatment effect (i.e., more rapid improvement) than treatment-as-usual therapy and, importantly, these effects persisted at 18-month follow-up.

Each of these interventions involved structured programming interventions led by mental health professionals. An additional kind of intervention, known as psychological first aid, can be implemented by any trained professional in a child’s life, including classroom teachers. To date, no RCT has been conducted on such approaches (Grolnik et al., 2018); however, a pilot study of a program known as Listen, Protect, Connect using quasi-experimental analysis found reduced symptoms on a small sample (Ramirez et al., 2013). This is a potential area for future research, though obviously first aid interventions cannot be *planned*. Careful methodologies will need to be developed in order to determine rigorous impact estimates of such programs.

One final caveat for interpreting RCTs in mental health research is that all symptoms are likely to be reduced over time for multiple causes. For individuals, spontaneous remission and reversion to the mean are not uncommon, and so individual ratings of mental health scales may revert to less severity over time even in control conditions. However, for treatment participants, it is not always possible to attribute improvement to the aspects of the treatment as delivered, as mere expectation of improvement, demand characteristics, feelings of support, therapist-client alliance, and effort justification all come into play in reducing ratings of psychological distress (Beyerstein, 1997; Gaudiano & Herbert, 2008).

The interventions reviewed so far are focused on healing students’ individual symptomology via group interventions. However, it is also necessary to focus on community-level healing, as well. At the community level, reactions to mass trauma in schools can be subdivided into three timeframes (Openshaw, 2013): (1) primary prevention strategies, (2) secondary interventions taken during a crisis, and (3) tertiary interventions that are post-crisis such as debriefings, short term counseling, and longer-term follow-up care. She further notes that parts (2) and (3) are more likely to be effective if prevention strategies include a plan for crisis—the “ounce of prevention” principle.

Hobfoll et al. (2007) reached out to a multitude of researchers and practitioners around the topic of mass trauma intervention and coded responses for themes, referring to them as *Five Essential Elements*. These five essential elements of intervention for mass trauma are (1) Sense of Safety, (2) Calming, (3) Sense of Self- and Community-Efficacy, (4) Connectedness, and (5) hope (Hobfoll et al., 2007). These themes emerge repeatedly in reports of community-level interventions and reactions to school shootings and mass trauma.

Crepeau-Hobson and Summers (2011) and Dishman, Lewis, and Pepper (2011) both report on the immediate school and administrative level reactions to a horrific school hostage event in Colorado that left a student dead and many more traumatized. A qualitative case study, Crepeau-Hobson and Summers (2011) report that individuals on the mental health response team were led into the classroom by law enforcement to see the site of the killings (in this case, a murder-suicide), which was reported as difficult and beneficial for mental health responders. This team led a response plan that crosses the line between secondary and tertiary, as students were brought to a shelter nearby that became a site for screening and healing. Their report underlines the need for long term interventions after “the numbness wear[s] off and real behaviors unravel” (Crepeau-Hobson & Summers, 2011, p. 290). They reported that the response plan required more top-down organization, e.g. in the form of evaluation and also in terms of organization of roles: they report ‘turf wars’ between outsider and insider mental health professionals as the community struggled to determine how to react to the incident. Dishman, Lewis, and Pepper (2011) describe other elements of the response to the incident: they describe the need for healing of staff members *before* the work of healing of students begins. However, students benefitted from a return to school-as-usual, with its attendant familiarity and security. Uniquely, this incident involved the use of a “PASS Program,” which invited community members, mostly parents, to act as additional sets of eyes around the school after the event. While the wisdom of bringing on additional unknown adults to the school after an unknown 53 year old man led a hostage situation may be questioned, it undoubtedly gave the community a way to connect and feel useful—it gave the community a way to come together for the process of healing.

Crepeau-Hobson et al. (2012) provide additional case studies of school shootings with further ‘lessons learned.’ After the shooting at Columbine High School, Colorado established a Crisis Response Team that was available in the immediate aftermath of later shootings. They reiterate that a “one size fits all” model is not efficacious and that the CRT must respond differently to each case. Learning from prior turf wars, the CRT has a model of “Incident Command Systems” which establish a single coordinator for mental health and a separate coordinator for public information.

They applied a “NOVA model” for community healing after the most recent shooting (Crepeau-Hobson et al., 2012), composed of three elements: “Safety and security, ventilation and validation, and prediction and preparation” (p. 214). Students and families must be made to feel safe in the aftermath, be allowed to vent and be validated, and then the community must prevent further incidents from happening in the future. Additional key components of their ‘lessons learned’ are that there must be careful reunification of families with students in a safe haven—a location in close proximity to the shooting but out of view of the media. Their recommendations include a debrief for mental health professionals, a transition into long-term follow up care, and some degree of monitoring and evaluation.

After reunification, what happens to the school itself? In general, schools typically close for some period of time to allow for crime scene documentation and for cleaning and renovation. Like many problems in dealing with shooting crises, this has drawbacks: the literature consistently notes that communities must come together and that students benefit from a return to normal, but time spent out of school prolongs this process. However, it provides time for teachers to debrief and prepare, as they are typically allowed to return to school before students (Crepeau-Hobson et al., 2012; Dishman, Lewis & Pepper, 2011). In the wake of its shooting, Virginia Tech had a policy of allowing students to leave the remainder of the school year (approximately 40% of their semester) with grades calculated based on work up to the event. No official data appear to be available, but professors estimate that student attendance in classes after the incident was normal, then quickly dropped to roughly 20-40% (Ryan & Hawdon, 2008).

As noted in the prior paragraph, one of the many surreal features of school shootings is the level of media attention they attract (Silva & Capellan, 2018). Haravuori et al. (2011) found that among students exposed to a school shooting, exposure to media interviewing, when regression adjusting for level of violence exposure, media consumption in general, and other background characteristics, accounted for variation in the level of PTS symptomology. Additionally, level of exposure was a significant covariate, indicating that this media effect was targeted; that is to say that the media seek out students with highest levels of exposure, precisely the ones who are most likely to be further traumatized by being interviewed by the media. Paine and Schools (2007) wrote that handling the media, whom they describe as intrusive, was an extraordinarily difficult task in the immediate aftermath of the trauma.

However, media can serve a dual role in community healing after an event. Turunen et al. (2014) describe a series of interventions at multiple levels over multiple time periods after a school shooting in Finland. Part of their long-term community healing involved media coverage that included psychoeducative and calming content, both in the immediate aftermath and at the one-year anniversary. This approach stands in contrast with American media coverage, which can often focus on political arguments about the proposed causes of such incidents. This narrative in the media about etiology of school shootings is not just politically charged but can be a deep part of the process of framing the event. For example, describing the shooting as an isolated event resulting from mental illness prevents victim-blaming, especially among the victims, but also constrains the public policy discussions that are available (Ryan and Hawdon, 2008). A consistent theme throughout this review is the importance of being able to process and debrief within and as a community after a community trauma (Hobfoll et al., 2007; Nurmi, Räsänen, & Oksanen, 2012). In the case of Virginia Tech, they may have reduced the ability of their students to return to normalcy and to process as a community.

Finally, long-term (tertiary) interventions typically involve a “screen and treat” model, in which children and adolescents exposed to community trauma are screened for symptomology; only those above a given threshold are directed toward treatment for trauma. Saltzman et al. (2001) opened this line of research for traumatized children by screening middle schoolers. They discovered that roughly 7% of their sample met criteria for PTS; they directed these students to a support group and found improvements in PTS symptomology and academic performance. Acosta et al. (2012) provide a review and analysis of measures for screening for violence induced trauma. These measures are intended for individual levels of violence exposure but seem readily extensible to community-level violence should responders decide to utilize them for a screening process.

After the Utøya incident, Norway conducted follow-up screenings with students who were exposed to violence in the shooting (Dyb et al., 2014b). Their report indicates that roughly three quarters of the students who were present received some form of follow up care in terms of mental health interventions and that this was concentrated among students with the highest levels of exposure. Such global screenings after school shootings will be an essential part of making sure that there are no ‘hidden students’ who may be suffering needlessly due to stigmata associated with mental health or the incident itself.

Policy Implications

At the outset of any mass school shooting incident, local policymakers and response teams from out of town are faced with decisions from the seemingly mundane to the monumental. Because of a small but increasing body of literature describing these cases (Crepeau-Hobson, 2012), best practices around these decisions are emerging.

The first priority is that students’ need for protection is not over once the shooting stops. Students should be protected from the media and, to the maximum extent possible, from individuals from out of town (excepting crisis response teams). A ‘safe haven’ should be established as close to the school site as practicable without re-traumatizing children and this can be a locus for mental health triage.

Schools should seek to return to normal operations as quickly as possible after removing visual traces of the incident. While it seems to have helped adults to process the event to witness the scene (Crepeau-Hobson and Summers, 2011), this is surely inappropriate for children. Nevertheless, Pine et al., (2015) indicate that in the case of *natural* disasters, adolescents benefited emotionally from understanding the circumstances of the disaster. This may be the case for school shootings as well: schools should consider establishing basic facts to dispel rumors and increase student emotional processing.

Following a resumption of classes, schools should offer psychoeducational programming as is found in the effective CBT-based interventions discussed above. A ‘screen-and-treat’ model is appropriate here, but evidence suggests that such a process might find that roughly half (Suomalainen et al., 2011) of students might be eligible under this model. Schools should prepare to provide a large and systematic program of interventions.

For communities, a key feature is that the community must be allowed to reframe the tragedy, as needed, as a community hurt that requires community healing. Vigils, memorials, and religious elements seem to be common (e.g. as in Ryan and Hawdon, 2008; Turunen et al. 2014). From a public mental health perspective, following the lead of Finland in providing psychoeducation about trauma through mass media (Turunen et al., 2014) seems both wise and high in return on investment.

The US Department of Education has a fund available, “Project School Emergency Response to Violence (SERV),” for the purpose of “short-term and long-term education-related services for local educational agencies (LEAs) and institutions of higher education (IHEs) to help them recover from a violent or traumatic event in which the learning environment has been disrupted” (US Department of Education, 2014). Funds ($50,000) can be granted for explicit purposes of restoring schools and students to prior levels of functioning, and they can be awarded to students, faculty, staff, and the immediate families thereof. However, data are not readily available online regarding monitoring and evaluation of the program. If it is not already doing so, Project SERV should partner with schools and districts to monitor and evaluate post-shooting interventions; the need for such activities is a recurring theme in much of the literature presented herein.

Problems with logistics were reported for some school shootings when outside mental health professionals and local counselors had unclear roles and expectations. Schools should have plans for an Incident Command System (Crepeau-Hobson et al., 2012) to provide clear instructions on which actors are responsible for which roles. Such a system could be established nationally through an examination of best practices, with individuals assigned roles by “cluster” as with UNOCHA (Scott, 2012).

Future Research

There is much that remains unknown about school shootings, their effects, and best practices in their wake. Grolnick et al. (2018) list a host of reasons for why scholarship in the wake of disasters is difficult, including practicalities such as problems with obtaining IRB approval and participant consent (a problem echoed by Lowe and Galea, 2017), difficulty of identifying survivors, the difficulty of implementing rigorous designs on short notice, and the problem of dealing with myriad stakeholders simultaneously. They estimate that preparing for research on crisis response could take around six months, which is already outside the time range for many post traumatic stress interventions. While school shootings are not yet predictable through modeling, it seems reasonable to suggest that little time will pass before the next large, indiscriminate mass shooting in a school. Therefore, the savvy researcher should have IRB documentation, study designs, and, if possible, grant money ready and waiting so that a project can spring into action shortly following the next such incident. Schools are asked to develop plans of action for such events; it seems reasonable that social scientists interested in the phenomenon should do the same.

Various future pathways of research are raised throughout this review. As noted above, no RCT to date has been conducted on psychological first aid programs, wherein teachers and other school staff are trained to act as mental health first responders in such incidents (Grolnik et al., 2018, Ramirez et al., 2013). Typically, RCTs in this field are conducted with a first wave receiving treatment and a second wave being randomized to delay treatment for a time, acting as a control group on standby. In the case of psychological first aid, refusing treatment for students for reasons of causal inference is clearly unethical. However, teachers may be trained in psychological first aid at random and the effects of such training can be indirectly studied under normal circumstances to gauge the efficacy of the treatment. Additionally, quasi-experimental approaches may allow for causal inference regarding the efficacy of this approach.

The ‘screen and treat’ model for finding students with PTS presumably requires that students who are selected for treatment score above a certain threshold on a mental health screening; this is precisely the kind of running variable with a cut-score that enables the use of regression discontinuity designs. The efficacy of the ‘treatment’ in a screen-and-treat approach following in the wake of a school shooting can thus be evaluated for marginal students near the cut score, allowing for an impact estimate essentially the same as an RCT.

We know that exposure to violence results in PTS symptoms and difficulty concentrating, as well as behavioral and academic problems in school for children. However, these latent factors are surely connected to one another, e.g. violence exposure may cause PTS, which in turn causes difficulty concentrating, which in turn causes achievement to drop. A path-analysis or structural equation model describing these relationships would be beneficial for understanding the basic relationships at work and may yield dividends in understanding where to focus efforts for intervention in the future.

Finally, much of the research indicates a need for continued monitoring and evaluation of programs, yet no set of consistent standards has been established for such activities. Researchers and practitioners should convene to establish a tentative list of best practices—knowing that the appropriate response is heavily context dependent—that can be used to track and evaluate schools as they attempt to recover from community traumas.

References

Acosta, J., Barnes-Proby, D., Harris, R., Francois, T., Hickman, L. J., Jaycox, L. H., & Schultz, D. (2012). An examination of measures related to children’s exposure to violence for use by both practitioners and researchers. *Trauma, Violence, & Abuse*, *13*(4), 187-197.

Ayer, L., Setodji, C., Schultz, D., Jaycox, L. H., & Kofner, A. (2017). Change in externalizing problems over time among ethnic minority youth exposed to violence. *Children and Youth Services Review*, *82*, 19-26.

Beers, S. R., & De Bellis, M. D. (2002). Neuropsychological function in children with maltreatment-related posttraumatic stress disorder. *American Journal of Psychiatry*, *159*(3), 483-486.

Beyerstein, B. L. (1997). Why bogus therapies seem to work. *Skeptical Inquirer*, *21*, 29-34.

Bonanno, G. A. (2005). Resilience in the face of potential trauma. *Current directions in psychological science*, *14*(3), 135-138.

Bowen, N. K., & Bowen, G. L. (1999). Effects of crime and violence in neighborhoods and schools on the school behavior and performance of adolescents. *Journal of Adolescent Research*, *14*(3), 319-342.

Brener, N. D., Simon, T. R., Anderson, M., Barrios, L. C., & Small, M. L. (2002). Effect of the incident at Columbine on students’ violence-and suicide-related behaviors. *American journal of preventive medicine*, *22*(3), 146-150.

Burde, D., & Linden, L. L. (2013). Bringing education to Afghan girls: A randomized controlled trial of village-based schools. *American Economic Journal: Applied Economics, 5(*3), 27-40.

Cohen, A. P., Azrael, D., & Miller, M. (2014). Rate of mass shootings has tripled since 2011, Harvard research shows. *Mother Jones*, *15*, 14.

Cross, A. B., Jaycox, L. H., Hickman, L. J., Schultz, D., Barnes‐Proby, D., Kofner, A., & Setodji, C. (2013). Predictors of study retention from a multisite study of interventions for children and families exposed to violence. *Journal of Community Psychology*, *41*(6), 743-757.

Dabalen, A., & Paul, S. (2012). Estimating the causal effects of conflict on education in Côte d'Ivoire. Retrieved from http://documents.worldbank.org/curated/en/61471146 8244189279/pdf/WPS6077.pdf

Delaney-Black, V., Covington, C., Ondersma, S. J., Nordstrom-Klee, B., Templin, T., Ager, J., ... & Sokol, R. J. (2002). Violence exposure, trauma, and IQ and/or reading deficits among urban children. *Archives of pediatrics & adolescent medicine, 156*(3), 280-285.

Dyb, G., Jensen, T. K., Nygaard, E., Ekeberg, Ø., Diseth, T. H., Wentzel-Larsen, T., & Thoresen, S. (2014a). Post-traumatic stress reactions in survivors of the 2011 massacre on Utøya Island, Norway. *The British Journal of Psychiatry*, *204*(5), 361-367.

Dyb, G., Jensen, T., Glad, K. A., Nygaard, E., & Thoresen, S. (2014b). Early outreach to survivors of the shootings in Norway on the 22nd of July 2011. *European journal of psychotraumatology*, *5*(1), 23523.

Gaudiano, B. A., & Herbert, J. D. (2000). Can we really tap our problems away? A critical analysis of thought field therapy. *Skeptical Inquirer*, *24*(4), 29-33.

Grolnick, W. S., Schonfeld, D. J., Schreiber, M., Cohen, J., Cole, V., Jaycox, L., ... & Wong, M. (2018). Improving adjustment and resilience in children following a disaster: Addressing research challenges. *American Psychologist*.

Haravuori, H., Kiviruusu, O., Suomalainen, L., & Marttunen, M. (2016). An evaluation of ICD-11 posttraumatic stress disorder criteria in two samples of adolescents and young adults exposed to mass shootings: Factor analysis and comparisons to ICD-10 and DSM-IV. *BMC psychiatry*, *16*(1), 140.

Haravuori, H., Suomalainen, L., Berg, N., Kiviruusu, O., & Marttunen, M. (2011). Effects of media exposure on adolescents traumatized in a school shooting. *Journal of traumatic stress*, *24*(1), 70-77.

Hickman, L. J., Setodji, C. M., Jaycox, L. H., Kofner, A., Schultz, D., Barnes-Proby, D., & Harris, R. (2013). Assessing programs designed to improve outcomes for children exposed to violence: Results from nine randomized controlled trials. *Journal of experimental criminology*, *9*(3), 301-331.

Hurt, H., Malmud, E., Brodsky, N. L., & Giannetta, J. (2001). Exposure to violence: Psychological and academic correlates in child witnesses. *Archives of pediatrics & adolescent medicine*, *155*(12), 1351-1356.

Jaycox, L. H., Langley, A. K., & Dean, K. L. (2009). *Support for Students Exposed to Trauma: The SSET Program*. RAND Corporation. PO Box 2138, Santa Monica, CA 90407-2138.

Jaycox, L. H., Langley, A., Dean, K. L., Stein, B. D., Wong, M., Sharma, P., ... & Kataoka, S. H. (2009). Making it easier for school staff to help traumatized students.

Jensen, T. K., Holt, T., & Ormhaug, S. M. (2017). A follow-up study from a multisite, randomized controlled trial for traumatized children receiving TF-CBT. *Journal of abnormal child psychology*, *45*(8), 1587-1597.

Langley, A. K., Gonzalez, A., Sugar, C. A., Solis, D., & Jaycox, L. (2015). Bounce back: Effectiveness of an elementary school-based intervention for multicultural children exposed to traumatic events. *Journal of consulting and clinical psychology*, *83*(5), 853.

Liao, Y., Shonkoff, E. T., Barnett, E., Wen, C. F., Miller, K. A., & Eddy, J. M. (2015). Brief report: Examining children's disruptive behavior in the wake of trauma–A two-piece growth curve model before and after a school shooting. *Journal of adolescence*, *44*, 219-223.

Lowe, S. R., & Galea, S. (2017). The mental health consequences of mass shootings. *Trauma, Violence, & Abuse*, *18*(1), 62-82.

Muschert, G. W. (2007). Research in school shootings. *Sociology Compass*, *1*(1), 60-80.

Nadeem, E., Jaycox, L. H., Kataoka, S. H., Langley, A. K., & Stein, B. D. (2011). Going to scale: Experiences implementing a school-based trauma intervention. *School psychology review*, *40*(4), 549.

Nurmi, J., Räsänen, P., & Oksanen, A. (2012). The norm of solidarity: Experiencing negative aspects of community life after a school shooting tragedy. *Journal of Social work*, *12*(3), 300-319.

Openshaw, L. L. (2013). Group interventions in rural schools to assist with a community trauma. *Contemporary Rural Social Work*, *5*, 110-124.

Pine, N. S., Tarrant, R. A., Lyons, A. C., & Leathem, J. M. (2015). Rolling with the shakes: an insight into teenagers’ perceptions of recovery after the Canterbury earthquakes. *Kōtuitui: New Zealand Journal of Social Sciences Online*, *10*(2), 116-125.

Ramirez, M., Harland, K., Frederick, M., Shepherd, R., Wong, M., & Cavanaugh, J. E. (2013). Listen protect connect for traumatized schoolchildren: a pilot study of psychological first aid. *BMC psychology*, *1*(1), 26.

Salloum, A., & Overstreet, S. (2012). Grief and trauma intervention for children after disaster: Exploring coping skills versus trauma narration. *Behaviour research and therapy*, *50*(3), 169-179.

Saltzman, W. R., Pynoos, R. S., Layne, C. M., Steinberg, A. M., & Aisenberg, E. (2001). Trauma-and grief-focused intervention for adolescents exposed to community violence: Results of a school-based screening and group treatment protocol. *Group Dynamics: Theory, Research, and Practice*, *5*(4), 291.

Scott, N. (2012). OCHA on message: The cluster approach. Retrieved from https://www.unocha.org/sites/unocha/files/dms/Documents/120320\_OOM-ClusterApproach\_eng.pdf

Scrimin, S., Axia, G., Capello, F., Moscardino, U., Steinberg, A. M., & Pynoos, R. S. (2006). Posttraumatic reactions among injured children and their caregivers 3 months after the terrorist attack in Beslan. *Psychiatry research*, *141*(3), 333-336.

Sharkey, P., Schwartz, A. E., Ellen, I. G., & Lacoe, J. (2014). High stakes in the classroom, high stakes on the street: The effects of community violence on student’s standardized test performance. Sociological Science, 1, 199-220.

Shemyakina, O. (2011). The effect of armed conflict on accumulation of schooling: Results from Tajikistan. *Journal of Development Economics, 95(*2), 186-200.

Silva, J. R., & Capellan, J. A. (2018). The media’s coverage of mass public shootings in America: fifty years of newsworthiness. *International Journal of Comparative and Applied Criminal Justice*, 1-21.

Smith, A. J., Layne, C. M., Coyle, P., Kaplow, J. B., Brymer, M. J., Pynoos, R. S., & Jones, R. T. (2017). Predicting Grief Reactions One Year Following a Mass University Shooting: Evaluating Dose-Response and Contextual Predictors. *Violence and victims*, *32*(6), 1024-1043.

Stein, B. D., Jaycox, L. H., Kataoka, S. H., Wong, M., Tu, W., Elliott, M. N., & Fink, A. (2003). A mental health intervention for schoolchildren exposed to violence: a randomized controlled trial. *Jama*, *290*(5), 603-611.

Strøm, I. F., Schultz, J. H., Wentzel-Larsen, T., & Dyb, G. (2016). School performance after experiencing trauma: a longitudinal study of school functioning in survivors of the Utøya shootings in 2011. *European Journal of Psychotraumatology*, *7*(1), 31359.

Suomalainen, L., Haravuori, H., Berg, N., Kiviruusu, O., & Marttunen, M. (2011). A controlled follow-up study of adolescents exposed to a school shooting–Psychological consequences after four months. *European Psychiatry*, *26*(8), 490-497.

Swee, E. L. (2015). On war intensity and schooling attainment: The case of Bosnia and Herzegovina. *European Journal of Political Economy, 40*, 158-172.

Thoresen, S., Flood Aakvaag, H., Wentzel-Larsen, T., Dyb, G., & Kristian Hjemdal, O. (2012). The day Norway cried: Proximity and distress in Norwegian citizens following the 22nd July 2011 terrorist attacks in Oslo and on Utøya Island. *European Journal of Psychotraumatology*, *3*(1), 19709.

U.S. Department of Education. (2014). Project School Emergency Response to Violence (SERV). Retrieved from https://www2.ed.gov/programs/dvppserv/index.html

Figure 1: Trends and Types over Time

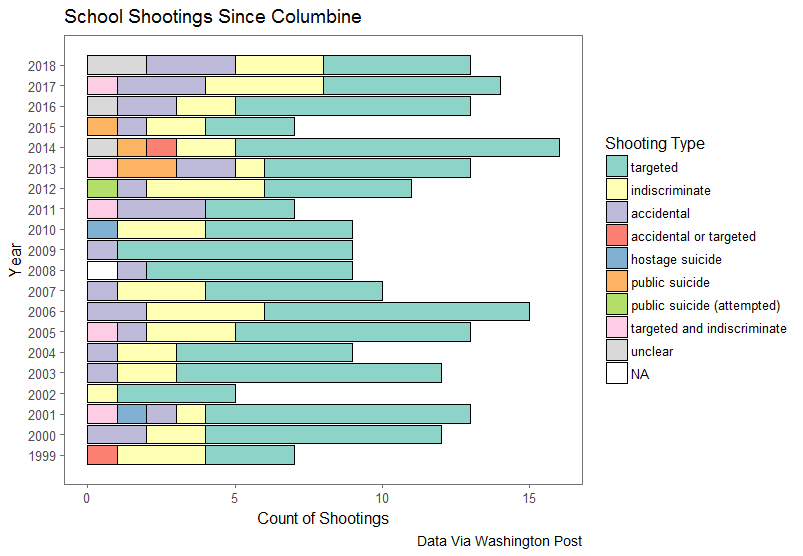
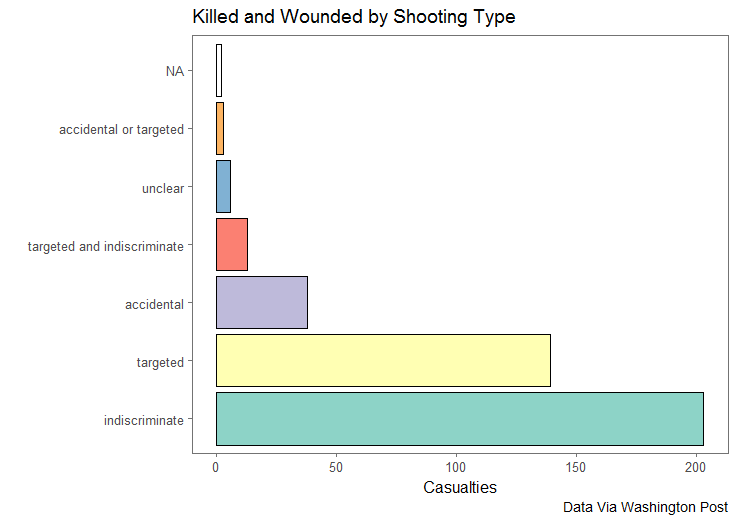


Figure 2: Casualties by Shooting Type



1. These data are available at https://github.com/washingtonpost/data-school-shootings [↑](#footnote-ref-1)
2. PTSD is a clinical diagnosis; in this case and in many other research projects, researchers did not diagnose participants but only sought to identify symptoms that are commonly associated with such a diagnosis. [↑](#footnote-ref-2)