Youth Violence: What We Know and What We Need to Know

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Abstract

School shootings tear the fabric of society. In the wake of a school shooting, parents, pediatricians, policy makers, politicians, and the public search for answers to the puzzle of youth violence, but there are no simple answers. Acts of violence are complex, especially rare acts like school shootings. Violent acts are influenced by multiple factors, often acting together. After the Sandy Hook Elementary School shooting in Newtown, Connecticut in which 20 students and 6 staff members were killed, the 12 authors of this article wrote a report for the National Science Foundation on what we know and don’t know about youth violence. This article provides an updated version of that report. After distinguishing violent behavior from aggressive behavior, we describe the prevalence of gun violence in the U.S. and age-related risks for violence. We delineate important differences between violence in the context of rampage school shootings, which are rare, and much more common urban street violence. We summarize evidence on some major risk factors for youth aggression and violence, as well as protective factors that mitigate or counter risk, highlighting individual and contextual factors which often interact. We consider new quantitative “data mining” procedures that can be used to predict youth violence perpetrated by groups and individuals, recognizing critical issues of privacy and ethical concerns that arise in the prediction of violence perpetrated by individuals. We conclude by discussing implications of the evidence to date for public policies that could reduce youth violence, and we offer suggestions for future research. (250 words; 250 words max)

Keywords: aggression, violence, rampage shootings, street shootings, youth
Youth Violence: What We Know and What We Need to Know

“We can’t tolerate this anymore. These tragedies must end. And to end them, we must change. We will be told that the causes of such violence are complex, and that is true. No single law—no set of laws can eliminate evil from the world, or prevent every senseless act of violence in our society. But that can’t be an excuse for inaction. Surely, we can do better than this. If there is even one step we can take to save another child, or another parent, or another town, … then surely we have an obligation to try.”

— President Barack Obama, Interfaith Prayer Vigil, Newtown High School

Newtown, Connecticut, 16 December 2012

President Obama made these remarks two days following the Newtown shooting, in which a 20-year-old young man first killed his mother in their home, and then went to a nearby elementary school in Newtown, Connecticut and killed 20 children and 6 staff members before killing himself. In the wake of the Newtown shooting, Representative Frank Wolf (Republican-Virginia) asked the National Science Foundation (NSF) to determine what researchers do and do not know about the connection between exposure to media violence (e.g., video games, films, television) and youth violence, and other factors that contribute to these devastating events. The NSF contacted the first two authors of this article and requested that we assemble a team of experts to write a report on causes of youth violence. The 12 authors of this article assembled at the NSF headquarters to write the report on 1-2 February 2013, acting as an advisory committee to the NSF Social, Behavioral and Economic Sciences Division. We were told to focus on school rampage shootings as well as other forms of youth violence and aggression. A recent analysis of 110 rampage shootings from 2009 to 2014 found that the average rampage shooter is older (median age 34) than the typical perpetrator of homicide (median age 26), and that most
shootings involve family and domestic violence (Everytown for Gun Safety, 2014). Only 4% of the rampage shootings in their sample occurred in schools. Thus, rampage shootings committed by youth in schools are even less likely than those that occur in other settings by older individuals. However, our charge was to focus on rampage shootings in schools, since the Newtown tragedy led to our assignment. Thus, in this article we focus on school rampage shootings rather than all types of rampage shootings.

Our report (Bushman et al., 2013) was given to Representative Wolf, who then distributed it to all members of Congress and to all of America’s Governors. The first author also testified about the report before The U.S. House of Representatives Committee on Commerce, Justice, Science, and Related Agencies on 19 March 2013. In this article, we summarize findings from our report, augmented by new findings. We also discuss the implications of these findings on youth violence for prevention, public policy, and future research.

Aggression and Violence in the United States

In this section, we define aggression and violence. Then we discuss the heavy incidence of gun violence in the U.S. Finally, we focus on age differences in violent behavior, because youth are at particular risk for serious acts of violence, both as perpetrators and victims.

Defining Aggression and Violence

Lay people and researchers often use the term “aggression” differently. Lay people may describe a salesperson as “aggressive” when he or she tries really hard to sell someone something. The salesperson does not, however, want to harm anyone. Most researchers define human aggression as any behavior intended to harm another person who does not want to be harmed (Bushman & Huesmann, 2010). The harm can be physical or psychological.

Most researchers define violence as aggression that has as its goal extreme physical harm,
such as injury or death (Bushman & Huesmann, 2010). For example, one youth spreading rumors about a peer is an act of aggression but is not an act of violence. One youth intentionally hitting, kicking, shooting, or stabbing another person is an act of violence. Thus, all violent acts are aggressive acts, but not all aggressive acts are violent acts—only those designed to cause extreme physical harm would be classified as violent.

**Gun Violence in the United States**

The United States (U.S.) is the most heavily armed society in the world with 270 million of the world's 875 million known guns—about 90 guns for every 100 citizens (MacInnis, 2007). Thus, even though the U.S. is only about 4% of the world’s population (Schlesinger, 2013), the U.S. has about 31% of the world’s guns.

Although violent crime in the U.S. has been decreasing since the mid-1990s, school rampage shootings have increased (Rocque, 2012). The U.S. is unique among high-income countries with respect to our level of lethal violence, particularly gun violence (e.g., Wellford, Pepper, Petrie, 2013). Gun violence is a serious public health concern in the U.S. In 2010 alone there were about 11,100 homicides, 19,400 suicides, and 600 accidental deaths due to guns (Kegler, & Mercy, 2013). Next year, the number of gun-related deaths is projected to exceed the number of traffic-related deaths in the U.S. (Christoff & Kolet, 2012).

Guns are easily purchased in the U.S. with little oversight or regulation. When guns are not secured, youth and other persons who are susceptible to the misuse of guns can easily access them. All of these factors give the U.S. the highest rate of gun fatalities among high-income countries—about 20 times the average for other high-income countries (Fisher, 2012).

**Why Focus on Youth Violence?**

There is a characteristic distribution of violent behavior over the life-course. Incidents of
violence increase in frequency during adolescence and early adulthood for a subset of individuals, and then rapidly and continuously decrease throughout life (Loeber & Farrington, 2012). A disproportionate amount of violent crime in America is committed by 15- to 24-year-olds (FBI Uniform Crime Reports, 2013). Other age groups, such as the elderly, are much less likely to commit violent crimes. That is why our report focuses on youth violence. Fortunately, the large majority of youth never commit a violent crime.

Two Types of Youth Gun Violence: Rampage Versus Street Shootings

Violent rampage shootings in schools differ in dramatic ways from “street violence” commonly associated with U.S. inner cities. In this section we contrast the evidence and characteristics on these markedly different types of youth who shoot to kill. Table 1 contains a summary of some major differences between these two types of youth violence. Of course, there are always exceptions to these general differences.

School rampage shootings. Our NSF report was commissioned in the wake of the Newtown school shooting. This tragedy joined a small but growing list of rampage shootings committed by youth in schools, but also in other public venues (e.g., movie theaters, shopping malls, supermarkets). The scale of the loss when these events happen is so devastating and apparently random that the public and the nation’s legislators are seeking answers to questions about causes and potential prevention measures. Yet because these events are rare, most of the evidence on the features of rampage shooters is based on intensive case history studies as well as more abstract analyses of databases like that maintained by the Centers for Disease Control on school-related homicides. This review relies primarily upon two reviews, one that analyzed all school shootings from 1970 through 2000 (Newman, Fox, Harding, Mehta, & Roth, 2004), and a one that analyzed school shootings from the 1950s through 2011 (Rocque, 2012).
School shootings typically occur in stable, close-knit, low-crime, small rural towns with a less frequent secondary pattern developing in exurbs. The school shooter generally is a white adolescent male, with no recorded history of disciplinary problems. School shooters typically have no documented history of medical treatment for mental disorders, although (often in retrospect) some show signs of early-stage onset of severe mental illness (Newman et al., 2004; Langman, 2009). Their symptoms are frightening to them, but perhaps because they are aware of the stigma that accompanies a diagnosis, these young men often conceal their symptoms and go entirely undiagnosed and untreated. Those who survive into their twenties frequently develop full blown mental disorders that are immediately recognized. However, symptoms of mental illness may be overlooked or attributed to the emotional fallout of common adolescent problems of bullying and social rejection. Indeed, the future shooter may magnify slights and feel severely depressed and angered by incidents of rejection. It is important to note, however, that millions of adolescents who have similar experiences and feelings never become school shooters.

Although the small sample size makes it difficult to generalize about the perpetrators, school shooters are often above average in intelligence and academic achievement (Newman et al., 2004). At the same time, school shooters often lack social attributes and physical skills (e.g., athletic prowess) that are highly valued by peers (Newman et al., 2004).

School shooters are commonly assumed to be loners who act out of anger, but ethnographic and archival research on these rare events indicates otherwise (Newman et al., 2004). Most often, school shooters are adolescent boys who have a long history of trying to join peer groups, but find themselves continuously rebuffed. They are socially awkward, but not disengaged. In fact, their sense of self and well-being appears excessively contingent on the group’s view of them. This painful social position often leads to clown-like behavior or bullying,
both designed to get attention or capture social status and peer acceptance. However, such attention-attracting behavior can result in further rejection and victimization by peers. More often than not, shooters sit on the margins, experiencing repeated letdowns as whatever brief episodes of social achievement (a friendly gesture, a moment of inclusion) melt away and the long quest for acceptance begins again (Newman et al., 2004).

Shooting classmates and teachers may take on the status of a “script” or template which, when shared secretly with peers, becomes a last ditch effort to gain attention and acceptance (Newman et al., 2004). Scripts are knowledge structures stored in memory that contain information about how to behave in different situations (Abelson, 1981). In films and plays, scripts tell actors and actresses what to say and do on stage. In memory, scripts serve a similar function; they define situations and guide behavior. The person first searches his or her memory to find a script for how to behave in that situation, retrieves the script, assumes a role in the script, and uses the script as a guide for behavior. Scripts can be learned by direct experience or by observing others, such as parents, siblings, peers, and media characters.

Relying on the dangerous and alluring anti-hero figure that are sometimes depicted in the media, school shooters seem to be making a final effort to gain entrance into social cliques that have held them at arm’s length. Indeed, in some cases studies, it appears that members of these social groups tacitly manipulate the marginal boy, almost instructing him on how to play this role (Newman et al., 2004). Police sometimes consider charging these “bystanders” as co-conspirators, but this rarely transpires because the evidence of actual collaboration is hazy, and bystanders say they thought the killer was only engaging in “fantasy talk.” The general point here is that there is a social drama unfolding around the shooting is less about murder than about social acceptance and media imagery that links masculinity to violence and fame. School shooters generally do not
personally know anyone who has killed before, and they are not imitating individuals they know. They might, however, imitate other rampage shooters or media characters.

Fame may be a compelling motive for school shooters. In an interview following the Newtown shooting, Harvard Professor Steven Pinker said, “It is a guaranteed way to get fame. In fact, it's the only guaranteed way to gain fame. If you decide your life is worth nothing, you're a nobody, you haven't made a difference, and you want to do something that guarantees that your name will be on the lips of everyone in the country, what are your options? There's only one, and that is kill a lot of innocent people” (NOVA, 2012). It is almost as if school shooters want to be on the world stage. As one writer noted, school shootings are distinct because they are “theatrical, tragic and pointless” (Fast, 2008, p. 11).

Many high school shooters are obsessed with guns, and gain access to them by stealing from their parents (Newman et al., 2004). Older rampage shooters, such as those who are in college, turn to the Internet, gun shows, and other means of legal acquisition of guns.

Rampage shooters also often kill themselves after killing as many victims as they can (Vossekull et al., 2002; Everytown for Gun Safety, 2014; Fast, 2008; Lang, 2009). Although murder-suicides are generally rare (Eliason, 2009), when they do occur they are disproportionately likely to involve multiple homicide victims (Centers for Disease Control and Prevention, 2012a). That is, people who commit homicide followed by suicide tend to leave more homicide victims than those who only commit homicide.

Youth suicide rates rose dramatically in the 1960’s and have remained stubbornly high since that time (Centers for Disease Control and Prevention, 2012b; Romer & Jamieson, 2003). Although rates of suicidal ideation among youth are higher than for other age groups, what distinguishes perpetrators of murder-suicide is their co-occurring hostile ideation reflecting long-
standing resentments towards others (Vossekull et al., 2002). Thus, it is not surprising that suicidal persons who commit homicide tend to be more lethal toward others than those who only commit homicide. Many school shooters apparently want to commit suicide, but either cannot bring themselves to do it (so they let police officers kill them instead), or want to make a spectacle of the event (Fast, 2008; Langman, 2009; Newman et al., 2004).

Given the widespread media attention to rampage shooting events, it is possible that extensive news coverage encourages contagion among vulnerable youth. Considerable research supports the existence of suicide contagion resulting from press coverage of public acts of suicide, especially in youth and young adults (Romer et al., 2006). Intense media coverage may also encourage imitation among those youth with suicidal-homicidal ideation. At the same time, media attention can alert the public, including school children that may be privy to threats of violence, about the seriousness of what they hear and the importance of reporting it. Media attention to shootings provokes a spike in reporting threats, which can lead to an increase in the interceptions of shooters before they carry out their plans. More needs to be known about the nature of media coverage of rampage shootings in order to increase helpful and decrease harmful media coverage of violence against self or others.

**Street shootings.** The data base for street violence comes from decades of social science research. In contrast to school shooters, urban “street shooters” more commonly live in densely populated areas with high crime levels and low social trust levels (Sharkey & Sampson, 2010). Urban youth street shooters often have histories of behavioral difficulties in childhood (Loeber et al., 2005). Youth in these settings tend to be non-white and come from high poverty neighborhoods, often plagued by illicit drug and gun markets, high rates of incarceration, and few opportunities for well-paying jobs or for advancement through education (Harding, 2010).
Street shooters often have strong loyalties to their neighborhood “turfs.” They are usually engaged in contests of wills with known antagonists. They are rarely involved in random acts of violence, but instead aim to hurt or kill individuals they know (Harding, 2010). They too may be motivated by images of masculinity and dominance, but where inner-city street shootings are concerned, fantasy and reality are more likely to blend in a toxic brew of scripts of interpersonal and intergroup violence well-known among all involved. Violent behavior “on the street” may well blend media images with the real thing in communities where the fear and horrible consequences of gun violence are unfortunately routine facts of everyday life rather than a commercial trope (Anderson 1999; Harding, 2010; Jones 2010).

Another difference between school shooters and street shooters is where they obtain weapons. Young street shooters obtain weapons from people they know (e.g., peers), but usually through an illegal gun market (Webster et al., 2002). They are less likely than school shooters to have acquired them surreptitiously, without the knowledge of the owner. In addition, street shooters rarely commit suicide after shooting others (Harding, 2010).

Risk Factors for Youth Violence

When any kind of gun violence occurs, it is only natural for citizens and policy makers to seek to identify “the” cause. However, as President Obama noted, violent behavior is very complex and influenced by multiple causal factors, often acting together. The more extreme the violent behavior (e.g., from hitting, to shooting, to rampage shooting), the more complex the causality may be. Following the Newtown shooting, Congress and the popular press focused on three risk factors for school shootings: (1) access to guns, (2) exposure to violent media, and (3) mental health. However, we expanded this list and focused on two major categories of risk factors: (1) characteristics of the individual (e.g., sex of perpetrator; neurobiological factors;
personality traits; mental illness), and (2) contextual variables (e.g., access to guns; exposure to violent media; family influences; social rejection and peer hierarchies; poverty, respect, dignity, and social trust). This list of risk factors is certainly not exhaustive. In addition, risk factors often co-occur and interact. Violent acts often are the product of interactions among individual and contextual risk factors.

Many characteristics associated with youth violence apply to both school and street shooters, although others may not. In this section, we discuss risk factors for youth violence, noting wherever possible how the individual and contextual risk factors for those who commit rare rampage school violence differ from those of more common street violence.

**Individual Risk Factors for Youth Aggression and Violence**

**Sex of perpetrator.** Although females can and do commit violent crimes, the overwhelming majority of violent crimes are committed by males, with the highest rates among males ages 15 to 24 (Uniform Crime Reports, 2013). Young men are in a particularly sensitive part of the life cycle in which their sense of masculinity is developing in the context of popular media that glorifies violence and domination of others (Kimmel & Mahler, 2003). It is often the least physically developed young boys who lose out in pecking orders that value height, big muscles, athletic prowess, and mature looks (Newman et al., 2004). Guns become a great equalizer in this tournament of recognition (Harcourt, 2006).

**Neurobiological factors.** Neurobiological risk factors have long been implicated in youth violence. These include neurocognitive deficits, perinatal complications, genetic risks, and psychophysiological differences (e.g., low resting heart rate), among others (Glenn & Raine, 2014). Rapid advancements in technologies for imaging the human brain, assaying biomarkers,
and studying gene-expression in neuroscience and epigenetics are making it possible to study neurobiological risk processes in much greater detail, as well as the complex interplay of social context and biological variation that could influence the development of violent behavior, such as gene by environment interactions. Additionally, many well-established behavioral risk factors for aggression and violence (e.g., poor self-control, stress-reactivity) are now being studied at multiple levels of analysis, including at the level of genetic and neurobiological processes. Concomitantly, there is expanding interest in neurobiological protective factors with respect to aggression and violence.

A complex network of genetic, endocrine, and environmental factors influence the brain structures involved in behavior and moral decision-making (Fumagalli & Priori, 2012). There is now a greater understanding about how chronic and traumatic stress resulting from adverse childhood experiences (e.g., family violence and conflict, child physical abuse and neglect, sexual abuse, traumatic separation from caretakers, social isolation, bullying, peer rejection) can shape the development and functioning of the hypothalamic-pituitary-adrenocortical (HPA) axis in ways that compromise adaptive responses to stress (Lupien, McEwen, Gunnar, & Heim, 2009). Such atypical development of the HPA axis is associated with aggression, impulsiveness, and mood disorders in humans and other animals (Veenema, 2009). However, research is providing evidence of epigenetic and gene-environment interaction effects that moderate the impact of chronic stress on neural mechanism revealing both how stress resilience and stress vulnerability develop (Champagne & Mashoodh, 2009; Feder, Nestler, & Charney, 2009).

Neuroimaging research on normative brain development is helping shed light on why youth in general, and some youth in particular, may be susceptible to risky behavior including aggression and violence. Adolescent risky decision making may be facilitated by imbalances in
the rates of development of the earlier maturing subcortical regions implicated in processing affect, threat and rewards (e.g., amygdala and nucleus accumbens) and the more slowly maturing prefrontal cortical regions implicated in behavior supporting one’s long-term goals (Mischel & Ayduk, 2004; Casey, Jones, & Hare, 2008). That is, the prefrontal cortex may not be sufficiently mature to regulate strongly activated reward, affect, and threat regions during adolescence. Of course, within this normative pattern, there is considerable variation. Some individuals show characteristic heightened stress reactivity supported by compromised HPA-axis development and associated amygdala activity, as well as reduced ability to harness the prefrontal cortical regions that support mature decision making over impulsive overreactions (Berman et al. 2013).

Evidence is accumulating that prosocial, affiliative, and reconciliatory behaviors are supported by interacting social and neurological systems. Enlarged amygdaloid nuclei, for example, receive cortical input and sensory information from temporal association areas (Barger et al., 2012; Fumagalli & Priori, 2012). These structures—particularly the lateral amygdaloid nucleus—appear to be related to increased cortical input and the processing of emotion within highly communicative social networks (Barger et al., 2012).

Youth whose brains have been functionally and structurally altered by chronic stress, depression, or both, and who are living in the absence of regular interaction with trusted peers and adults, may be more affected by social threats that can lead to violence.

**Personality traits.** One of the best predictors of future behavior is past behavior. Thus, it is not surprising that individuals who are characteristically aggressive are more likely to engage in later aggressive acts (e.g., Anderson & Bushman, 1997). Individual differences in aggressiveness become detectable by the late preschool and early elementary school years (e.g., Eron, Walder, & Lefkowitz, 1971; Huesmann, Eron, Lefkowitz, & Walder, 1984). Although
overall levels of aggression and violence decrease sharply after age 25, there is considerable
stability in individual differences in aggressiveness (e.g., Huesmann, Dubow, & Boxer, 2009;
Loeber & Farrington, 2012). Indeed, individual differences in aggressiveness are almost as stable
over time as individual differences in intelligence (Olweus, 1979). For example, one study
reported 22-year correlations of .50 for males and .35 for females (Huesmann et al., 1984).

Individual differences in self-control are among the strongest and most consistent
observed individual correlates of crime, delinquency, violence, and other problem behaviors
(Gottfredson, 2005; Loeber & Farrington, 2012; Pratt & Cullen, 2000). Much violent behavior is
short-sighted, and seemingly adventitious. It produces little gain but it engenders considerable
long-term negative consequences for the perpetrator. Many acts of violence among urban youth
are not planned long in advance, but instead erupt so suddenly that they seem to be nearly
spontaneous (even to the offender, in hindsight). Frequently, alcohol or other drugs are involved.
In contrast, rampage shootings tend to be planned and deliberate (Cornell et al., 2013).

Three other personality traits are broadly related to aggression and violence, the so-called
“Dark Triad of Personality”—narcissism, psychopathy, and Machiavellianism (Paulhus &
Williams, 2002). The term “narcissism” comes from the mythical Greek character Narcissus who
fell in love with his own image reflected in the water. Narcissists have inflated egos, and they
lash out aggressively against others when threatened (e.g., Bushman & Baumeister, 1998). It is a
common myth that aggressive people have low self-esteem (Bushman et al., 2009). Actually,
many violent individuals think they are special people who deserve special treatment. When
narcissists don’t get the special treatment they think they deserve, they lash out aggressively
against others (e.g., Bushman & Baumeister, 1998). One study found that violent criminals had
much higher levels of narcissism (but not lower levels of self-esteem) than other young men
(Bushman & Baumeister, 2012). Interestingly, narcissism levels in young adults have been increasing sharply since the late 1970s (Twenge, Konrath, Foster, Campbell, & Bushman, 2008).

Psychopaths show a pervasive disregard for, and violation of, the rights of others. They are callous and unemotional individuals. A growing body of evidence indicates that “callous-unemotional” traits that are the antithesis of empathy in youth are associated with earlier onset of antisocial behavior and violence (Frick, Ray, Thornton, & Kahn, 2013; Loeber et al. 2005). These traits also show considerable stability over time. Psychopaths mainly focus on obtaining their own goals, regardless of whether they hurt others in the process. Psychopaths are more likely to engage in premeditated acts of aggression and violence than in impulsive acts (Nouvion, Cherek, Lane, Tcheremissine, & Lieving 2007). Because most murders are impulsive, psychopaths are not frequently murderers, though they are violence prone (Hare & McPherson, 1984; Williamson, Hare, & Wong, 1987). If children with psychopathic traits are induced to focus on the pain and suffering they inflict on others (something they normally don’t do), they behave less aggressively (van Baardewijk, Stegge, Bushman, & Vermeiren, 2009).

“Machiavellianism” comes from the Italian philosopher and writer Niccolò Machiavelli, who advocated using any means necessary to gain raw political power, including aggression and violence. Machiavellianism is positively related to bullying in school and other aggressive acts (Andreou, 2004; Russell, 1974).

A common feature of the dark triad personality traits is lack of empathy for others, which is one of the strongest deterrents against violence. Interestingly, empathy levels in young adults have been decreasing sharply since the late 1970s (Konrath, O’Brien, & Hsing, 2011).

**Mental illness.** When school shootings occur, the shooters are often portrayed in the media as having some form of severe mental illness, and indeed the available evidence suggests
that some are at the onset of what may become a serious disorder if they survive (Newman et al., 2004; Rocque, 2012). However, drawing conclusions about the specific link between school shootings and severe mental illness remains premature, because the necessary data has not been systematically collected (Applebaum, 2013). Although severe mental illness is linked with somewhat higher risk of violent acts, only a small proportion of all violent acts are due to severe mental illness (Applebaum, 2013). Of these acts, few involve guns (Applebaum & Swanson, 2010). In fact, evidence to date suggests that a lifetime diagnosis of a severe mental illness may add little additional risk of violence, especially if the individual is in remission or is receiving treatment (Applebaum & Swanson, 2010). The factors predictive of future violence among the severely mentally ill are similar to those that predict violence in the general population (e.g., being male, substance abuse, prior history of violence, history of childhood maltreatment, recent stressful life events involving rejection, loss and failure, tendency to react to perceived threat with anger and violence rumination) (Elbogen & Johnson, 2009; Nestor, 2002; Steadman et al., 1998; VanDorn, Volavka, & Johnson, 2012). Future research will need to examine the circumstances under which mental illness is linked to youth violence.

**Contextual Risk Factors for Youth Aggression and Violence**

**Access to guns.** In the United States in 2011, 84% of homicide victims ages 15-24 were killed with guns (National Center for Injury Prevention and Control, 2011). The frequent involvement of guns in lethal youth violence and the ability of guns to inflict more lethal wounds than other personal weapons suggest that gun availability is an important cause of youth homicides. There are methodological challenges to making causal inferences about the positive association between gun availability and homicide risks (National Research Council, 2005); however three types of evidence point in the direction of causation. First, high levels of gun...
ownership and much more lax gun control laws in the U.S. likely make unsupervised access to handguns more available to youth within the U.S. compared with other high-income countries. Although nonlethal rates of crime and violence in the U.S. as well as fighting by high school students are similar to that of other high-income countries (Smith-Khuri et al., 2004; Block 1993), youth homicides committed with guns are more than 42 times higher in the U.S. than in other high-income countries (Richardson & Hemenway, 2011).

Second, a study comparing homicide rates across U.S. states, which controlled for other risk factors for lethal violence (e.g., economic and social resource deprivation, racial composition, alcohol use, rates of nonlethal violent crime), found that for every 1% increase in household gun ownership youth homicides committed with guns increased by 2.4% (Miller, Hemenway, & Azrael, 2007). It can be difficult to discern the independent effects of gun ownership from those of lax gun laws that make it easier for youth to access guns, because states with the highest prevalence of gun ownership typically have the most lax gun laws. Both likely play a role in youth’s unsupervised access to guns and associated risks for lethal violence (Webster, Vernick, & Bulzachelli, 2009).

Third, temporal changes in illegal gun availability to youth coincide with temporal changes in youth homicide. The extraordinary increase in youth homicides that occurred in the late 1980s and early 1990s was largely driven by homicides committed with guns, and was geographically concentrated in urban areas where street shootings are prevalent. This sharp increase in youth homicides with guns, concentrated among Black males, mirrored trends in arrests for illegally carrying guns and deaths due to gun suicides and accidental shootings (Blumstein & Cork, 1996). Similarly, the dramatic reduction in juvenile-involved murders between 1994 to 1999 and leveling off since then has closely mirrored trends for juvenile arrests.
for weapons violations, almost all of which are for illegal possession of a gun (Snyder, 2011). Policing strategies designed to detect and deter illegal gun carrying in high-risk settings have consistently been shown to reduce gun violence (Koper & Mayo-Wilson, 2006). Youth also report that their awareness of these police practices curtail their gun carrying (Freed, Webster, Longwell, Carrese, & Wilson 2001). Although targeted initiatives with relatively small and well-trained police units have proven to be effective in reducing gun violence, broader initiatives such as “stop and frisk” in New York City have proven to be very contentious because they are vulnerable to racial bias in their application (e.g., Gelman, Fagan, & Kiss, 2007). If these approaches lead to harassment and racial profiling, they could decrease community trust of police officers.

Gun availability for school shooters occurs differently from that of street shooters, but is no less important. Most school shooters under 18 steal guns from their parents or other relatives (Newman et al., 2004). Thus, it is especially important for parents and relatives to keep guns at home carefully secured.

**Exposure to violent media.** Public debate on the link between violent media and youth violence can become especially contentious in the wake of a shooting rampage. In many rampage shootings, the perpetrator puts on a uniform (e.g., hockey mask, trench coat, movie costume, military uniform), as if following a media script. The perpetrator then collects several guns and ammunition, goes to a public place, kills as many people as possible, and then often kills himself (or is killed by the police). It is tempting for some to conclude that violent media caused the shooting rampage. However, it is not possible to make causal inferences about the link between exposure to violent media and violent criminal behavior because it is unethical to conduct experimental studies in which research participants can commit violent crimes.
One can, however, draw causal inferences about the link between exposure to media violence and aggressive behavior in milder forms than violence. Hundreds of studies have shown that exposure to media violence is a significant risk factor for aggressive behavior in youth, and experimental studies indicate that the link is causal (e.g., for meta-analytic reviews see Anderson et al., 2010; Bushman & Huesmann, 2006; Greitemeyer & Mügge, 2014). Studies also have shown that parents who set limits on the amount and content of children’s media use provide a powerful protective factor against aggression (e.g., Gentile & Bushman, 2012).

Violent media often contain guns, and research has shown that the mere presence of guns can increase aggression, even at a subliminal level (e.g., Subra, Muller, Bègue, Bushman, & Delmas, 2010). This effect, called the “weapons effect,” has been replicated dozens of times (Bushman, 2003). Recent research indicates that gun violence in PG-13 films (for ages 13+) has tripled since the rating was introduced in 1985 to the point that it now exceeds the level found in R-rated films (for ages 17+) (Bushman, Jamieson, Weitz, & Romer, 2013). Thus, violent media could produce a “weapons effect” by exposing youth to guns in ways that glorify their use.

There is also a downward spiral between aggression, rejection, and consumption of violent media (Slater, Henry, Swaim, & Anderson, 2003). In particular, aggressive youth tend to be rejected by nonaggressive peers, and therefore spend more time consuming violent media and associating with other aggressive youth (who have also been rejected by others), which, in turn, is associated with even more aggressive behavior.

Although there is a link between exposure to violent media and subsequent aggressive and violent behavior (e.g., Huesmann, 1986; Huesmann, Moise-Titus, Podolski, & Eron, 2003), it must be noted that millions of young Americans consume violent media and don’t commit violent crimes. Raising the likelihood of aggression is not equivalent to pushing the viewer down
a pathway that leads to violence. Moreover, the "symbolic pathway" by which this association unfolds has yet to be fully understood. In the case studies of school rampage shootings, exposure to violent media created a positive link between desirable masculine images and shooting. Rather than raising an aggressive impulse *per se*, the pathway worked by celebrating the anti-hero as a figure to be admired and imitated. In addition, youth who do not comprehend the plot of a heroic film are more likely to identify with the villain, perhaps because they did not fully understand the motives of the characters (Calvert, Murray, & Conger, 2004). Taken together, the findings suggest a need for caution about assuming causal linkages.

According to catharsis theory, exposure to media violence can act as a safety valve by releasing violent impulses into harmless channels. However, there is little to no scientific evidence supporting catharsis theory (e.g., Bushman, 2002; Bushman, Baumeister, & Stack, 1999; Geen & Quanty, 1977; Gerbner & Gross, 1976; Russell, 1993). Another theory proposes that media violence may reduce violent crime by keeping young men off the street (Dahl & DellaVigna, 2009), but this effect needs to be replicated.

**Family influences.** Families appear to play multiple roles that may increase or decrease the risk of youth violence (Dodge et al., 2008; Farrington, Loeber, & Tofti, 2012; Loeber & Farrington, 1998, 2012; Lösel & Farrington, 2012; Masten, in press; Stoddard et al., 2013; van Horn & Lieberman, 2012). Many of the best-established risk factors for youth violence are based in the family, including harsh and rejecting parents, interparental violence, child abuse and neglect, chaotic family life, inconsistent discipline, and poor monitoring by parents of children showing early signs of aggression. Moreover, individual risk factors for aggressive or violent behavior, such as poor self-control, also are related to these family risk factors. Risk factors for developing violence commonly co-occur and predict multiple negative outcomes, including
aggression and other antisocial behaviors, substance abuse, mental health problems, and health-risk behaviors. suggesting that interventions targeting influential risk factors could have high and broad return on investment (Evans, Li, & Whipple, 2013; Obradović, Shaffer, & Masten, 2012).

Factors associated with lower risk for youth violence often implicate the same group of family and individual attributes. Family protective factors include close attachment bonds with consistent caregivers, effective and developmentally sensitive parenting (including consistent disciplinary practices and monitoring), and families operating in ways that children experience as safe, well-managed, and well-regulated. These factors also have been implicated as protective for a variety of serious problems, including violence, in high-risk children and youth (Masten, 2007; Lösel & Farrington, 2012).

Interventions to mitigate risk and promote resilience in children at risk for a variety of behavioral problems including aggression and violence often target family function and particularly the quality of caregiving and parenting (Institute of Medicine and National Research Council, 2011; Loeber & Farrington, 2012; Sandler, Schoenfelder, Wolchik, & MacKinnon, 2011). Results also suggest that interventions targeting family dynamics early in life carry the potential to cascade forward in time, with spreading benefits to youth and adult outcomes in multiple domains of adjustment through direct and indirect pathways (Dodge et al., 2008; Masten & Cicchetti, 2010; Patterson, Forgatch, & DeGarmo, 2010).

Several of the best known prevention efforts in the literature targeting family function have shown long-term effects in multiple domains, including reduced risk for youth violence (Welsh et al, 2012). These include the Nurse-Family Partnership (Olds, 2006), parent training on how to manage challenging child behavior (e.g., Patterson et al., 2010), and Multisystemic Family Therapy in adolescence (Henggeler et al., 1998).
It remains to be established that such interventions would be effective for mitigating risk for street violence in high-risk urban neighborhoods, because it is unclear how much influence individual or family factors can exert in extremely high-risk neighborhoods or entrenched gang cultures of street violence. The benefits of these family-based interventions for preventing rampage shootings are also unclear. Although family circumstances in rampage shootings are quite varied, most families exhibited characteristics that have been identified as protective against serious youth problems including violence (Newman et al., 2004; Rocque, 2012).

**Social rejection and peer hierarchies.** Status anxieties, a history of social rejection, and peer hierarchies also can help create conditions that increase the risk of youth violence. Some evidence suggests that rampage shooters have a history of rejection from relatively small and cohesive peer networks into which they have sought entry through behaviors intended to curry favor, but which peers perceive as socially inept (Newman et al., 2004). With regard to street violence, rejection in the form of disrespect of one’s group can lead to collective violence. Youth may join neighborhood gangs for protection from such violence only to become involved in dynamics that alternate among protection, predation, and victimization (Rios 2011).

Under most conditions, however, rejection in various forms—exclusion, devaluation, disrespect, bullying—can lead to aggression but rarely to lethal violence. When rejection occurs in adverse family, community, and peer circumstances, it can lead individuals to develop a heightened sensitivity for future threats of rejection, which can increase the likelihood of aggression and violence (Downey, Freitas, Lebolt & Rincon, 1999; Newman et al., 2004). Peer rejection may have a stronger impact than rejection from significant others on males than on females, with the opposite pattern occurring for females (Baumeister & Sommer, 1997). Among adolescent males, rejection in forms that convey powerlessness and devaluation of one’s
masculinity may be especially threatening (Bourgois 1996). Research has shown that narcissistic individuals, who have an inflated but fragile sense of self, often lash out aggressively at others when they are rejected or humiliated by peers (e.g., Thomaes, Bushman, Stegge, & Olthof, 2008; Twenge & Campbell, 2003).

Intense reactions to rejection are especially likely for rejection sensitive individuals with low self-control (Mischel & Ayduk, 2004). One such reaction is impulsively using a lethal weapon that happens to be accessible. Indeed, youth with a history of being bullied and bullying others are more likely to report carrying weapons (Bradshaw, Waasdorp, Godweber, & Johnson, 2013; van Geel, Vedder, & Tanilon, 2014). A second reaction is ruminating about a plan for revenge, which may increase the probability of its implementation (Gollwitzer, 1999). This outcome may be particularly likely if the school shooter has released warnings about his intentions in order to gain attention, and fears another episode of rejection if he "backs down" (Newman et al., 2004).

There are two reasons why rejection may have a more profound effect on youth than older adults. First, youth is a time when identities form and consolidate. Thus, youth are particularly vulnerable to identity threat and negative reactions from peers. Second, due in part to immature brain development, youth is a time of generally risky choices and behavior, especially in emotionally charged circumstances. The extreme reactivity and risky decision making that may increase the risk of violence is restricted to a small subset of youth (Frick & Viding, 2009), and indeed may become evident at any time in the life course in reaction to identity-challenging stress and factors that may compromise self-control such as substance abuse.

When in a state of heightened threat, the perceived danger posed by the threat source can become exaggerated (Downey, Mougos, Ayduk, London, & Shoda, 2004). In this state, more
extreme responses than are warranted may occur, especially when the resources needed for exercising self-control are unavailable. Gang-related shootings often occur in the context of chronic threat. Gang members live with danger and fear, and have little faith in the ability of police and other authorities to protect them. Older male adults who might otherwise contribute to creating safe, cohesive communities are disproportionately absent through incarceration, early death, illness, or substance abuse. Thus, gang members feel they must protect themselves from danger. They often dull the anxiety that living under stress generates with substances such as alcohol and street drugs, which only makes things worse by decreasing inhibitions, increasing existing sensitivities to threat, and increasing impulsive decision making (Coid et al., 2013).

**Poverty, respect, dignity, and social trust.** In poor urban areas, youth violence can become a form of rough street justice that occurs in response to failures by the formal justice system to secure neighborhoods and limited opportunities for youth to generate respect and dignity among peers. Under these conditions, public youth identities can become linked to “campaigns for respect” organized around the capacity to repel or commit peer violence (Anderson 1999). Strong neighborhood identities and rivalries can lodge such campaigns in the defense of “turf” by youth groups and gangs, which escalates violence collectively and leaves urban spaces a dangerous web of zealously protected territories.

Concentrated poverty, social disorganization, structural inequality, and racial discrimination may produce a context in inner cities where violence becomes a prominent part of street life (Anderson, 1999; De Coster, Heimer, & Wittrock, 2006). Parents still play important roles, but youth (especially those of color) have to navigate a street reality that often models and supports violence, and a broader society where they must contend with racialized stereotypes of criminality (Eberhardt, Goff, Purdie, & Davies, 2004). As a consequence, parenting youth who
are embedded in a violent street context can be particularly challenging, and even the type of parenting that typically promotes healthy development might not be sufficient to protect against youth violence (De Coster et al., 2006).

Urban youth of color often do not trust police and other authorities (Harding 2010), which can increase the risk of violence (Rios 2011). Even in the most dangerous of inner-city urban contexts, however, schools remain among the safest places that youth can be. Schools are especially effective when they cultivate mechanisms of informal social control among youth that based on social trust, relationship building, and problem solving rather than on formal discipline (Morrill & Musheno, in press).

Schools become the focus of rampage shootings in small, rural towns because they are the epicenter of social life for the community and therefore make the ideal “stage” for attacking the social order that is perceived by shooters to be against them (Newman et al., 2004). On the other hand, for street shootings urban street life downplays the centrality of schools and renders other settings more dramatic places for proving one’s manhood.

Data Mining: Can It Predict Youth Violence?

The advent of tools making it possible to search large quantities of data available in social media through computer algorithms has raised new possibilities for predicting youth violence. Because social media is often publicly available, data mining algorithms—tools for mining and analyzing large data sets for patterns of interest—provide the means for sifting through social media data to predict events. Some data mining algorithms are fully automatic, using computational algorithms that scale to large quantities of data, whereas others combine automated methods with humans (e.g., domain experts, trained analysts) “in the loop” to achieve results beyond what a person or a machine could produce alone (Han, Kamber, & Pei, 2011).
Representative data mining tasks include *prediction* of unknown quantities, *modeling* the relationships between variables, and *detection* of patterns. Prediction of discrete-valued and real-valued quantities are termed *classification* and *regression* respectively. These paradigms capture many of the questions related to youth violence, such as determining whether an individual will commit a violent act (classification), predicting the rate of gang violence that will occur in an urban neighborhood (regression), understanding the relationships between various neighborhood indicators and violence (modeling), or highlighting anomalous communication patterns that may be predictive of violence (detection). Such patterns include social rejection, expressions of violent sentiments or intentions, indicators of mental illness, attempts to purchase weapons, glorification of violence, or suspicious behaviors reported by others (Coppersmith, Harman & Dredze, 2014). Data mining techniques have multiple potential uses for predicting both youth violence that occurs in groups, and youth violence that is perpetrated by a single individual against others. Prediction of group violence (particularly when focused on predicting geographic areas, such as gang boundaries, which are more likely to have outbreaks of violence in the near future) has been effectively applied in multiple urban areas, whereas prediction of individual-level violence (such as school shootings) is a more difficult, and open, problem. Moreover, the monitoring of social media data, particularly to determine whether the monitored individual is likely to perpetrate violence, presents challenges to privacy and other serious ethical issues.

**Predicting group violence.** To date, researchers have successfully developed techniques for predicting geographic “hot-spots” of crime in American cities such as Chicago, Los Angeles, and New York City (Cohen, Gorr, & Olligschlaeger, 2007; Eck, Chainey, Cameron, Leitner, & Wilson, 2005; Gorr & Harries, 2003; Harries, 1999; Mohler, Short, Brantingham, Schoenberg, & Tita, 2011; Neill & Gorr, 2007). These techniques work well because urban crime often follows
regular patterns, and they have the tremendous benefit of reducing the overall level of street violence without the cost of violating individual privacy. Most of these techniques rely on data that is often publicly available, such as aggregate counts of crimes, de-identified crime offense reports, and 911 emergency telephone calls.

A complementary approach to violence prevention analyzes social network ties, using social media or other data sources such as co-offending data to identify individuals at high risk of being victims or perpetrators of street violence (Papachristos & Wildeman, in press). For example, the Chicago Police Department uses social media data (e.g., Facebook profiles) to map the relationships between Chicago’s most active gang members. The police use the inferred social network for prediction of homicides and development of interventions targeted at the individuals at highest risk for involvement in a homicide.

**Predicting individual violence.** Individual-based surveillance to predict rampage shootings is inherently much more difficult than place-based surveillance, for several reasons. First, there is a huge “class imbalance” problem because rampage shootings are extremely rare. Even if features are identified that increase an individual’s probability of committing violence by a factor of 10, this may still mean only that 1 in 1,000 individuals displaying these factors may actually perpetuate violence, whereas huge numbers of individuals displaying these factors will never perpetuate violence. Second, there may be wide discrepancies in the amount and types of data available for each individual (e.g., some potentially dangerous individuals may not use online communication or may not reveal anything predictive). Third, there are large risks to individual privacy that are difficult to mitigate, which presents both moral and legal concerns.

Successful examples of individual-based crime prediction include the software used in Baltimore, Philadelphia, and Washington, D.C. to predict which individuals on probation or
parole are most likely to murder or commit other crimes (Berk, Sherman, Barnes, Kurtz, & Ahlman, 2009). Such approaches rely on detailed information collected about each offender’s life history and criminal record, and thus will not help prevent first-time offenders. Other approaches look for suspicious links between individuals (Krebs, 2001), and are potentially useful for detecting patterns indicative of terrorist activity or organized crime, but not an individual actor working alone.

Another example is tracking when social media are used to bully others. Cyberbullying is a form of bullying that occurs in the digital age. Bullying is defined as willful and repeated “aggressive behavior that is persistent, intentional, and involves an imbalance of power and strength” (Hinduja & Patchin, 2010, p. 12; also see Olweus, 1978). Cyberbullying refers to the use of digital media to bully others, including, but not limited to, flaming, online gossips or rumors, teasing, reputation destruction, and cyber-ostracism (Hinduja & Patchin, 2009). The use of social media for cyberbullying creates opportunities to study “bullying traces”—online transcripts of bullying events (Xu, Jun, Zhu, & Bellmore, 2012). Bullying traces may also reveal when youth resist cyberbullying or even intervene to stop it (Marwick & Boyd, 2011).

In summary, data mining techniques have potential to predict youth violence that occurs in groups and youth violence that is perpetrated by individuals. However, privacy is a major issue in predicting the latter and in intervening based on these predictions. Additionally, there are substantial ethical and legal issues related to identifying “false positives” in the prediction of any behavior, particularly those with a low base rate.

**Preventing Youth Violence**

In this section we offer suggestions on how to reduce youth aggression and violence.

**Reduce youth access to guns.** About 2/3 of U.S. homicides are committed with guns
(FBI Uniform Crime Reports, 2013). Although one can certainly kill people with other weapons (e.g., knives), one can kill more people much faster with guns than with other weapons. For example, the same day of the Newtown shooting a man stabbed 22 children in China, but none of them died (Associated Press, 2012). Guns also increase the physical and psychological distance between the killer and the victims, which makes killing much easier (e.g., Baumeister, 1997).

Based on the available evidence, four strategies would reduce youth access to guns (Webster & Vernick, 2013). First, set the minimum age to 21 years for handgun purchase or possession. Second, require background checks for all gun transactions and handgun purchaser licensing, with stiffer penalties if illegally transferring a gun to an underage youth. Third, require that gun owners lock up guns to prevent unsupervised youth access. Fourth, enforce gun laws and increase youth outreach with violence interruption. One example of violence interruption, the Cure Violence model (2014), views violence as a learned behavior that often operates like an infectious disease through social networks. The program applies principles that have been successful in combatting infectious diseases, including interrupting transmission, identifying and changing key behaviors of the highest potential transmitters, and changing social norms. Outreach staff trained to mediate conflicts can interrupt gun violence. Staff members often have similar backgrounds to the high-risk youth they work with. They provide informal mentoring, model nonviolent behavior, and referral to risk-reducing programs (e.g., job training, substance abuse or mental health treatment). Public education and community mobilization complement the efforts of violence interrupters and outreach workers to promote nonviolent norms.

Street shooters tend to gain access to guns illegally (i.e., from fellow gang members, gun traffickers, or home burglaries). Rampage school shooters 18 and younger, in contrast, tend to gain access to guns that are in their own households by stealing legal guns from their parents or
other relatives (Newman et al., 2004). College age rampage shooters who are at least age 21 are often able to acquire guns from licensed gun dealers or from unlicensed private sellers who they find online or at gun shows (Newman & Fox, 2009). Federal gun laws and the laws in most U.S. states prohibit a relatively small number of individuals with mental illnesses—those who, through a legal proceeding, were found to represent a serious threat to themselves or others as a result of a mental illness—from possessing guns. The records for these mental health disqualifications often are not made available to law enforcement agencies conducting pre-gun-sale background checks. As a result, in the case of college shooters, individuals who were known on campus to have significant mental and emotional problems were perfectly able to access guns from licensed gun dealers, usually legally.

Although gun safety is an important part of prevention, it is critical not to place too much confidence in this strategy. Some rampage school shooters took blowtorches to safes, found cable cutters to slice through security devices, etc. to gain access to guns (Newman et al., 2004). A very dedicated killer can be difficult to deter via gun control alone. But many people are not quite that dedicated. They are ambivalent, and anything that raises the stakes and makes it harder for them to access guns can indeed be an effective part of prevention strategies. In sum, gun laws are helpful but not sufficient for deterring gun violence in youth.

**Family interventions.** A common saying is that “an ounce (gram) of prevention is worth a pound (kilogram) of cure.” Although not specifically focused on violence, prevention research focused on crime and delinquency supports the idea that substantial and lasting crime prevention effects can be achieved by altering early childhood experiences in ways designed to enhance socialization and monitoring. There are several types of effective programs, ranging from home visits by nurses to parent training, but those most effective for high-risk youth are those
developed specifically for such youth (Dekovic et al., 2011; Greenwood, 2006).

Parent training reduces antisocial behavior and delinquency in children (for a meta-analytic review see Piquero, Farrington, Welsh, Tremblay, & Jennings, 2009). Interventions with parents that begin early in development (e.g., Olds, 2006) or prior to school entry (Webster-Stratton & Taylor, 2001) are particularly promising for reducing harsh or neglectful parenting, which is a major precursor of aggression and other antisocial behavior. The Triple P (Positive Parenting Program) intervention has shown success in this regard (Prinz et al., 2009), and a major effort in the U.K. to make successful parenting interventions available to all families has shown that these programs can be delivered on a wide scale (Lindsey & Strand, 2013).

Self-control training delivered directly to children can increase self-control and decrease delinquency (Moffitt, 2011; Piquero, Jennings, & Farrington, 2010). As predicted by self-control theory and cascade models of development, these interventions could have wide-ranging positive effects. The risk of violence also is likely to be reduced by interventions focused on developing social cognitive skills that are intended to increase empathy, problem solving skills, the effective management of interpersonal conflict, anger management, and alternative ways of interpreting social cues and coping with rejection and disappointment. Schools have successfully implemented universal preventive classroom interventions that improve conduct and reduce risks for violence, such as the Good Behavior Game (Kellam et al., 2011; Petras et al., 2008). Programs that start in first grade and continue into adolescence, that intervene with parents and schools, and that target social skills and other risk factors, can reduce the risk for youth violence (Conduct Disorders Prevention Research Group, 2011). Efforts are also promising for preschool programs that can reduce later involvement with the criminal justice system (Dekovic et al., 2011; Heckman, 2013). Careful evaluations to identify what programs work, and for whom, need
Minimizing violent media effects. With regards to violent media, “the train has left the station,” so to speak. However, parents can reduce the negative impact of violent media on their children. Typically, parental interventions are placed in one of three groups: (1) instructive mediation, (2) restrictive mediation, and (3) social coviewing (Valkenburg, Krcmar, Peeters, & Marseille, 1999). Instructive mediation, which involves parents talking to their children about violent media content (e.g., alternative means of solving conflict besides aggression, why it is unrealistic), can reduce the harmful effects of violent media on children (e.g., Nathanson, 2004).

Restrictive mediation involves restricting access to violent media. Parents can use filtering devices to restrict violent content on television sets and computers. Parents can also restrict the sheer amount of media exposure. The American Academy of Pediatrics recommends no more than 2 hours per day of entertainment “screen time” for children 2 to 18 years old, and no screen time for children under 2 (American Academy of Pediatrics, 1999). They also recommend that parents establish “screen-free” zones at home by making sure that there are no televisions, computers, or video games in children’s bedrooms, and by turning off the television set during dinner.

Social coviewing involves parents consuming violent media with their children without discussing it, and can backfire because children assume that violent media must not be harmful if their parents watch it with them and don’t say anything bad about it (Nathanson, 1999).

We recommend establishing an easy-to-understand universal ratings system for all forms of media, with ratings assigned by child development experts rather than the industry. In America, the rating system is like alphabet soup, with different ratings used for different forms of media (e.g., TV-MA for television, R for movies, Ao for video games), and different content
codes (e.g., FV, V, S, L, D, AC, AL, GL, MV, V, GV, BN, N, SSC, RP). Often parents do not understand the ratings. For example, in one survey, only 3% of parents knew that FV meant “fantasy violence,” and some even thought it meant “family viewing” (Kaiser Family Foundation, 1999). Some countries already do this, such as the Netherlands, which assigns an age-based rating (e.g., 12+ for children 12 and older) and easy to understand symbols (e.g., a fist for violence) to all media. The ratings and symbols are assigned by child development experts rather than by the industry. Media literacy programs can also help children become more intelligent and critical media consumers. There are several excellent programs already available, which can be implemented at school or home.

**Improving school and community climates.** Social scientists, social workers, and law enforcement agents have been involved in violence prevention activities for decades, ranging from interdiction of illegal guns to mediation efforts designed to “take the temperature down” to shock-oriented programs that introduce young people to the realities of prison life. Providing positive role models, opportunities for engagement in educational and extracurricular experiences, and using religious figures or reformed ex-prisoners, are also a means of trying to persuade youth that violence leads to bad outcomes for themselves, their families, and their communities (see Matjasko et al., 2012 for review of these programs).

General efforts in schools should focus on creating climates where students feel engaged and a sense of belonging. Of particular importance is the development of mechanisms that can build social trust between youth and adults, both in schools and in communities. On campuses, ensuring that culturally diverse students have access to all academic and extra-curricular opportunities can break down negative stereotypes among groups and create trust among peers. There is also a need to recognize and cultivate informal practices of peer conflict management.
that youth use to solve problems in non-aggressive ways (Morrill & Musheno, in press). School policies emphasizing suspension and expulsion of youth exhibiting behavioral difficulties (e.g. “zero tolerance” or some forms of “safe schools” policies) can interrupt such informal practices and marginalize already challenged children, even propelling them on a pipeline to prison (Bahena et al. 2012). Once in this pipeline, the likelihood of violence increases. Moreover, such policies tend to differentially punish non-white peer groups, especially African American boys, which can further marginalize them in school and create the conditions where they will more likely to resort to aggression and violence to solve peer conflict (Ferguson 2001).

Some programs also focus on children who are underachieving and demonstrating behavioral difficulties. One example is the Sources of Strength program, in which youth are trained to recognize and refer suicidal peers to adults for support (Wyman et al., 2010). The Sources of Strength program could also be adapted for use in violence prevention. In addition, interventions that increase self-control and active problem solving skills in the face of anger-inducing threat should be available to individual students.

Behavioral threat assessment is more effective than profiling based on individual characteristics. Systems that work with children (e.g., schools, community health centers, physicians) can benefit by having a behavioral threat assessment protocol in place for identifying and managing children who are behaving in ways that signal a potential for violence. Advocacy groups within the community can reduce youth violence and create a sense of cohesion.

Protocols need to be in place to ensure continuity of treatment of youth with serious mental illness as they move from one system to another (e.g., reenter the community following a period of incarceration), as well as for ensuring that effective treatment is prioritized when they come in contact with the child welfare or criminal justice systems.
Preventing rampage shootings in schools and communities. Programs and strategies to prevent rampage shootings are not well developed, in part because the phenomenon itself is of recent vintage as a recognized category of crime. That said, and given the near impossibility of predicting who will become a rampage shooter, the most efficacious form of prevention lies in ensuring that information that “something terrible is about to happen” is brought to trusted adults who have the knowledge to respond effectively. This requires encouraging the recipients of warnings, threats, and other forms of advanced notice to come forward (Newman et al., 2004). There are many reasons—generally tied to the social risks of being labeled a “tattle-tale”—that dissuade youth from telling adults what they know. The task is complicated by the reputation of school shooters for saying “crazy things” to gain attention.

Efforts to alert schools to the potential for hostile action by students have been implemented in some U.S. states and other countries (e.g., Cornell et al., 2009; Endrass et al., 2011). Although school shooters often “leak” their intentions to others in the community (Fein et al., 2002), these messages are typically not taken seriously. However, the establishment of tip lines and other mechanisms for reporting such threats appear to uncover potential threats and avert threats to school safety (Cornell et al., 2009). These programs are similar in intent to efforts to identify youth at risk for suicide in schools (Cooper et al., 2011). Students, parents, and school staff are educated about the warning signs of suicidal behavior and encouraged to help potential victims to get treatment.

Encouraging youth to come forward must be tempered by the understanding that the vast majority of the time they will be reporting false positives. The language of threat is simply too common to assume it always means something. But when threats become more specific (in terms of targets, timing, preparation, etc.), the only real protection is to foster the conditions of trust
and confidentiality that will signal to members of the social cliques where they hear threats to come forward and report the threats.

Zero tolerance policies need to be reconsidered, at least for speech (weapon possession should never be tolerated). When school systems react to verbal comments with automatic sanctions, the practice can dissuade students who hear threats from coming forward to report their concerns out of fear of over-reaction in a climate of a high level of false positives. Shutting down this information pipeline leaves us in a very vulnerable position because interruption of plots is essential to prevention. Students need to be encouraged to come forward with what they know, and anything that disinclines them to do so should be seriously reconsidered.

Schools should look for holistic peer violence interventions. Of particular importance are mechanisms to cultivate social trust and meaningful, relational ties across different peer groups and among teachers and students. Such efforts can be grounded in activities (e.g., student clubs) that include but are not limited to sports where students can be recognized for achieving collective and individual goals. Schools can involve alumni, local businesses, civic leaders, and parent groups in such activities. Although trying to predict which specific students will turn into shooters is futile, schools should focus attention on students who show signs of disturbance or broadcast an intention to do harm. Of particular importance is ensuring that informal and formal control systems operate in tandem to respond robustly to both actual and potential bullying and physical violence (Morrill & Musheno, in press).

Postvention for school shootings. School shootings are devastating, especially to the communities in which they occur. Based on the available evidence, we offer some general suggestions about what to do in the aftermath of a school shooting. Media attention often creates a major problem for school authorities in the aftermath of a shooting. Schools should insist that
news organizations pool their resources and send one representative, rather than multiple reporters to cover rampage school shootings. Media also provide a stage for antisocial youth to become a “star” through extreme acts of violence, such as rampage shootings. Their access to attention through media should be minimized.

Communities should develop post-shooting crisis plans that provide mental health services on a widespread basis. Educators need to be both well informed about the symptoms of trauma and open with parents about the importance of counseling. Special attention should also be paid to the needs of teachers and staff in the wake of a school shooting. They are often expected to step into the role of counselor or comforter when they are also suffering from trauma and in need of support. Mental health resources should be available in schools at all times, not just in the aftermath of a school shooting.

Schools have a legitimate need to reassure the public that security has been restored in the wake of a school shooting. Different schools have taken different approaches, such as searching student bags for weapons, adding locks and security personnel at the school entrance, and building fences around the school property. Although such measures can reassure students and parents in the short-term, they can also undermine social trust in the long-term and must be accompanied with other efforts to rebuild trust and meaningful relational ties on school campuses. Moreover, school rampage shooters are generally people who belong on site because they are students rather than intruders for whom a perimeter fence is a barrier to action.

**Prevention of street shootings.** Street shootings involve an extremely difficult set of both individual and contextual influences that are generally resistant to intervention. Research suggests that parental efforts to shield children (especially boys) from harmful influences in concentrated poverty settings are only marginally successful (Fauth et al., 2007; Ingoldsby et al.,
Reducing the forces that encourage youth violence will require concerted efforts by police, parents, and other adults to avoid the debilitating effects of involvement with the juvenile justice system that treats poor and minority youth harshly and ensnares them (rather than reducing their continued delinquency). The effort currently underway to reform the juvenile justice system by engaging youth through education and treatment (rather than punishment) is a strategy that could bear fruit (Models for Change, 2014). Similarly, support for successful reentry of incarcerated youth and young adults into their communities has the potential to reduce future violence.

Research conducted with serious youth offenders in urban centers such as Chicago indicates that youth with substance use problems are particularly likely to experience recidivism after release into the community (Schubert & Mulvey, 2014). Other research (also in Chicago) indicates that nearly all youth detained in the juvenile justice system have experienced traumatic events leading to Post Traumatic Stress Disorder (PTSD) and comorbid disorders (Abram et al., 2013). Such conditions are treatable, but current practice in juvenile detention does not deliver these treatments in a consistent manner, leaving many youth at risk for further offending (Schubert & Mulvey, 2014), and high risk for gun violence upon return to their communities (Teplin et al., 2014).

**Directions for Future Research**

In our charge from the NSF to write about what we know and don’t know about youth violence, it immediately became apparent that although there is a developed literature on the topic, there is much that we still do not know. Future research on youth violence is sorely needed. In this section we describe some of the most urgent directions for future research.

Previous research has shown that when exposed to movie characters that smoke, many
youth are more likely to start smoking themselves (e.g., Dal Cin, Stoolmiller, & Sargent, 2012); the same is true for characters that drink (e.g., Wills, Sargent, Gibbons, Gerrard, & Stoolmiller, 2009). Future research should test whether youth are more interested in acquiring and using guns after exposure to movie characters that use guns.

Future research should examine what types of individuals are most susceptible to violent media effects (e.g., youth with certain mental illnesses, males with extremely traditionally masculine gender roles, very young children, low socioeconomic status youth, youth with poor self-control, youth who possess guns, youth who fantasize about behaving violently as an antihero). Future research should also investigate what types of settings facilitate violent media effects (e.g., playing a violent video game cooperatively vs. competitively vs. alone, 3D technology, large screens, ultra-realistic characters).

Future research can also investigate whether violent media create a positive orientation toward an antihero in the manner predicted by social learning theory (Bandura, 1973). Youth who admire antiheroes in violent media might be more likely to emulate their behavior.

Finally, future research could investigate the effectiveness of possible forms of restrictive mediation that might help parents protect their children from unwanted exposure to violent media. The current rating systems for different forms of media used in the U.S. is often confusing to parents. One approach is to establish a universal rating system for all forms of media that include ratings by child development experts versus the entertainment industry. Comparisons of the violence ratings made by these two sources could yield information about the validity, as well as potential biases, of different kinds of raters. Most rating systems are a double-edged sword (Bushman & Cantor, 2003). On the one hand, ratings provide parents with information they can use to make decisions about what media content their children are exposed to. On the other hand,
ratings can be like a magnet to attract children to objectionable media content.

A second approach is to compare locked versus unlocked settings for violent content on media devices (e.g., television sets, computers, video game consoles). The current default is unlocked, so that users can access any content, including violent content, on any media device they own. If industry voluntarily changed the system to locked, unwanted exposure to violent content should decrease. This technique is already available for sexually explicit movies on cable and satellite television. If industry did not want to make such changes in their default settings, various approaches to teach and encourage parents to change the settings to locked could be compared. These kinds of options (e.g., the V-chip) are currently available to parents, but often are not used. Another possibility is to examine how parents make decisions when setting up their cable boxes, some of which have a feature to elect parental controls during installation. The selection of parental controls allows parents to lock or unlock violent content, sexual content, etc. on their cable box. This feature eliminates the need for a default setting altogether on cable television. Research could examine the impact of parents’ decisions during their cable box set-up on their children’s subsequent exposure to violent content. Taken together, research on these various kinds of restrictive mediation could shed light on effective ways to reduce violent media exposure that do not intrude upon broadcaster rights of free speech.

Future research can profit by examining the intersection of hostile and suicidal ideation in youth as a marker for youth who are at risk for murder-suicide, a common characteristic of rampage shootings (Everytown for Gun Safety, 2014; Vossekull, et al., 2002). At present, we know little about how repeated exposure to violent media portrayals, including those that involve the use of guns, affect youth with both hostile and suicidal ideational tendencies. Do such portrayals teach youth ways to express their hostile intentions and are these experiences
particularly influential among suicidal youth? Finally, does interaction with like-minded peers on the Internet and other venues increase social support for such hostile action?

Family function appears to play a multitude of roles in generating or mitigating risk for youth violence and also in promoting pathways of development leading away from antisocial behavior and violence. Moreover, some of these roles show strong evidence of malleability (e.g., parenting skills). However, numerous gaps remain in the literature to inform policy and interventions to reduce youth violence and promote resilience in those at high-risk for perpetrating violence. Moreover, the family backgrounds of rampage shooters do not generally demonstrate the typical markers of familial risk. Indeed, it is precisely the conventional and many characteristics of families that rampage shooters have come from that generates so much dismay and puzzlement. For these young people, family functioning appears to be less the issue than peer group dynamics in combination with individual vulnerabilities that jeopardize children’s ability to “fit in” that their families cannot protect them from and are often largely “in the dark” about. However, it will be important to gain further systematic information on school rampage shooters, on those whose plans were interrupted, and on those whose behavior is deemed to pose a threat. This may be an effective way to develop a a clearer sense of the individual and contextual factors that increase the risk of rampage shootings.

Similarly, street shootings are heavily concentrated in high-poverty neighborhoods where parents have little trust in the police, and peer influences are often driven by gang membership and other turf identities (Goffman, 2014; Harding, 2010). Nevertheless, parents and schools that can shield children from these harmful influences may be somewhat effective in reducing involvement in violence (Fauth et al., 2007; Ingoldsby et al., 2012; Tolan et al., 2003).

Research is needed on the role of early childhood experiences on risk for youth violence,
including prenatal environment. There is a need to find ways to support the healthy development of children in vulnerable families. In addition, it is important for communities and policymakers together with scientists to identify the resources needed for family members with a child or youth who demonstrates signs of preoccupation with violence.

Research is needed on the best strategies and developmental timing for helping parents to teach and monitor children effectively in regard to promoting positive child uses of media, good self-control skills, safe behavior around guns, healthy peer relationships, and other potential protective factors against violence. Research is needed on improving child welfare systems that may inadvertently function as “violence feeder systems,” including the foster care and juvenile justice systems. It will also be important to further characterize the link between mental illness and youth violence. It is essential to develop non-stigmatizing ways of ensuring that youth who would benefit from the early identification of mental health problems that exacerbate risk for violence to be identified and receive effective interventions.

Research is also needed to understand how the ways in which schools deal with challenging behavior, that may contribute to the risk of violence when a suspension means that children are left without any adult supervision. Greater understanding also is needed about how youth deal with interpersonal peer conflict in school, especially the roles played by social trust, interpersonal relationships, and peer hierarchies in creating the conditions that lead youth away from or toward peer aggression. Efforts along these lines could be devoted to basic research and assessing the efficacy of school-level approaches, such as restorative justice programs, that seek to facilitate alternative ways of resolving peer conflict without exclusion or violence.

A growing body of theory and evidence implicates the role of community-level factors for youth violence in urban areas characterized by persistent disadvantage, gang violence, and
social disorganization (De Coster et al., 2006). However, little is known about leveraging change at the community level in such areas to reduce youth violence and promote youth success.

**Conclusions**

Rampage school shootings are rare. Schools remain the safest place for children—far safer than crossing the street. Even so, the shock that follows from the murders of innocent children is so threatening to our sense of social order that it calls out for explanation. We are unlikely to ever understand the depth of alienation and the desire for social status motivating the shooter, nor will we be able to restore peace of mind to the families and communities that have experienced these tragedies.

Street shootings take the lives of far more people in one year than all the school rampage shootings put together. In the understandable rush to speak to the need to understand the rampage school shooting, we must not lose sight of the fact that in terms of the sheer social cost, the violence that bedevils the nation’s poorest neighborhoods is far more costly in terms of human life, family disruption, and the destabilization of communities that follows from the fear and daily trauma of living with personal insecurity.

Whether we focus on the rare event or the more ubiquitous forms of violence, we must acknowledge that gun violence in the U.S. is far higher than in any other high-income country. The tools of social science are invaluable for understanding the causes and consequences of violence, and represent the most informed source of policy ideas for combating all kinds of youth violence. We already understand quite a bit about the etiology of rampage and street violence. Even so, there is more to be done and all the more reason—in the wake of events like the Newtown tragedy and those that have occurred since—to bend our disciplinary tools and knowledge to solutions.
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Table 1. Some major differences between street shootings and school shootings.

<table>
<thead>
<tr>
<th>Street Shootings</th>
<th>School Shootings</th>
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<tbody>
<tr>
<td>Less rare</td>
<td>Extremely rare.</td>
</tr>
<tr>
<td>Concentrated in inner cities.</td>
<td>Concentrated in rural areas and towns.</td>
</tr>
<tr>
<td>Non-white offenders overrepresented.</td>
<td>Mostly white offenders.</td>
</tr>
<tr>
<td>Guns usually obtained from illegal gun market.</td>
<td>Guns often obtained from family members who purchased them legally.</td>
</tr>
<tr>
<td>Preferred weapon is a handgun</td>
<td>Often multiple guns used, including semi-automatic rifles with high capacity magazines.</td>
</tr>
<tr>
<td>Many recidivist violent offenders.</td>
<td>Uncommon recidivist violent offenders.</td>
</tr>
<tr>
<td>History of discipline problems common.</td>
<td>History of discipline problems uncommon.</td>
</tr>
<tr>
<td>Co-offending typical.</td>
<td>Solo offending typical.</td>
</tr>
<tr>
<td>Prior criminal victimization common.</td>
<td>Prior criminal victimization uncommon.</td>
</tr>
<tr>
<td>Suicide combined with homicide uncommon.</td>
<td>Suicide and homicide very common.</td>
</tr>
<tr>
<td>Victims mostly of same race and sex (often African American males).</td>
<td>White victims predominate (male and female).</td>
</tr>
<tr>
<td>Victimization of family members highly unusual.</td>
<td>Victimization of family members can occur prior to the school shooting.</td>
</tr>
<tr>
<td>Mostly from low income families.</td>
<td>Mostly from stable, middle class families.</td>
</tr>
<tr>
<td>Substance use common.</td>
<td>Substance use uncommon.</td>
</tr>
<tr>
<td>Treatment and symptoms of mental illness uncommon.</td>
<td>Treatment of mental illness uncommon, but symptoms of mental illness common.</td>
</tr>
<tr>
<td>Generally below average in intellectual functioning and academic achievement.</td>
<td>Generally above average in intellectual functioning and academic achievement.</td>
</tr>
<tr>
<td>Generally personally know someone who has killed or been killed before.</td>
<td>Generally do not personally know anyone who has killed before.</td>
</tr>
<tr>
<td>Avoid media attention for shootings because they don’t want to be caught and prosecuted.</td>
<td>Seek media attention for shootings.</td>
</tr>
</tbody>
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