Aggression and Violent Behavior 21 (2015) 39–44

Contents lists available at ScienceDirect

Aggression and Violent Behavior

The link between posttraumatic stress disorder and firearm violence: A review

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ARTICLE INFO

Available online 14 January 2015

Keywords:
PTSD
Firearm
violence
Mental illness
Mass shooting

ABSTRACT

The relationship between firearm violence and mental illness has been a longstanding issue, and one that has received recent national attention due to highly publicized shootings. However, no prior reviews have focused on the relationship between firearm violence and posttraumatic stress disorder (PTSD) specifically. The current review examines evidence of PTSD as both a consequence of and risk factor for firearm violence. The studies reviewed suggest elevated rates of PTSD among those exposed to firearm violence, with particularly high levels of PTSD found among witnesses of mass shootings and firearm injury survivors. Additionally, these studies indicate that certain factors, such as closer proximity to the incident and closer relationship to the victims, increase one's risk for developing PTSD. Although there is a dearth of research on PTSD as a risk factor for perpetration of firearm violence, the available evidence suggests a significant connection between the two. Gaps in the current literature are discussed, as well as directions for future study. Firearm violence remains a significant public health concern, and identifying its impacts and potential risk factors such as PTSD will be crucial for interventions aimed at addressing this problem.

Contents

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http://dx.doi.org/10.1016/j.avb.2015.01.009
1359-1789/

1. Introduction

Recent high-profile shootings have brought the relationship between gun violence and mental illness to the forefront of the American public's attention (Dennis, Leonnig, & Johnson, 2012; Gassen & Williams, 2013), leading to calls for greater access to treatment and tighter restrictions on gun ownership among individuals with mental health problems (Kliff, 2013; O'Connell & Fields, 2011). Understanding the relationship between mental illness and firearm violence is critical for guiding public policy and treatment aimed at the prevention of gun violence. The following review focuses on the link between post-traumatic stress disorder (PTSD) and firearm violence. Although numerous studies have examined PTSD as a consequence of violence (e.g., Kilpatrick et al., 2003) and a correlate of aggressive behavior (e.g., Kivisto, Moore, Elkins, & Rhatigan, 2009), there have been no previous attempts to synthesize the evidence linking PTSD to firearm violence. Below we review the evidence for PTSD both as a consequence of and a risk factor for firearm violence, highlighting gaps in the literature and proposing topics for future study.

2. Method

2.1. Searches

Sources for this review were found by searching Medline and PsycINFO. The searches included the terms "firearm", "gun", or "handgun" and "psyc", "social", "violen", "mental", or "PTSD" with relevant truncation symbols. Bibliographies of book chapters were reviewed and articles and source materials solicited from colleagues. Relevant articles and chapters were included if they contained evidence-based studies.

2.2. Definition of PTSD

PTSD is a mental disorder that follows significant trauma or threat of trauma to the self or others, and is associated with persistent re-experiencing of the event, avoidance of stimuli associated with the trauma, emotional numbing, and increased physiological arousal. The duration of the symptoms must be more than one month and the symptoms must cause significant distress or impairment in functioning (American Psychiatric Association [APA], 2013). PTSD was not formalized as a mental disorder until the release of *DSM-III* (APA, 1980). The diagnosis was revised in *DSM-III-R* (APA, 1987) and *DSM-IV* (APA, 1994), retained in *DSM-IV-TR* (APA, 2000), and revised again in *DSM-5* (APA, 2013). Based on data from the nationally representative National Comorbidity Survey Replication (NCS-R), the lifetime prevalence of PTSD is estimated as 6.8% (Kessler et al., 2005), and the current past year prevalence is estimated as 3.5% (Kessler, Chiu, Demler, & Walters, 2005). Most of the studies reviewed in this paper focused on individuals meeting all of the diagnostic criteria for PTSD, defined using the *DSM-III*, *III-R*, *IV*, or *IV-TR* criteria. Other studies measured PTSD symptom severity as a continuous variable, but did not report whether individuals met the *DSM* diagnostic criteria for the disorder. However, it is important to note that even subclinical levels of PTSD symptoms are often associated with significant distress and functional impairment (Friedman, Resick, & Keane, 2007).

3. PTSD following firearm violence

Table 1 shows the results of 17 studies that reported rates of PTSD following firearm violence in the community. All of the studies were carried out in the U.S. except for one study each from Australia (Creamer, 1989), the UK (Manolias & Hyatt-Williams, 1993), Turkey (Karabekiroglu, Akbas, Tasdemir, & Karakurt, 2008), Finland (Suomalainen, Haravuori, Berg, Kiviruusu, & Marttunen, 2011), and the Netherlands (Gersons, 1989). Rates of individuals meeting the criteria for PTSD among those exposed to firearm violence ranged from 5% (Johnson, North, & Smith, 2002) to 74% (Creamer, 1989). Other studies, in which no diagnostic cutoff was used, also reported high rates of individuals experiencing moderate or severe PTSD symptoms (Greenspan & Kellermann, 2002; Pynoos et al., 1987). This wide range of PTSD rates following firearm violence may result from a number of factors, including the changing definition of PTSD over time (Creamer, 1989), the diagnostic sensitivity of the assessment methods (Schwarz & Kowalski 1991), and the degree of exposure to the violence (North, Smith, & Spitznagel, 1994; Pynoos et al., 1987). We review these studies in detail below. We have categorized the studies according to type of index traumas described (e.g., witnessing firearm violence, being wounded by a firearm), as certain types of firearm violence may be particularly strongly associated with the subsequent development of PTSD.

3.1. Exposure to mass shootings

"Mass shooting" was the term used in most of the studies in which multiple persons were killed and/or wounded by a gunman or sniper. The lowest reported rate of PTSD (5%) comes from a study following a courtroom shooting (Johnson et al., 2002). The authors speculated that this relatively low rate of individuals meeting the criteria for PTSD may be accounted for by the smaller scope, shorter duration, and lower intensity of the incident relative to other mass shootings. However, 71% of respondents met the PTSD intrusion criteria and 56% met the hyperarousal criteria. Thus, although only a small number of people in the study met full criteria for PTSD, the majority reported some PTSD symptoms.

The prevalence of PTSD following mass shootings may depend on the degree of exposure to the traumatic event. For instance, in a study of elementary school age children after a fatal sniper attack, the proximity of the subjects to the firearm violence and the degree to which they knew the deceased child were significant factors in the development of PTSD (Pynoos et al., 1987). Forty-nine percent of the children who were on the playground, the site of the violence, reported severe PTSD symptoms, compared with only 6% of those who were not in school the day of the shooting. However, the development of PTSD symptoms is not limited to those who witness firearm violence first-hand. In a large study of Virginia Tech students after the shooting in 2007, the exposures that explained the most cases of probable PTSD were inability to confirm the safety of friends (31%), death of a friend/acquaintance (20%), and death of a close friend (10%; Hughes et al., 2011).

Longitudinal studies can provide a better picture of the trajectory of PTSD following a mass shooting. North, McCutcheon, Spitznagel, and Smith (2002) conducted a 3-year study of survivors of a 1991 mass shooting, and found that the rate of PTSD dropped from 26% at initial assessment to 14% after one year, but increased to 18% after three years. These fluctuating rates reflect the remission and relapse of some individuals, and worsening symptoms among some individuals who initially presented with subthreshold PTSD.

3.2. Firearm injury

Although only two studies were found regarding firearm injury and PTSD, both report high rates of distressing PTSD symptoms. Burnette (1998) found that 58% of participants who had experienced a gunshot wound met full diagnostic criteria for PTSD, and half of that group was more than one year post-assault. Additionally, Burnette (1998) found that characteristics of the trauma (e.g., assault severity) and the individual (e.g., negative change in outlook, use of "safeguarding" behavior such as carrying a weapon) predicted PTSD symptom severity. In a study of 60 adults admitted to a trauma center due to serious gunshot wounds, 73% reported moderate or severe PTSD intrusion symptoms, and 83% reported moderate or severe PTSD avoidance symptoms (Greenspan & Kellermann, 2002). Although levels of emotional