

## **Terrorism and Health**

**Dana Rose Garfin, Ph.D.<sup>1</sup>**

**E. Alison Holman, Ph.D., FPN<sup>2</sup>**

<sup>1</sup>Department of Psychology and Social Behavior, 4201 Social & Behavioral Sciences Gateway,  
University of California, Irvine, CA 92697-7085; Phone: (415) 407-9498; Fax: (949) 824-3002  
Email: dgarfin@uci.edu

<sup>2</sup>Program in Nursing Science, 100E Berk Hall, University of California, Irvine, CA 92697-3959  
Email: aholman@uci.edu

## Glossary

**Indirect Exposure:** Witnessing a collective trauma through media sources or through exposure to personal narratives in the context of one's professional role

**Posttraumatic Growth:** Positive psychological change that occurs after struggling with a challenging life circumstance

**Relative Risk Appraisal:** Process that links exposure to an adverse event with subjective appraisal of future risk

**Religiosity:** Active participation in religious activities or social structures

**Resiliency:** Capacity of individuals to adapt successfully to disturbances/adversities that threaten the stability of their lives; the ability to 'rebound' when one's ability to function has been impaired to some degree by an adverse experience

**Resistance:** The ability to withstand or adapt to adversity—'psychological immunity' to stress

**Secondary Stressors:** Practical strains that occur as a result of a larger negative event

### **Abstract**

Terrorist attacks are human perpetrated community disasters that injure the innocent and spread fear, anxiety, and dread throughout the population. After a terrorist attack, many people exhibit striking resilience and may even report beneficial outcomes. However, a large body of work has also linked exposure to terrorist attacks with deleterious physical and mental health outcomes. Directly exposed individuals may be physically impacted through injury or exposure to environmental contaminants and are at risk for psychosocial difficulties including Posttraumatic Stress Disorder (PTSD), anxiety, depression, and functional impairment. After an attack, many citizens are also indirectly exposed through television, newspaper, radio, and social media coverage; consequences of this indirect exposure often mimic those generally associated with direct exposure to traumatic events. While proximity to terrorist acts has been correlated with negative outcomes in some instances, a large body of research indicates that proximity to an event and symptoms do not necessarily co-occur in a “dose-response” relationship; people far removed from the event may experience deleterious physical and mental health consequences. Longitudinal studies further suggest that effects may be persistent. Physiological reactions and coping strategies may help explain variability in outcomes. Clarifying the predictors of adaptive and maladaptive responses is essential to advance theory and inform the design and administration of more effective post-attack services.

**Keywords:** terrorism, PTSD, trauma, 9/11, anxiety, posttraumatic growth, health, stress, appraisals, resilience, Ireland, Oklahoma City, indirect exposure, coping

## **Definitions and Characteristics**

Terrorist attacks are unique community disasters. They are random, uncontrollable, and unpredictable events, perpetrated by humans for the specific objective of generating fear and anxiety in the populace (Silver & Matthew, 2008). While definitions of terrorism have varied, a 2012 Academic Consensus defines terrorism as a fear-generating tactic with primarily political or ideological undertones, often executed for propagandistic and psychological purposes (Schmid, 2012), although not uniformly (Silver & Matthew, 2008). In contrast to conventional warfare, terrorist attacks are aimed at civilians rather than military combatants; the “rules “of warfare are often completely disregarded. Consequently, the injured tend to be innocent and defenseless victims, indiscriminately harmed by brutal and often shocking means. Importantly, terrorism targets the broader population, not only those physically attacked, in order to intimidate, frighten, destabilize, and impair societal functioning (Schmid, 2012). This manipulation of the cognitive and emotional mechanisms of the fear response seeks to elicit broad perceptions of a threatening surrounding environment. Such appraisal processes are integral components of the stress process generally (Lazarus & Folkman, 1984) and terrorist acts specifically (Cairns & Wilson, 1989), with potentially long-lasting psychological and physical consequences (Silver, 2011).

Terrorism can be perpetrated by individuals, organizations, and governments. Much of what is discussed in the literature is terrorism perpetrated by individuals or organizations. Although state-sponsored terrorism has received much less attention, it is a tool state or national governments use to protect their interests and spread their ideology on the international stage. This article will focus on the impacts of individual or organizational terrorism, as it comprises the bulk of the literature.

Terrorism impacts the population by: 1) harming the directly attacked, 2) causing illness and injury from debris and other harmful toxins released into the surrounding area (e.g., bombs exploding), 3) creating “secondary stressors” through disruption of daily life (e.g., access to services such as health care and transportation) (e.g., Shalev, Tuval, Frenkiel-Fishman, Hadar, & Eth, 2006), 4) causing psychological distress to both the directly exposed and the broader population through indirect exposure, and 5) damaging individual’s physical health as a result of a heightened fear response. As a result of these multi-faceted and far-reaching effects, terrorism has challenged clinicians, researchers, and policy makers seeking to best understand population-level reactions to these events. How are individuals and communities affected? What predicts resilience or vulnerability to the negative impacts of these events? What are the long-term repercussions of terrorism? Who is in need of interventions? Which services are most effective in promoting health following exposure to terrorism? How widely and when should services be distributed throughout the population?

### **Historical Perspective**

Formal studies of the human psychological impact of terrorism began with studies of the conflict in Northern Ireland. Early inquiries acknowledged the potential for terrorism’s long-term negative health repercussions, but lacked methodologically stringent designs (Curran, 1988). Since these early inquiries, there has been a vast expansion of studies examining responses to terrorism and exploring practical and theoretical issues using improved designs such as longitudinal assessments with representative samples. The majority of this work has focused on Israel (e.g., Berger, Pat-horenczyk, & Gelkopf, 2007; Gelkopf, Berger, Bleich, & Silver, 2012; Hobfoll, Canetti-Nisim, & Johnson, 2006; Hobfoll et al., 2009), the Alfred P. Murrah Federal Building bombing in Oklahoma City (e.g., North et al., 2004; Pfefferbaum et al., 2001), and,

most prolifically, the September 11, 2001 (9/11) attacks on the World Trade Center (WTC) in New York City and the Pentagon Building in Washington D.C (e.g., Schlenger et al., 2002; Schuster et al., 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002; Silver, 2011). Other work has focused less extensively on the Madrid bombing of 2004 (e.g., Conejero & Etxebarria, 2007), the 2005 bombings of the London transportation network (e.g., Brewin et al., 2010), among other events. Many of these studies have used epidemiological methods to describe responses throughout the population. This flourishing area of research has tangible implications for those seeking to mitigate the physical and mental health burdens often associated with acts of terrorism.

### **Commonly Studied Outcomes**

Posttraumatic Stress Disorder (PTSD) and Posttraumatic Stress Symptoms (PTS) are by far the most commonly studied outcomes after terrorist acts (e.g., Shalev et al., 2012). As stated in the DSM-IV-TR (American Psychiatric Association, 2000)<sup>1</sup>, a diagnosis of PTSD requires direct exposure to a traumatic event involving actual death or injury to oneself or the direct witnessing of such an event to another (Criterion 1A), with associated fear, helplessness or horror (Criterion A2). A PTSD diagnosis also requires at least one re-experiencing (Criterion B) symptom (e.g., nightmares, persistent or recurring memories of the event), three or more avoidance symptoms (Criterion C; e.g., difficulty remembering details of the event, emotional numbing), and two or more hyperarousal symptoms (Criterion D; e.g., startles easily, difficulty sleeping). Importantly, given that PTS symptom structure in those both directly and indirectly (e.g., watched media coverage of the event, heard a personal narrative) exposed to terrorist attacks is strikingly similar, (Suvak, Maguen, Litz, Silver, & Holman, 2008), the utility of

---

<sup>1</sup> Although revisions have been made to diagnostic criteria in the new 2013 DSM-V, since the extant literature uses DSM-IV or DSM-III guidelines for probable-PTSD diagnosis, DSM-V criteria will not be addressed in this entry.

relying on Criterion A as a prerequisite for a PTSD diagnosis has been questioned (Brewin, Lanius, Novac, Schnyder, & Galea, 2009). Consequently, to capture symptomatology in the broader population, researchers often examine Posttraumatic Stress (PTS) after terrorist attacks, which measures traumatic stress responses without the use of Criterion A. Such issues are particularly important in the context of terrorism, where the intention is to frighten and intimidate large populations and the vast majority of those impacted are indirectly exposed.

Other commonly studied outcomes include acute stress reactions (e.g., Gil-Rivas, Holman, & Silver, 2004; Holman et al., 2008), anxiety disorders (e.g., DiMaggio, Galea, & Richardson, 2007), general distress (e.g., Shalev et al., 2012), functional impairment (e.g., Neria et al., 2013; Shalev et al., 2012; Silver et al., 2002), depression (e.g., Henrich & Shahar, 2008), ongoing fear and worry about future attacks (e.g., Holman & Silver, 2005; Silver et al., 2002), and changes in political views (e.g., Huddy & Feldman, 2011; Morgan, Wisneski, & Skitka, 2011; Torabi & Seo, 2004). Behavioral and attitudinal shifts, which can have important lifestyle and public health implications, have also been examined. For example, after the 2005 London transportation network bombings, 23% of people reported that they felt unsafe on public transit, and 76% intended to travel less as a result of the bombing (Rubin, Brewin, Greenberg, Simpson, & Wessely, 2005). Similarly, after 9/11, anxiety about future terrorist attacks was positively correlated with choices congruent with a more sedentary lifestyle (e.g., more time spent indoors, tendency to watch more television) (Torabi & Seo, 2004).

While the majority of research on terrorism has focused on psychopathology and other deleterious psychosocial outcomes, positive and adaptive responses have also been studied. In the wake of a terrorist attack, some report a better appreciation of life, more meaningful personal relationships, changed priorities, and a richer existential or spiritual life (Tedeschi & Calhoun,

2004). For example, in a nationally representative sample, 57% of Americans reported perceived societal benefits (e.g., increased political or religious engagement, prosocial behavior) that occurred following 9/11 (Poulin & Silver, 2009). Similarly, a review by Morgan and collaborators (2011) noted that prosocial behaviors such as donating blood and money and patriotism increased after 9/11.

Research on resiliency (i.e., ability to rebound after distress-inducing adversity) and resistance (i.e., psychological “immunity” to the negative impact of adversity) is important given that positive adjustment is frequent (Bonanno, Galea, Bucciarelli, & Vlahov, 2006; Curran, 1988; Schlenger et al., 2002; Silver et al., 2002). For example, in a population-based study of 2,752 New York residents conducted approximately 6 months after 9/11, resilience was common; high resilience was indicated in 65.1% percent of sample, and 33% failed to endorse more than one symptom of PTSD (Bonanno et al., 2006). Yet not all studies have found such widespread positive adaptation. In a longitudinal, representative sample of Israeli Jews and Arabs during the Second Intifada (2004-2005), a time of heavy terrorist and rocket attacks, only 22.1% of participants exhibited resistance, a minority exhibited resilience, and the majority (54%) exhibited a chronic distress trajectory (Hobfoll et al., 2009). Variability in these profiles could be explained by a number of factors; better outcomes were associated with being male, Jewish (i.e., not the minority in Israel), higher income, higher education, less psychosocial resource loss, and less economic loss (Hobfoll et al., 2009). These findings may provide useful information to help capitalize on people’s natural strengths in the aftermath of terrorism and may help identify people less likely to exhibit resilient or resistant responses. This may help guide the design, implementation, and distribution of interventions to increase adaptive responses in the population.

In a related vein, posttraumatic growth (PTG), or positive psychological change experienced as a result of the struggle with highly challenging life circumstances has been documented after terrorist attacks (Pooley, Cohen, O'Connor, & Taylor, 2012; Tedeschi & Calhoun, 1996). Of note, while PTG and resilience might both be viewed as "positive outcomes" associated with exposure to negative events, they are best viewed as distinct concepts. As indicated in a study of adolescents, citizens, and army personnel exposed to terror in Israel and after the second Lebanon War, PTG and resilience were inversely correlated (Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009). This suggests divergent processes driving such outcomes, and that perhaps the process of managing distress symptoms and overcoming them leads to enhanced psychological development.

Every terrorist act, by definition, has directly and indirectly exposed targets. As a result, it is important to consider the impact of these acts on directly exposed and indirectly exposed people. Without considering the full range of intended targets we cannot accurately understand the toll terrorism takes on human mental and physical health.

### **Effects of Direct Exposure**

**Mental Health Consequences.** Those directly exposed to terrorist attacks are at risk for mental and physical health problems--effects that are frequently linked (Holman et al., 2008; Nair et al., 2012) and may influence each other in a bidirectional manner (Robinson, 2003; Sharp & Harvey, 2001). After the 9/11 terrorist attacks, many rescue workers were involved in the clean-up and recovery efforts and subsequently developed associated mental health problems. In a study of 28,962 WTC disaster workers, prevalence of PTSD was 12.4%; greater risk was correlated with less preparation and training, earlier start date, and longer duration of service (Perrin et al., 2007). After 9/11, of those enrolled in the WTC Health Registry (described above),

24.5% reported both lower quality of life and more unmet mental health needs (Nair et al., 2012). After controlling for demographic and 9/11-related exposures, participants with lower respiratory symptoms (LRS) were more than 4 times as likely to have met criteria for PTSD; those with lower quality of life 2-3 years after 9/11 were more likely to have died 5-6 years post-9/11. Such findings illustrate the link between physical health problems, stress physiology, emotional states, and psychopathology.

A growing body of research has demonstrated the lack of a clear dose-response relationship between exposure to terrorist attacks and mental health outcomes. In a study of residents from two suburbs of Jerusalem (one directly exposed to terrorist attacks and one indirectly exposed), both communities reported financial burdens, interruption of daily life, trauma exposure (although the directly exposed community reported more), and PTS symptoms (Shalev et al., 2006). Importantly, this study did not find a proximity effect; that is, rates of PTSD were not statistically different in directly and indirectly exposed populations. However, the authors acknowledge the potential for a “ceiling effect”, as both cities were located relatively close to Jerusalem, where terrorist attacks frequently occur. Similarly, degree of exposure to terrorism was unrelated to traumatic stress-related (TSR) symptoms in a nationally representative sample of Israeli adults (Bleich, Gelkopf, & Solomon, 2003). As was true in Ireland, where a long history of terrorism exists, cultural factors or habituation may offer a partial explanation for these findings. Most recently, researchers demonstrated that extended exposure to media coverage of the Boston Marathon bombings (6 or more hours per day in the week following the attack) was associated with higher levels of acute stress symptoms than was direct exposure (being at or having a loved one present at the bombings; Holman, Garfin, Silver, 2013). These

findings raise questions about the meaning and impact of “direct” exposure and suggest the need for a more nuanced definition of exposure.

After exposure to any traumatic event, including terrorist attacks, many people’s psychological distress will abate over time. However, for others symptoms will persist or subsequently emerge. For example, in a longitudinal study of survivors of the 1974 terrorist attack on Ma’a lot, Israel, where a group of high-school children were taken hostage, a vast majority of survivors reported persistent event-related PTS over 17 years later (Desivilya, Gal, & Ayalon, 1996). Similarly, while WTC disaster recovery workings exhibited substantial reduction between assessments taken at 1-2 years, 3-4 years, and 5-6 years post-attacks, many workers continued to present with symptoms and others experienced delayed-onset PTSD (Cukor et al., 2011). A study of firefighters and emergency medical service workers 7-9 years post-9/11 found that 7% still met criteria for probable-PTSD and 19.4% had probable depression (Webber et al., 2011). Ongoing exposure may be especially distressing over time: in a sample of 709 Israeli Jews and Arabs exposure to ongoing terrorism following the Second Intifada was associated with chronic distress in majority (54.1%) of participants (Hobfoll et al., 2009).

**Consequences for Physical Health.** Terrorist attacks cause physical injury to the individuals who are the direct recipients of the violent act. Prior to 9/11, the Murrah Federal Building bombing killed more people than any previous act of terrorism on American soil; 167 people died and 592 sustained injuries (Mallonee et al., 2013). However, the 9/11 attacks were unprecedented in terms of the number of casualties and physical injuries, and damage to the physical landscape. The plane crash, subsequent collapse of the twin towers, smoldering fires, and removal of debris spewed chemical contaminants, glass, steel, cement, fires, and jet fuel over the densely populated Manhattan area, impacting the respiratory health of those exposed

(Landrigan et al., 2004). The people most at risk included firefighters and other first responders, although residents from the surrounding areas were also impacted. A survey conducted on 2,812 residents approximately 12 months after the attacks found that 55.8% of residents in the highly exposed area closest to Ground Zero developed respiratory problems, compared to 20.1% in a control area (Reibman et al., 2004). Of relevance to mental health outcomes, environmental contaminants may have interacted with the psychological stress of experiencing the terrorist attacks, as indicated by studies linking 9/11-related PTSD and respiratory problems (e.g., asthma) (Fagan, Galea, Ahern, Bonner, & Vlahov, 2003). Such effects did not necessarily wane over time. Exposure to 9/11 was associated with both asthma and PTS symptoms 5 to 6 years after the WTC collapse; in analyses of a longitudinal cohort study that drew on data from the World Trade Center Healthy Registry (the largest post disaster registry in US history, N=71,437), asthma and PTS symptoms often co-occurred in individuals directly exposed to the attacks (e.g., office workers, those involved in the rescue efforts, passersbys) (Brackbill et al., 2009; Nair et al., 2012).

Data from the WTC Health Registry study further suggests that standardized mortality ratios for rescue workers and non-rescue workers were actually *lower* than those for the New York City region overall (Brackbill et al., 2011). However, exposure to the dust near the WTC attacks was associated with increased risk for severe headaches, skin rash, heartburn, heart disease, and stroke when respondents were compared to those who had not been exposed to the dust (Brackbill et al., 2006; Jordan et al., 2011). Indeed, respondents who (a) were not involved in the rescue/recovery and (b) reported intermediate/high levels of WTC dust/debris exposure had *higher* mortality when compared to respondents with low exposure. This finding appeared to be driven largely by greater cardiovascular mortality in the highly exposed group (Brackbill et

al., 2011). These findings need to be considered cautiously, however as the convenience sample included only 14% of eligible respondents all of whom volunteered for the study. Importantly, the “pre-9/11” health data were retrospectively recalled 2 years after the 9/11 attacks (Brackbill et al., 2006). Nonetheless, these results suggest important implications for health care service utilization, which may increase throughout the population following acts of terrorism (Holman & Silver, 2011). For example, a study of 444 Manhattan residents examined hospital administrative records and found that health service utilization, outpatient visits, and functional impairment increased the year following 9/11; greater loss was correlated with worse outcomes (e.g., more missed work, greater psychological distress) (Neria et al., 2013). More directly, terrorist attacks often target health care facilities, creating an immediate impediment for those seeking treatment, and halting treatment for people who may have been under medical care prior to the attacks. In Ireland in the 1980s, terrorists frequently used this tactic, targeting health care workers and hospitals, which resulted in broad and detrimental health consequences throughout the community (Zwi & Ugalde, 1989). Moreover, besides directly harming the physical health of those in need of health care, such actions generate anxiety in the population regarding the ability to access necessary services.

### **Effects of Indirect Exposure**

**Mental Health Consequences.** Terrorist attacks, when considered in the context of the increasingly media saturated nature of our society, stand in stark contrast to traditional warfare. People geographically distant from terrorist events are indirectly exposed through radio, television, print, and social media. This allows for events to be transmitted rapidly and as they occur (Silver & Matthew, 2008) and for repeated exposure to disturbing images (Ahern, Galea, & Resnick, 2002). Indeed, over 60% of Americans watched the 9/11 terrorist attacks occur live

on television (Silver et al., 2002). Many repeatedly saw the planes crashing into the WTC or people falling or jumping from the towers in post-attack news coverage (Ahern et al., 2002). Such indirect exposure can have striking physical and mental health consequences. Research conducted after the Oklahoma City Murrah Federal Building bombings first provided convincing evidence that individuals indirectly exposed to terrorism could exhibit symptoms typically associated with direct exposure to traumatic events. Seven weeks after the bombing, television exposure was correlated with PTS in middle school students without physical or emotional exposure to the event (Pfefferbaum et al., 2001); these effects extended to print media as well (Pfefferbaum et al., 2003).

Research conducted after the September 11<sup>th</sup> terrorist attacks significantly expanded this research and stood in blunt contrast to traditional views of post-disaster mental health, which predict a linear relationship between proximity to a traumatic event and psychological distress (Marshall et al., 2007). The psychological effects of 9/11 were evident across America (Schuster et al., 2001) and even extended to other continents, as school children in London reported PTS associated with 9/11-related television exposure (Holmes, Creswell, & O'Connor, 2007). Throughout America, increased 9/11 television coverage, as well as specific gruesome images, were positively associated with 9/11-related PTS (Ahern et al., 2002; Bernstein et al., 2007; Schlenger et al., 2002). Effects persisted for years after the attacks; the amount television exposure in the week following 9/11 was positively associated with PTS symptoms and physical health problems 2-3 years later (Silver et al., 2013). Furthermore, terrorism-related media exposure may promote distress long after the event's initial occurrence. For example, those who watched more anniversary coverage of 9/11 exhibited higher PTSD and were more at risk for developing delayed-onset PTSD one year post-attacks (Bernstein et al., 2007).

Research conducted after other terrorist attacks echoed these findings, although not conclusively. For example, after the 2005 London transportation network bombings, 31% of people in a representative sample of Londoners reported substantial stress (Rubin et al., 2005). In contrast, two days after the Dimona bombings in Israel, researchers conducted a telephone survey of randomly sampled adults, stratified by proximity, and found that distress symptoms (anxiety, stress, fear) were higher in those geographically closer to the event (Amital, Amital, Shohat, Soffer, & Bar-Dayana, 2012). These findings suggest that after a terrorist attack, geographic proximity may have a stronger effect in the immediate aftermath, due to secondary stressors that interrupt daily life and essential services or a variety of other factors. Proximity may matter less after the debris has been cleared and basic services restored, but the psychological residue remains (Amital et al., 2012). Taken together, these findings have important implications for post-disaster intervention: in the immediate aftermath, it may be important to focus efforts on restoring basic services, while other forms of psychosocial intervention should be distributed more widely as time progresses.

Indirect exposure can occur through other methods besides media exposure. For example, in a sample of relief workers who were either directly exposed or indirectly exposed through survivor narratives, acute PTSD (less than 3 months) was found in 4.6% of those who heard survivor narratives and 6.4% of those directly exposed; 6-8 months later none met criteria for full PTSD (Zimering, Gulliver, Knight, & Keane, 2006). Such striking resilience could be explained by a combination of intervention, pre-9/11 trainings, and the personal disposition of those who choose to be recovery workers. Future research on the relationship between indirect exposure and response is essential given this body of evidence.

**Physical Health Consequences.** As the connection between mental states and physical health is increasingly accepted, it is important to consider the link between terrorism-related distress in indirectly exposed individuals and subsequent physical health consequences. For example, after 9/11, health care utilization increased dramatically, and not just for the direct victims of the attacks (Holman & Silver, 2011). Psychological reactions in the immediate aftermath of an event may have long-term implications for physical health: among those both indirectly and directly exposed to 9/11, more severe acute stress reactions predicted significantly increased incidence of cardiovascular problems three-years after the attacks (Holman et al., 2008). Early indirect television-based exposure to reports about the 9/11 attacks was associated with increased incidence of physical ailments over the 3-years following 9/11 among respondents living all across the US (Silver et al., 2013). These findings are unique in that pre-9/11 health status collected *before* 9/11 was included in the analyses, thus demonstrating increases in physical health ailments over 3 years following the attacks. The health consequences of terrorism may even extend to the unborn: gestation during 9/11 was associated with increased male fetal death (Bruckner, Catalano, & Ahern, 2010); a cohort study indicated higher incidence of schizophrenia in babies born to mothers who were exposed to 3 days of aerial bombardment in their 2<sup>nd</sup> trimester during the Arab-Israel war of 1967 (Malaspina et al., 2008). In sum, there is a growing body of research demonstrating the negative health impacts of *indirect* exposure to terrorism. These findings suggest that widespread psychological terror does more than intimidate and instill fear. It may also translate into physiologic stress responses strong enough to trigger pathophysiology consistent with stress-related diseases.

### **Mechanisms of Adverse Responses**

An important theoretical and practical issue relates to the process by which exposure to terrorism is translated into physical and mental health outcomes. Drawing from perspectives from the cognitive sciences, risk appraisal, traumatic stress and psychopathology literature is the theory of relative risk appraisal, defined as the psychological processes linking exposure to terrorist events and subjective responses (Marshall et al., 2007). As viewed in the cognitive sciences, human perception is a multidimensional process, actively engaged in interpreting information from the environment. A “dose-response” perspective between proximity and response implements a classical behaviorist “stimulus-response” model that fails to account for the role of other factors that influence health outcomes (e.g., individual differences, social surroundings, prior experiences, and demographic factors) in the wake of a terrorist event. Through “catastrophic secondary appraisal”, information from the environment (which includes both direct and indirect exposure to an event) alters our views of potential threat. These catastrophic appraisals immediately following an event may predict subsequent PTSD (Engelhard, van den Hout, Arntz, & McNally, 2002). Another characteristic of terrorism that may influence cognitive processes and post-attack distress is that an individual or group of individuals are blameworthy in perpetrating terrorist acts; prospective research from the stress and coping literature has indicated attributing responsibility for a negative event to another person is associated with greater likelihood of subsequent PTSD and greater distress (Delahanty et al., 1997).

A large body of research suggests that biological mechanisms may partially explain variability in health outcomes. Such ideas stem from landmark work done in the 1920s indicating that neurobiological systems are rapidly activated by an individual’s perception of threat and by strong emotions (Cannon & Britton, 1925). Terrorism may simultaneously act as both an acute

and chronic stressor, generating physiological symptoms associated with the acute stress responses (immediate feeling of danger during and immediately after the attacks) and chronic stressors (which may occur as society deals with practical problems resulting from the destructive acts as well as the ongoing feeling of dread). As people appraise the environment as threatening, multiple components of the stress response may be activated (McEwen, 1998; 2007); such appraisals may similarly occur for both directly and indirectly exposed individuals. Variability in these responses is likely to have a genetic component that may help explain why some people react strongly and experience negative physical health problems as a result of their acute stress response while others adapt less detrimentally (Holman, 2012). Indeed, one need not experience terrorism directly to demonstrate genetic susceptibility to stress-related mental and physical health problems (Holman, 2012; Holman, Lucas-Thompson, Lu, 2011).

### **Coping**

Individuals exhibit wide variability in coping strategies after a traumatic event (Wortman & Boerner, 2007; Wortman & Silver, 1989). Coping after a terrorist attack may be a product of culture, individual differences, and available resources. A common response is seeking support from other people. After the Nairobi bombings in Kenya, the vast majority (93%) reported using relatives and friends for emotional support; other common responses included seeking professional health care services (64%), turning to religion (48%), medication (35%), and alcohol use (11%); most used more than one source (Zhang et al., 2013). After the London subway bombings, 75% of people reported a desire to contact others (Rubin et al., 2005). Such support seeking may be quite adaptive. Social support appeared to buffer Israeli middle school students from depression following terror attacks by Qassam rockets (Henrich & Shahar, 2008). In a related vein, Mehl and Pennebaker (2003) found, perhaps surprisingly, that after 9/11

number of daily social interactions did not increase. However, dyadic and in-person interactions increased, suggesting specificity in the use of social support following acts of terrorism (Mehl & Pennebaker, 2003).

Use of various coping strategies has been differentially associated with positive and negative outcomes. Spirituality (an individual's self-perceived commitment to spiritual practices) and religiosity (active participation in religious social structures) predicted more positive physical and mental health outcomes in a national sample of Americans after 9/11 (McIntosh, Poulin, Silver, & Holman, 2011). Other strategies have been associated with negative outcomes; Silver and collaborators (2002) found that after 9/11, avoidant coping (e.g., giving up, denial, self-distraction) and disengaging from coping strategies predicted subsequent PTS. Moreover, the efficacy of coping strategies may be culturally specific. In a study of 913 Israeli adolescents exposed to terrorist attacks, problem solving strategies were correlated with positive outcomes, while emotion focused coping was associated with PTS and mental health problems (Braun-Lewensohn et al., 2009). The authors note that problem-focused coping might be particularly adaptive in places like Israel where there are constant threats of terrorism.

### **Associations with Subsequent Stressors**

Reactions to terrorism may also be impacted by negative life events that occur after the event and may also influence reactions to future collective stressors. After 9/11, delayed onset-PTSD and non-remittance of symptoms was predicted by negative life events that happened since the initial attacks (Adams & Boscarino, 2006). Reactions to 9/11 have also been linked to responses to subsequent stressors: in a nationally representative sample of 975 Americans, 9/11-related PTS 7 years post-attacks predicted distress following the 2008 economic meltdown (Garfin, Poulin, Blum, & Silver, in press).

### **Policy Implications and Future Directions**

The past several decades have seen a proliferation of research examining predictors of physical and mental health outcomes following acts of terrorism. Advances have been made in describing prevalence of, and variability in, maladaptive and adaptive responses. Such research has the potential to advance theories regarding exposure to traumatic events more generally, and may help inform the design of evidence-based interventions and more appropriately distributed post-event relief services. Identifying predictors of resilience, resistance, and long-term distress is important as policy makers and health care providers seek to mitigate the far-reaching effects of these heinous acts. A number of advances have been made in the development of evidenced-based practices and interventions following terrorist acts, as detailed in a recent review by Watson, Brymer, and Bonanno (2011). Examples include Psychological First Aid (PFA) which seeks to reduce distress and provide practical information after a disaster (see Watson, Brymer, & Bonanno, 2011), and community-based cognitive therapies, effective in Northern Ireland after the Omagh bombing (Gillespie, Duffy, Hackmann, & Clark, 2002). More general practices may include ongoing assessments, case management, and the design of treatment portfolios for affected individuals (Neria et al., 2013).

Future research on terrorism should include more assessments in third world countries, where terrorist attacks are more frequent but less often empirically studied (Zwi & Ugalde, 1989). Work on long-term effects should continue and grow to include more longer-term assessments of potential physical health consequences of both direct and indirect exposure. Exploring biological or genetic differences is a particularly exciting area of future research that may help further explain variability in responses. Future research needs to push the boundaries defining “exposure” to include the myriad ways mass media is prolonging our terror-related

experiences and potentially enhancing the risk for its mental and physical health impacts (Holman et al., 2013). Building population resistance/resilience to terrorism's negative health effects requires clarification of the many interacting biological, personal, interpersonal, and societal processes affecting individual and community-level responses. Armed with this broader contextual understanding of the many ways terrorism affects us, we can develop targeted public health interventions that prevent its far-reaching and long-lasting effects.

## Biographies

**Dana Rose Garfin**, Ph.D. is a post-doctoral scholar at in the Department of Psychology and Social Behavior at the University of California Irvine (UCI), where she is project director for a study examining reactions to the 2013 Boston Marathon Bombings. She holds a Ph.D. and an M.A. from UCI as well as a B.A. from the University of Colorado from which she graduated Summa Cum Laude. She has worked with homeless populations in Denver, immigrant populations in Mexico, members of the Dine (Navajo) nation in Arizona, and Tibetan refugees in Northern India. Dana's current program of research focuses on how early negative life events and community disasters are associated with physical and mental health outcomes. Her research projects have included two studies that assess longitudinal psychosocial reactions to the 2010 8.8 magnitude Chilean earthquake; a longitudinal study of psychosocial development in 2,232 British children; and a National Science Foundation-funded longitudinal study of how turbulent social events (e.g., terrorist attacks, the economic crisis) are associated with mental health outcomes in a nationally representative sample of Americans. Dana has received seven awards for her dissertation research including the PERISHIP Fellowship in Hazards, Risks, and Disaster, a Grant-in-Aid from the Society for the Psychological Study of Social Issues, the Student Research Award from the International Society for Traumatic Stress Studies, The Newkirk Center for Science and Society Graduate Research Fellowship, The UCI Framework Program for Global Health Travel Award and the UCI Public Impact Fellowship (honorable mention). Dana has presented preliminary findings of her research at the Ministry of Health and at the Presidential Palace in Santiago, Chile and has worked with leaders at the Institute of Health and Futures and the Chilean Board of Assistance and Scholarships in Chile to translate empirical findings into public policy.

**E. Alison Homan, Ph.D., FNP** is an associate professor in Nursing Science, health psychologist, and family nurse practitioner with nearly 20 years of clinical experience. Over the past 25 years, Dr. Holman has been PI or co-PI on several community-based studies of coping with a variety of traumatic life events (e.g., incest, firestorms, war, terrorism, school shootings) that were funded by the National Science Foundation and the Josiah Macy Jr. Foundation. Her experiences in the pediatric intensive care unit providing care for traumatized children and their families led Dr. Holman to a career seeking to understand the psychological, social, and biological underpinnings that link the mental and physical health consequences of trauma exposure.

Dr. Holman received several early career awards for her work: the 1992 Outstanding Graduate Student Achievement Award for Research in Victimology from the Association for the Treatment of Sexual Abusers for her study of resilience in incest survivors; the 1994 Martha Newkirk Award for Excellence in Graduate Student Research and 1995 UCI Alumni Associations Lauds and Laurels Award Outstanding Graduate Student Research award for her dissertation research—a 2-year longitudinal study of coping with the 1993 Southern California firestorms. She subsequently received the Chaim Danieli Young Investigator Award from the International Society for Traumatic Stress Studies in 2001. Most recently, Dr. Holman received the prestigious Robert Wood Johnson Foundation Nurse Faculty Scholars award (2010-2013) to support a genetic extension of the prospective, 3-year longitudinal study of the mental and physical health consequences the September 11<sup>th</sup> terrorist attacks (9/11). Dr. Holman has successfully conducted multi-year studies of coping with trauma characterized by high rates of participation and low rates of attrition (retaining 80% of participants over 3 years). She has helped pioneer new approaches to conducting this research that include rapid entry into the field

to collect acute stress responses in real time, and Internet-based survey methodologies that provide representative samples of the American population and allow participants anonymity in responding to sensitive questions.

### **List of Relevant Web Pages**

International Society for Traumatic Stress Studies [www.istss.org](http://www.istss.org)

National Center for PTSD [www.ptsd.va.gov](http://www.ptsd.va.gov)

Psychology Beyond Borders [www.psychologybeyondborders.org](http://www.psychologybeyondborders.org)

**Cross References**

Anxiety, Panic and phobias

Coping with Stress

Culture and Mental Health

Demography and Mental Health

Depression

Posttraumatic Growth

Posttraumatic Stress Disorder

Psychophysiology

Religion, Spirituality, and Mental Health

Resilience

Stress

Stress Related Growth

Social Support

Toxins, Pollutants and Mental Health

## References

- Adams, R., & Boscarino, J. (2006). Predictors of PTSD and delayed PTSD after disaster: The impact of exposure and psychosocial resources. *The Journal of Nervous and Mental Disease, 194*(7), 485–493. doi:10.1097/01.nmd.0000228503.95503.e9.
- Ahern, J., Galea, S., & Resnick, H. (2002). Television images and psychological symptoms after the September 11 terrorist attacks. *Psychiatry, 65*(4). doi/abs/10.1521/psyc.65.4.289.20240
- Amital, D., Amital, H., Shohat, G., Soffer, Y., & Bar-Dayan, Y. (2012). Resilience emotions and acute stress reactions in the population of Dimona and the general population of Israel two days after the first suicide bombing attack in Dimona. *The Israel Medical Association Journal: IMAJ, 14*(5), 281–5.
- Berger, R., Pat-Horenczyk, R., & Gelkopf, M. (2007). School-based intervention for prevention and treatment of elementary students' terror-related distress in Israel: a quasi-randomized controlled trial. *Journal of Traumatic Stress, 20*(4), 541–551. doi:10.1002/jts.
- Bernstein, K.T., Ahern, J., Tracy, M., Boscarino, J.A., Vlahov, D., & Galea, S. (2007). Television watching and the risk of incident probable posttraumatic stress disorder: a prospective evaluation. *The Journal of Nervous and Mental Disease, 195*(1), 41–7.  
doi:10.1097/01.nmd.0000244784.36745.a5
- Bleich, A., Gelkopf, M., & Solomon, Z. (2003). Exposure to terrorism, stress-related mental health symptoms, and coping behaviors among a nationally representative sample in Israel. *JAMA, 290*(5), 612–20. doi:10.1001/jama.290.5.612

- Bonanno, G.A., Galea, S., Bucchiarelli, A., & Vlahov, D. (2006). Psychological resilience after disaster: New York City in the aftermath of the September 11th terrorist attack. *Psychological Science, 17*(3), 181–6. doi:10.1111/j.1467-9280.2006.01682.x
- Brackbill, R.M., Hadler, J.L., DiGrande, L., Ekenga, C.C., Farfel, M.R., Friedman, S., ... Thorpe, L.E. (2009). Asthma and posttraumatic stress symptoms 5 to 6 years following exposure to the World Trade Center terrorist attack. *JAMA, 302*(5), 502–16. doi:10.1001/jama.2009.1121
- Brackbill, R. M., Thorpe, L. E., DiGrande, L., Perrin, M., Sapp 2nd, J. H., Wu, D., ... & Thomas, P. (2006). Surveillance for World Trade Center disaster health effects among survivors of collapsed and damaged buildings. Morbidity and mortality weekly report. Surveillance summaries (Washington, DC: 2002), 55(2), 1-18.
- Braun-Lewensohn, O., Celestin-Westreich, S., Celestin, L.-P., Verleye, G., Verté, D., & Ponjaert-Kristoffersen, I. (2009). Coping styles as moderating the relationships between terrorist attacks and well-being outcomes. *Journal of Adolescence, 32*(3), 585–99. doi:10.1016/j.adolescence.2008.06.003
- Brewin, C.R, Fuchkan, N., Huntley, Z., Robertson, M., Thompson, M., Scragg, P., & Ehlers, A. (2010). Outreach and screening following the 2005 London bombings: usage and outcomes. *Psychological Medicine, 40*(12), 2049–57. doi:10.1017/S0033291710000206
- Brewin, C.R., Lanius, R.A., Novac, A., Schnyder, U., & Galea, S. (2009). Reformulating PTSD for DSM-V: life after Criterion A. *Journal of Traumatic Stres, 22*(5), 366–373. doi:10.1002/jts.
- Bruckner, T.A., Catalano, R., & Ahern, J. (2010). Male fetal loss in the U.S. following the terrorist attacks of September 11, 2001. *BMC Public Health, 10*, 273. doi:10.1186/1471-2458-10-273

- Cairns, E. D., & Wilson, R. (1989). Coping with political violence in Northern Ireland. *Social Science and Medicine*, 28(6), 621–624.
- Cannon, W., & Britton, S. (1925). Studies on the conditions of activity in endocrine glands. *American Journal of Physiology*, 72, 283–294.
- Conejero, S., & Etxebarria, I. (2007). The impact of the Madrid bombing on personal emotions, emotional atmosphere and emotional climate. *Journal of Social Issues*, 63(2), 273–287. doi/10.1111/j.1540-4560.2007.00508.x/full
- Cukor, J., Wyka, K., Mello, B., Olden, M., Jayasinghe, N., Roberts, J., ... Difede, J. (2011). The Longitudinal course of PTSD among disaster workers deployed to the World Trade Center following the attacks of September 11th. *Journal of Traumatic Stress*, 24(5), 506–514. doi:10.1002/jts.
- Curran, P. S. (1988). Psychiatric aspects of terrorist violence: Northern Ireland 1969-1987. *The British Journal of Psychiatry*, 153(4), 470–475. doi:10.1192/bjp.153.4.470
- Desivilya, H.S., Gal, R., & Ayalon, O. (1996). Brief report extent of victimization , traumatic stress symptoms , and adjustment of terrorist assault survivors: a long-term follow-up. *Journal of Traumatic Stress*, 9(4), 881–889.
- DiMaggio, C., Galea, S., & Richardson, L. D. (2007). Emergency department visits for behavioral and mental health care after a terrorist attack. *Annals of Emergency Medicine*, 50(3), 327–34. doi:10.1016/j.annemergmed.2006.10.021
- Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, 38(4), 319–45. doi:10.1016/S0005-7967(99)00123-0
- Engelhard, I. M., van den Hout, M.A., Arntz, A., & McNally, R. J. (2002). A longitudinal study of “intrusion-based reasoning” and posttraumatic stress disorder after exposure to a train

disaster. *Behaviour Research and Therapy*, 40(12), 1415–24. doi.org/10.1016/S0005-7967(02)00018-9

Fagan, J., Galea, S., Ahern, J., Bonner, S., & Vlahov, D. (2003). Relationship of self-reported asthma severity and urgent health care utilization to psychological sequelae of the September 11, 2001 terrorist attacks on the World Trade Center among New York City area residents. *Psychosomatic Medicine*, 65(6), 993–996.

doi:10.1097/01.PSY.0000097334.48556.5F

Garfin, D.R., Poulin, M.J., Blum, S., & Cohen, R.C. (in press). The aftermath of terror: A nationwide longitudinal study of posttraumatic stress across the 9/11 decade. *Journal of Traumatic Stress*.

Gelkopf, M., Berger, R., Bleich, A., & Silver, R. C. (2012). Protective factors and predictors of vulnerability to chronic stress: a comparative study of 4 communities after 7 years of continuous rocket fire. *Social Science and Medicine*, 74(5), 757–66.

doi:10.1016/j.socscimed.2011.10.022

Gillespie, K., Duffy, M., Hackmann, A., & Clark, D. M. (2002). Community based cognitive therapy in the treatment of post-traumatic stress disorder following the Omagh bomb. *Behaviour Research and Therapy*, 40(4), 345–357. doi:10.1016/S0005-7967(02)00004-9

Gil-Rivas, V., Holman, E.A., & Silver, R.C. (2004). Adolescent vulnerability following the September 11th terrorist attacks: a study of parents and their children. *Applied Developmental Science*, 8(3), 130–142. doi:10.1207/s1532480xads0803\_3

Henrich, C.C., & Shahar, G. (2008). Social support buffers the effects of terrorism on adolescent depression: findings from Sderot, Israel. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47(9), 1073–6. doi:10.1097/CHI.0b013e31817eed08

- Hobfoll, S.E., Canetti-Nisim, D., & Johnson, R. J. (2006). Exposure to terrorism, stress-related mental health symptoms, and defensive coping among Jews and Arabs in Israel. *Journal of Consulting and Clinical Psychology, 74*(2), 207–18. doi:10.1037/0022-006X.74.2.207
- Hobfoll, S., Palmieri, P., Johnson, R.J., Canetti-Nisim, D., Hall, B. J., & Galea, S. (2009). Trajectories of resilience, resistance, and distress during ongoing terrorism: the case of Jews and Arabs in Israel. *Journal of Consulting and Clinical Psychology, 77*(1), 1–21. doi:10.1037/a0014360
- Holman, E.A. (2012). Acute stress and cardiovascular health: is there an ACE gene connection? *Journal of Traumatic Stress, 25*(5), 592–597. doi:10.1002/jts.
- Holman, E. A., Garfin, D. R., & Silver, R. C. (2013). Media’s role in broadcasting acute stress following the Boston Marathon bombings. *Proceedings of the National Academy of Sciences*. doi/10.1073/pnas.1316265110
- Holman, E. A., & Silver, R. C. (2005). Future-oriented thinking and adjustment in a nationwide longitudinal study following the September 11th terrorist attacks. *Motivation and Emotion, 29*, 389–410.
- Holman, E.A., & Silver, R.C. (2011). Health status and health care utilization following collective trauma: a 3-year national study of the 9/11 terrorist attacks in the United States. *Social Science and Medicine, 73*(4), 483–90. doi:10.1016/j.socscimed.2011.06.018
- Holman, E.A., Silver, R.C., Poulin, M., Andersen, J., Gil-Rivas, V., & McIntosh, D.N. (2008). Terrorism, acute stress, and cardiovascular health. *Archives of General Psychiatry, 65*(1), 73–80. oi:10.1001/archgenpsychiatry.2007.6
- Holmes, E.A., Creswell, C., & O’Connor, T. G. (2007). Posttraumatic stress symptoms in London school children following September 11, 2001: an exploratory investigation of peri-

traumatic reactions and intrusive imagery. *Journal of Behavior Therapy and Experimental Psychiatry*, 38(4), 474–90. doi:10.1016/j.jbtep.2007.10.003

Huddy, L., & Feldman, S. (2011). Americans respond politically to 9/11: understanding the impact of the terrorist attacks and their aftermath. *The American Psychologist*, 66(6), 455–67. doi:10.1037/a0024894

Jordan, H. T., Brackbill, R. M., Cone, J. E., Debchoudhury, I., Farfel, M. R., Greene, C. M., ... & Stellman, S. D. (2011). Mortality among survivors of the sept 11, 2001, world trade center disaster: results from the world trade center health registry cohort. *The Lancet*, 378(9794), 879-887.

Jordan, H. T., Miller-Archie, S. A., Cone, J. E., Morabia, A., & Stellman, S. D. (2011). Heart disease among adults exposed to the September 11, 2001 World Trade Center disaster: results from the World Trade Center Health Registry. *Preventive Medicine*, 53(6), 370-376.

Landrigan, P. J., Liroy, P. J., Thurston, G., Berkowitz, G., Chen, L. C., Chillrud, S. N., ... Small, C. (2004). Health and environmental consequences of the World Trade Center disaster. *Environmental Health Perspectives*, 112(6), 731–739. doi:10.1289/ehp.6702

Lazarus, R. S., & Folkman, S. (1984). The stress concept in the life sciences. In *Stress, Appraisal, and Coping* (pp. 1–21). New York, NY: Springer Publishing Ccompany.

Levine, S., Laufer, A., Stein, E., Hamama-Raz, Y., & Solomon, Z. (2009). Examining the relationship between resilience and posttraumatic growth. *Journal of Traumatic Stress* 22(4), 282–286. doi:10.1002/jts.

Lin, S., Reibman, J., Bowers, J. a, Hwang, S.A., Hoerning, A., Gomez, M. I., & Fitzgerald, E. F. (2005). Upper respiratory symptoms and other health effects among residents living near

- the World Trade Center site after September 11, 2001. *American Journal of Epidemiology*, 162(6), 499–507. doi:10.1093/aje/kwi233
- Malaspina, D., Corcoran, C., Kleinhaus, K. R., Perrin, M. C., Fennig, S., Nahon, D., ... Harlap, S. (2008). Acute maternal stress in pregnancy and schizophrenia in offspring: a cohort prospective study. *BMC Psychiatry*, 8, 71. doi:10.1186/1471-244X-8-71
- Mallonee, S., Shariat, S., Stennies, G., Waxweiler, R., Hogan, D., & Jordan, F. (2013). Physical injuries and fatalities resulting from the Oklahoma City bombing. *JAMA: Journal of the American Medical Association*, 276(5), 382–387.
- Marshall, R. D., Bryant, R.A, Amsel, L., Suh, E. J., Cook, J. M., & Neria, Y. (2007). The psychology of ongoing threat: relative risk appraisal, the September 11 attacks, and terrorism-related fears. *The American Psychologist*, 62(4), 304–16. doi:10.1037/0003-066X.62.4.304
- McEwen, B. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine*, 338, 171–179. doi:10.1056/NEJM199801153380307
- McEwen, B. S. (2007). Physiology and neurobiology of stress and adaptation: central role of the brain. *Physiological Reviews*, 87(3), 873–904. doi:10.1152/physrev.00041.2006
- McIntosh, D.N., Poulin, M.J., Silver, R.C., & Holman, E.A. (2011). The distinct roles of spirituality and religiosity in physical and mental health after collective trauma: a national longitudinal study of responses to the 9/11 attacks. *Journal of Behavioral Medicine*, 34(6), 497–507. doi:10.1007/s10865-011-9331-y
- Mehl, M., & Pennebaker, J. (2003). The social dynamics of a cultural upheaval: social interactions surrounding September 11, 2001. *Psychological Science*, 14(6), 579–585. doi:10.1046/j.0956-7976.2003.psci

- Morgan, G. S., Wisneski, D. C., & Skitka, L. J. (2011). The expulsion from Disneyland: the social psychological impact of 9/11. *The American Psychologist*, *66*(6), 447–54.  
doi:10.1037/a0024772
- Nair, H.P., Ekenge, C.C., Cone, J.E., Brackbill, R.M., Farfel, M.R., & Stellman, S.D. (2012). Co-occurring lower respiratory symptoms and posttraumatic stress disorder 5 to 6 years after the World Trade Center terrorist attack. *American Journal of Public Health*, *102*(10), 1964–73. doi:10.2105/AJPH.2012.300690
- Neria, Y., Olfson, M., Gameroff, M. J., DiGrande, L., Wickramaratne, P., Gross, R., ... Weissman, M. M. (2010). Long-term course of probable PTSD after the 9/11 attacks: a study in urban primary care. *Journal of Traumatic Stress*, *23*(4), 474–482. doi:10.1002/jts.20544.
- Neria, Y., Wickramaratne, P., Olfson, M., Gameroff, M. J., Pilowsky, D. J., Lantigua, R., ... Weissman, M. M. (2013). Mental and physical health consequences of the September 11 , 2001 (9/11) attacks in primary care: a longitudinal study. *Journal of Traumatic Stress*, *26*, 45–55. doi:10.1002/jts.
- Njenga, F. (2002). Focus on psychiatry in East Africa. *The British Journal of Psychiatry*, *181*(4), 354–359. doi:10.1192/bjp.181.4.354
- North, C.S., Pfefferbaum, B., Narayanan, P., Thielman, S., McCoy, G., Dumont, C., ... Spitznagel, E. L. (2005). Comparison of post-disaster psychiatric disorders after terrorist bombings in Nairobi and Oklahoma City. *The British Journal of Psychiatry*, *86*, 487–93.  
doi:10.1192/bjp.186.6.487
- North, C. S., Pfefferbaum, B., Tivis, L., Kawasaki, A., Chandrashekar, R., & Spitznagel, E. L. (2004). The course of posttraumatic stress disorder in a follow-up study of survivors of the Oklahoma City bombing. *Annals of Clinical Psychiatry*. doi:10.1080/10401230490522034

- Perrin, M. A., Digrande, L., Wheeler, K., Thorpe, L., Ph, D., Farfel, M., & Brackbill, R. (2007). Differences in PTSD prevalence and associated rescue and recovery workers. *American Journal of Psychiatry*, 164(9), 1385–1394. doi:10.1176/appi.ajp.2007.06101645
- Pfefferbaum, B, Nixon, S. J., Tivis, R. D., Doughty, D. E., Pynoos, R. S., Gurwitch, R. H., & Foy, D. W. (2001). Television exposure in children after a terrorist incident. *Psychiatry-Interpersonal and Biological Processes*, 64(3), 202–211.
- Pfefferbaum, B., Seale, T. W., Brandt, E. N., Pfefferbaum, R. L., Doughty, D. E., & Rainwater, S. M. (2003). Media exposure in children one hundred miles from a terrorist bombing. *Annals of Clinical Psychiatry* 15(1), 1–8. doi: 10.1023/A:1023293824492
- Pooley, J.A., Cohen, L., O'Connor, M., & Taylor, M. (2012). Posttraumatic stress and posttraumatic growth and their relationship to coping and self-efficacy in Northwest Australian cyclone communities. *Psychological Trauma: Theory, Research, Practice, and Policy*, 5(4) doi:10.1037/a0028046
- Poulin, M.J., & Silver, R. (2009). Finding social benefits after a collective trauma: perceiving societal changes and well-being following 9/11. *Journal of Traumatic Stress*, 22(2), 81–90. doi:10.1002/jts.
- Reibman, J., Lin, S., Hwang, S.A., Gulati, M., Bowers, J.A., Rogers, L., ... Fitzgerald, E. F. (2004). The World Trade Center Residents' Respiratory Health Study: new-onset respiratory symptoms and pulmonary function. *Environmental Health Perspectives*, 113(4), 406–411. doi:10.1289/ehp.7375
- Robinson, R.G. (2003). Poststroke depression: prevalence, diagnosis, treatment, and disease progression. *Biological Psychiatry*, 54(3), 376–387. doi:10.1016/S0006-3223(03)00423-2

- Rubin, G.J., Brewin, C.R., Greenberg, N., Simpson, J., & Wessely, S. (2005). Psychological and behavioural reactions to the bombings in London on 7 July 2005: cross sectional survey of a representative sample of Londoners. *BMJ*, *331*(7517), 606.  
doi:10.1136/bmj.38583.728484.3A
- Schlenger, W.E., Caddell, J.M., Ebert, L., Jordan, B.K., Rourke, K. M., Wilson, D., ... Kulka, R. A. (2002). Psychological reactions to terrorist attacks: findings from the national study of Americans' reactions to September 11. *JAMA*, *288*(5), 581–588.  
doi:10.1001/jama.288.5.581.
- Schmid, A.P. (2012). The revised academic consensus definition of terrorism. *Perspectives on Terrorism*, *6*(2). <http://www.terrorismanalysts.com/pt/index.php/pot/article/view/schmid-terrorism-definition>
- Shalev, A.Y., Ankri, Y., Israeli-Shalev, Y., Peleg, T., Adessky, R., & Freedman, S. (2012). Prevention of posttraumatic stress disorder by early treatment: results from the Jerusalem Trauma Outreach and Prevention study. *Archives of General Psychiatry*, *69*(2), 166–76.  
doi:10.1001/archgenpsychiatry.2011.127
- Shalev, A.Y., Tuval, R., Frenkiel-Fishman, S., Hadar, H., & Eth, S. (2006). Psychological responses to continuous terror: a study of two communities in Israel. *The American Journal of Psychiatry*, *163*(4), 667–73. doi:10.1176/appi.ajp.163.4.667
- Sharp, T. J., & Harvey, A.G. (2001). Chronic pain and posttraumatic stress disorder: mutual maintenance? *Clinical Psychology Review*, *21*(6), 857–77. doi:10.1016/S0272-7358(00)00071-4

- Silver, R.C., Holman, E.A., McIntosh, D.N., Poulin, M., & Gil-Rivas, V. (2002). Nationwide longitudinal study of psychological responses to September 11. *JAMA*, 288(10), 1235–1244. doi:10.1001/jama.288.10.1235.
- Silver, R.C. (2011). An introduction to “9/11: Ten Years Later.” *American Psychologist*, 427–428. doi:10.1037/a0024804
- Silver, R.C., Holman, E.A., Andersen, J.P., Poulin, M.J., McIntosh, D. N., & Gil-Rivas, V. (2013). Mental- and physical-health effects of acute exposure to media images of the September 11, 2001, attacks and the Iraq War. *Psychological Science*, 24(9), 1623–34. doi:10.1177/0956797612460406
- Silver, R.C., & Matthew, R. (2008). Terrorism. In V. N. Parrillo (Ed.), *Encyclopedia of social problems* (Vol. 2, pp. 926-929). Thousand Oaks, CA: Sage.
- Suvak, M., Maguen, S., Litz, B., Silver, R.C., & Holman, E.A. (2008). Indirect exposure to the September 11 terrorist attacks: does symptom structure resemble PTSD? *Journal of Traumatic Stress*, 21(1), 30–39. doi:10.1002/jts.
- Tedeschi, R.G., & Calhoun, L.G. (1996). The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. *Journal of Traumatic Stress*, 9(3), 455–71. doi: 10.1007/BF02103658
- Tedeschi, R.G., & Calhoun, L.G. (2004). Posttraumatic growth: conceptual foundations and empirical evidence. *Psychological Inquiry*, 15(1), 1–18. doi: 10.1207/s15327965pli1501\_01
- Torabi, M.R., & Seo, D.C. (2004). National study of behavioral and life changes since September 11. *Health Education and Behavior*, 31(2), 179–92. doi:10.1177/1090198103259183
- Watson, P.J., Brymer, M.J., & Bonanno, G.A. (2011). Postdisaster psychological intervention since 9/11. *The American Psychologist*, 66(6), 482–94. doi:10.1037/a0024806

- Webber, M., Glaser, M., Weakley, J., Soo, J., Ye, F., Zeig-Owens, R., ... Prezant, D. (2011). Physician-diagnosed respiratory conditions and mental health symptoms 7–9 years following the World Trade Center disaster. *American Journal of Internal Medicine*, *54*(9), 661–671. doi:10.1002/ajim.20993.
- Wortman, C.B., & Boerner, K. (2007). Beyond the myths of coping with loss: prevailing assumptions versus scientific evidence. In H. S. F. & R. C. Silver (Ed.), *Foundations of Health Psychology* (pp. 285–324). New York: Oxford University Press.
- Wortman, C.B., & Silver, R.C. (1989). The myths of coping with loss. *Journal of Consulting and Clinical Psychology*, *57*(3), 349–57.
- Zhang, G., North, C.S., Narayanan, P., Kim, Y.S., Thielman, S., & Pfefferbaum, B. (2013). The course of postdisaster psychiatric disorders in directly exposed civilians after the US Embassy bombing in Nairobi, Kenya: a follow-up study. *Social Psychiatry and Psychiatric Epidemiology*, *48*(2), 195–203. doi:10.1007/s00127-012-0535-4
- Zimering, R., Gulliver, S.B., Knight, J., & Keane, T. M. (2006). Posttraumatic Stress Disorder in disaster relief workers following direct and indirect trauma exposure to Ground Zero, *19*(4), 553–557. doi:10.1002/jts.
- Zwi, A., & Ugalde, A. (1989). Towards an epidemiology of political violence in the third world. *Social Science and Medicine*, *28*(7), 633–642. doi.org/10.1016/0277-9536(89)90210-4

**Suggested Reviewers**

Chris Brewin

William E. Schlenger

Randall D. Marshall