

# Psychological Trauma and Intermittent Explosive Disorder


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## Introduction

Human needs for safety, affiliation, respect, and autonomy are near universal, and when met, support striving, fulfillment, and subjective well-being (Maslow, 1943; Tay & Diener, 2001). Traumatic experiences thwart these needs and challenge beliefs about safety, justice, and self-worth. Traumatic events involve situations that are life threatening or overwhelm one's capacity for coping. During a life-threatening event, behaviors are mobilized to support survival in the form of freezing, fighting back, fleeing, or sheltering in place (Bracha, 2004; Cannon, 1932; Taylor et al., 2000). In the days and weeks following a traumatic event, sequelae such as disturbed sleep, heightened arousal, emotional lability, and intrusive recollections of the event are the norm (Shalev, 2002). Over time, these negative effects may dissipate and the individual may return to their pretrauma level of

functioning, thus recovering from the trauma. For some individuals, however, a traumatic experience sets into motion pervasive and lasting effects on identity, interpersonal relationships, and emotional and physiological functioning. A common long-term effect of trauma is increased anger and aggressive behavior—problems that have their roots in the cognitive, emotional, interpersonal, and physiological effects of the trauma. When the aggressive behavior is disproportionate, recurrent, and impairing, it may be diagnosed as intermittent explosive disorder (IED), a psychological disorder characterized by recurring and inappropriate aggressive outbursts. This chapter describes the relationship between trauma, aggression, and intermittent explosive disorder, and reviews phenomenology, cross-cultural studies of trauma and aggression, and theoretical perspectives.



## Psychological Trauma

Trauma has been described as a stressful experience that overwhelms one's capacity for coping (van der Kolk, 2000). When first defined in the Diagnostic and Statistical Manual of Mental Disorders-3rd Edition (DSM-III), trauma was considered to be an event that was psychologically distressing and "outside the range of usual human experience" (APA, 1980). Far from being rare, however, systematic investigations reveal trauma exposure to be quite prevalent in the general population. In fact most people (around 90%; Kilpatrick et al., 2013) experience a traumatic event in their lifetime, and exposure to multiple potentially traumatic experiences is also prevalent. The current DSM-5 defines trauma as an event that involves actual or threatened death, serious injury, or sexual assault, which can be experienced firsthand, witnessed, or learned about happening to a loved one (APA, 2013). This definition distinguishes trauma from other life stressors, such as job loss or divorce. An alternative classification system, the International Statistical Classification of Diseases (10th Edition; ICD-10; WHO, 1992) defines trauma more broadly as "a stressful event or situation...of an exceptionally threatening or catastrophic nature, which is likely to cause pervasive distress in almost anyone." Commonly experienced traumatic events include experiencing physical or sexual assault (53% lifetime prevalence), witnessing assault (33%), violent or accidental death of a loved one (52%), accident or fire (48%), and disaster (51%), based on national data weighted to estimate prevalence in the U.S. general population (Kilpatrick et al., 2013). Traumatic events can occur at any age; however, rates of exposure peak in late adolescence and early adulthood (Breslau, 2009). Risk

factors for exposure to trauma include lower education, low socioeconomic status, early conduct problems, and family history of psychopathology (Breslau et al., 1998; Breslau, Davis, & Andreski, 1995; Breslau, Davis, Andreski, & Peterson, 1991; Perkonig, Kessler, Storz, & Wittchen, 2000).

## Posttraumatic Stress Disorder

Experiencing psychological trauma is associated with increased rates of psychiatric disorders, including depression, anxiety, substance use disorders, and most notably, posttraumatic stress disorder (PTSD), which occurs in 6%–8% in the general population (Breslau, 2009; Frans, Rimmo, Aberg, & Fredrikson, 2005; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Kilpatrick et al., 2013). PTSD was formally recognized as a psychiatric diagnosis in the DSM-III in 1980, following lobbying by military veterans' groups and other stakeholders (Scott, 1990). Before that time, the constellation of symptoms comprising what we now recognize as PTSD was described in literature and historical accounts as “war neuroses,” “shell shock,” and “soldier’s heart,” among other terms. In the DSM-III, PTSD was characterized by three symptom “clusters”: *reexperiencing* symptoms, characterized by intrusive memories of the traumatic experience, nightmares, and traumatic flashbacks; *numbing*, reflected in diminished interest in activities and relationships and constricted affect; and *hypervigilance*, characterized by exaggerated startle response to surprising stimuli, irritability, poor sleep, survivor’s guilt, and traumatic amnesia. In DSM-5, the criteria include four symptom clusters that begin or worsen following a traumatic event: *intrusion* symptoms (e.g., intrusive memories, nightmares), *avoidance* (of thoughts and feelings, people and places associated with the traumatic event), *arousal* (sleep disturbance, irritability, hypervigilance), and *negative alterations in mood and cognition* (e.g., exaggerated negative beliefs about one’s self or the world). The latter cluster includes persistent negative beliefs about oneself, others, and the world, and distorted cognitions about the causes and consequences of the traumatic event. From its earliest inclusion in the DSM, the diagnosis of PTSD has required that the symptoms develop following a DSM qualifying trauma. Of course, stressful events falling outside of this definition also negatively impact health and behavior. Studies show that a variety of adverse experiences in childhood (ACEs) are associated with physical and mental health problems, violence risk, and aggression (Duke, Pettingell, McMorris, & Borowsky, 2010; Felitti et al., 1998; Matsuura, Hashimoto, & Toichi, 2013). Compared to earlier editions, the current DSM-5 criteria for

PTSD more explicitly recognize externalizing behavior problems associated with PTSD, specifically noting that angry outbursts, verbal and physical aggression, and other forms of risky and self-destructive behavior are common sequelae of trauma (APA, 2013).



## **Relationship Between Trauma, PTSD, and Aggression**

One of the first large-scale studies of PTSD was initiated in 1983 when the United States Congress commissioned a systematic study of Vietnam veterans. The purpose of the study, called the National Vietnam Veterans Readjustment Survey (NVVRS; Kulka *et al.*, 1988), was to estimate the prevalence of PTSD, comorbid conditions, and readjustment concerns, and to assess the healthcare needs of veterans, particularly those with PTSD, through the Veterans Health Administration system. The study revealed that the vast majority of veterans who developed chronic PTSD during the war experienced significant readjustment problems after leaving the military. Male veterans with the greatest exposure to war stress had higher rates of hostility and physical aggression than did civilian control subjects and the less trauma-exposed Vietnam era veterans. Forty percent of veterans with PTSD scored in the highest range on a measure of hostility and 25% had committed 13 or more physically aggressive acts in the prior year. Women veterans showed a different pattern: those with the greatest war exposure showed less physical aggression than their less exposed female veteran counterparts. In addition to problems with anger, veterans with PTSD reported lower overall life satisfaction, higher isolation, a higher rate of homelessness, and more arrests and incarcerations than veterans without PTSD. Men with PTSD reported more marital problems. Additionally, the spouses/partners of male veterans with PTSD self-reported more physical aggression compared to partners of those without PTSD. In summary, the NVVRS revealed significant morbidity and functional impairment among veterans with PTSD, including significant difficulties managing aggressive behavior.

Since the NVVRS, a robust body of research has both reaffirmed the links between trauma, PTSD, and aggression, and also further elaborated these relationships. Across numerous studies, veterans with PTSD evidence more anger, hostility, and aggression than veterans without PTSD (Beckham, Feldman, & Kirby, 1997; Chemtob, Hamada, Roitblat, & Muraoka, 1994; Frueh, Henning, Pellegrin, & Chobot, 1997; Lasko, Gurvits, Kuhne, Orr, & Pitman, 1994; Novaco & Chemtob, 2002). Furthermore, the relationship between PTSD and aggression is robust even

when excluding the irritability criteria from the PTSD diagnosis (Jakupcak, Hollie, & Felker, 2007; Novaco & Chemtob, 2002). Increased aggression is even observed in veterans with subthreshold PTSD symptoms (Jakupcak et al., 2007). PTSD is associated with both general aggression and intimate partner violence (IPV), which is aggression directed toward a current or former partner or spouse. Taft and colleagues examined general aggression and IPV by treatment-seeking combat veterans with and without partners. They found that partnered and nonpartnered combat veterans reported similar rates of general physical aggression (32% and 39%) in the past year and similar rates of general psychological aggression (81% and 87%). Among partnered combat veterans, 33% engaged in physical aggression toward their partner in the previous year, while 91% engaged in psychological aggression (Taft et al., 2009). Thus treatment-seeking combat veterans show similar rates of general aggression regardless of relationship status, and partnered veterans in this group show high rates of physical and psychological aggression. PTSD is also associated with aggression in civilians who have experienced trauma (including natural disaster, motor vehicle accident, violent crime, and sexual assault); among refugees and civilian survivors of war conflict; and among first responders (e.g., police and firefighters), who are exposed to traumatic events through their occupations (Andrews, Brewin, Rose, & Kirk, 2000; Ehlers, Mayou, & Bryant, 1998; Feeny, Zoellner, & Foa, 2000; Fincham, 2011; Hinton, Rasmussen, Nou, Pollack, & Good, 2009; Jayasinghe, Giosan, Evans, Spielman, & Difede, 2008; Meffert et al., 2008; Rees et al., 2013; Riggs, Dancu, Gershuny, Greenberg, & Foa, 1992; Silove et al., 2009). The robustness of the association between PTSD symptoms and aggression across both military and nonmilitary samples is supported by a meta-analysis of 39 studies, which showed an average correlation of 0.48 between PTSD symptoms and anger and 0.29 between PTSD symptoms and aggression (Orth & Wieland, 2006).

## Clinical Features of Anger and Aggression in PTSD

The development of PTSD symptoms following trauma exposure plays an important role in predicting problems with aggressive behavior. An important question in understanding trauma-related aggression in combat-exposed samples is whether participating in combat, which is a socially sanctioned form of violence, increases the risk of anger and aggression through socialization or normalization of aggressive behavior (Beckham et al., 1997; Hiley-Young, Blake, Abueg, Rozyanko, & Gusman, 1995). Studies that have controlled

for combat exposure find little or no direct impact of combat exposure on anger and aggression (Chemtob et al., 1994; Elbogen, Fuller, et al., 2010; Lasko et al., 1994). Instead, the effects of combat exposure on aggression appear to be related to increased severity of posttraumatic stress symptoms (Taft, Kaloupek, et al., 2007; Taft, Vogt, Marshall, Panuzio, & Niles, 2007). Anger and aggression are most associated with arousal/reactivity PTSD symptoms (Elbogen, Fuller, et al., 2010; King & King, 2004; Taft et al., 2009). This symptom cluster is characterized by autonomic and behavioral dysregulation and hyperreactivity to stimuli. The relationship of hyperarousal to PTSD is consistent with the role of arousal in aggressive behavior more generally (Zillmann, Katcher, & Milavsky, 1972).

Other factors that may impact aggression among trauma-exposed individuals are substance use, comorbid depression, and traumatic brain injury. Individuals diagnosed with PTSD have increased rates of substance use disorders (SUDs; Kessler et al., 1995; Kramer, Polusny, Arbisi, & Krueger, 2014). SUDs are independently associated with aggressive behavior and have been found to exacerbate aggression in individuals with PTSD (King & King, 2004). Some research by Elbogen et al. (2014) has attributed violence in PTSD to substance use, but other studies have found that PTSD symptoms (particularly hyperarousal) impact aggressive behavior both directly (independently) and indirectly via effects on substance use (Savarese, Suvak, King, & King, 2001; Taft, Kaloupek, et al., 2007). Likewise, a significant percentage of individuals with PTSD also meet criteria for major depressive disorder and have experienced traumatic brain injury (TBI; Breslau, 2009; Stein & McAllister, 2009), and evidence suggests that both depression (Sherman, Sautter, Jackson, Lyons, & Han, 2006; Taft et al., 2005) and TBI (Grafman et al., 1996) are risk factors for aggressive behavior. Taft et al. (2005) found that veterans with PTSD (PTSD+) who engaged in intimate partner violence (IPV) reported significantly more depression than PTSD+ veterans who did not engage in IPV, and also had greater trauma exposure. O'Donnell, Cook, Thompson, Riley, and Neria (2008) modeled the associations between trauma, PTSD, depression, and aggression, and found that PTSD symptoms mediated the relationship between trauma (wartime captivity) and physical and verbal aggression, and that depression severity moderated (i.e., strengthened) the relationship between PTSD symptoms and aggression (O'Donnell et al., 2008). Likewise, although TBI is associated with aggressive behavior and is common among individuals who have experienced trauma, multivariate analyses suggest that neither TBI nor loss of consciousness due to head injury significantly impacts

aggression (i.e., aggressive impulses, difficulty managing anger, or problems controlling aggressive behavior) above the effects of PTSD, based on research conducted on post-9/11 U.S. military veterans (Elbogen, Fuller, et al., 2010). Based on the research, PTSD symptoms are a key factor mediating the relationship between trauma exposure and aggression. While comorbidities such as alcohol use, depression, and TBI may exacerbate aggressive tendencies, they do not account for the relationship between trauma and aggression.

## PTSD and Intermittent Explosive Disorder

Epidemiological studies and studies of large community samples that assess IED provide evidence of comorbidity between PTSD and clinically significant aggressive behavior. In the National Comorbidity Study Replication (NCS-R), approximately 15% of adults with IED by DSM-IV criteria also had lifetime PTSD (see Chapter 4 on “Comorbidity” for data regarding PTSD and IED by DSM-5 criteria). Having a diagnosis of PTSD was associated with a threefold increase in the odds of also having a lifetime diagnosis of IED. In fact, this figure may underestimate the association between DSM-IV PTSD and IED in the general population because the criteria used to identify IED are narrower than the DSM criteria for IED, in that the NCS-R criteria focus on physically aggressive, and not verbally aggressive, behavior (Kessler et al., 2006). The National Comorbidity Study Replication-Adolescent Supplement (NCR-R-SA) estimated the lifetime prevalence of IED (narrowly defined as meeting criteria in a one-year period) among U.S. adolescents aged 13–17 to be 5.3%. PTSD did not show significant comorbidity with IED among adolescents, based on odds ratios. Approximately 6% of adolescents with narrowly defined lifetime DSM-IV IED also evidenced lifetime PTSD. Approximately 7% of adolescents with lifetime PTSD evidenced lifetime IED (McLaughlin et al., 2012). One reason for the lack of association at this age may be the relatively later average age of onset of PTSD relative to IED. Median age of onset for PTSD is around 23 years; for IED it is 15 years. By age 15, only about 25% of lifetime PTSD cases have developed. By age 20, 75% of IED cases have developed (Kessler et al., 2005). Still, McLaughlin et al. (2012) observed that among comorbid IED and PTSD cases, the first onset was of PTSD in about half of cases, higher than would be predicted based on age of onset data alone. Accordingly, there is evidence both that IED is a risk factor for later PTSD, and that PTSD is a risk factor for IED. A large study of adults with IED

recruited from the community showed significant comorbidity between IED and PTSD, with fourteen percent of subjects with IED also having PTSD during the lifespan (Fanning, Lee, & Coccaro, 2016). Individuals with IED often have extensive and diverse histories of trauma, including natural disasters, life-threatening traumas, and multiple trauma exposures. Exposure to multiple traumatic events is associated with greater odds of IED diagnosis (Fincham, 2011; Nickerson, Aderka, Bryant, & Hofmann, 2012; Silove et al., 2009).

## IED in the Aftermath of Political Violence

Research from across the globe supports the notion that anger is a central component of the response to trauma. Silove and colleagues (2009) have studied the impact of war conflict and its aftermath on the population of Timor-Leste (East Timor) in Southeast Asia. The history of the now independent state in the 20th century was characterized by extreme violent conflict as it transitioned to independence. The period of occupation by Indonesia from 1975 to 1999, in particular, was marked by human rights violations including mass killings, torture, systematic rape, arbitrary detention, forced displacement, starvation, and preventable disease (Silove et al., 2009). Since Timor-Leste became established as an independent nation in 2002, the country has been marked by alternating periods of peace and internal conflict and has experienced persistent socioeconomic and developmental challenges (Liddell et al., 2013). Silove and colleagues' research has documented the prevalence and phenomenology of postconflict IED in the Timor-Leste population.

The East Timor Mental Health Epidemiological Needs Survey (ETMHENS) studied men and women aged 18 and older in urban and rural areas of East Timor and assessed trauma exposure and psychological distress, including depression and PTSD. The survey also assessed the presence and frequency of "anger attacks," using indigenous language terms for sudden, explosive attacks of anger. Anger attacks, as described by Fava et al. (1991), represent episodes of intense anger that are excessive reactions to provoking events, often accompanied by physiological hyperarousal (Fava et al., 1991). Anger attacks are analogous to anger outbursts that are the basis for the IED diagnosis. Silove et al. (2009) examined data from five census tracts (1554 respondents, response rate 80%), all of which had been affected by the military conflict, to assess the prevalence and correlates of explosive anger in the population. The study respondents were highly trauma exposed, reporting a



mean number of 4.2 traumatic exposures and endorsing exposure to war-related traumas at high rates: house burnt down (scorched earth tactic; 59%), family members disappeared (36%), combat (33%), physically attacked (18%), saw loved ones murdered (18%), torture (11%), and unjust imprisonment (7%). Thirty-eight percent of the sample reported at least monthly explosive anger episodes. Among this group, the average number of anger attacks was thirteen per month. Episodes of explosive anger were described as sudden and extreme attacks of anger in response to minimal provocation. The anger was invariably accompanied by either verbal or physical aggression that was directed toward family members or others in the person's proximity. Respondents reported that they were significantly distressed by their anger episodes and experienced negative social consequences as a result. When asked, respondents attributed the anger to past injustices, desire for revenge, or social and economic stressors (Silove et al., 2009). These reports of recurrent impulsive, anger-driven aggression, that is out of proportion to the provocation, and that results in distress and impairment, map closely to the DSM criteria for IED. The concordance between the culturally specific assessment of explosive anger and IED as assessed by the Structured Clinical Interview for DSM-IV (SCID) IED module was confirmed in a follow-up study which showed a correct classification rate of IED of 91% (Liddell et al., 2013).

The rate of clinically significant explosive anger identified by Silove and colleagues was considerably higher than the estimated prevalence of post-traumatic stress (PTS; 5%) or clinically significant psychological distress (3%). However, most subjects with PTS (81%) and clinically significant distress (69%) also reported recurrent anger episodes. There was a "dose effect" of trauma exposure on anger attacks, and experiencing six or more traumas was particularly associated with recurrent anger attacks.

In a subsequent study by the same group, Rees et al. (2013) examined the prevalence and predictors of IED diagnosis among women living in Timor-Leste. The authors conducted an epidemiological survey of 2,964 urban and rural-living men and women and qualitative interviews with 77 women. They assessed psychiatric disorders (including IED, major depression, and PTSD); sociodemographic factors; and exposure to a range of stressors and traumas both gender specific and nonspecific. To assess trauma due to sexual violence researchers asked women whether they had experienced "trauma suffered specifically because you are a woman." The rate of IED among women was 12.2%, double the rate of the men surveyed (6.6%). Among women, meeting criteria for IED was associated with comorbid

PTSD diagnosis (tetrachoric correlation;  $r_{tet}=0.35$ ) and severe psychological distress ( $r_{tet}=0.41$ ). Fifty-nine percent of women with IED had psychiatric comorbidity. The authors examined the impact of various demographic factors, traumas, and stressors, on IED diagnosis in women using multiple logistic regression, controlling for PTSD and depression. Urban residency (OR = 2.0), illness (“feeling sick”; OR = 1.7), gender-based violence (incorporating sexual assault, rape or death threats related to respondents’ political behavior, and domestic violence; OR = 2.3), severe poverty (OR = 1.2), and preoccupation with past injustices (OR = 1.7) were associated with IED in the multivariate analysis. The results are notable for the high estimated prevalence of IED overall and the relatively higher prevalence in women, which is opposite of prevalence estimates in the United States (Kessler et al., 2006; Nickerson et al., 2012). Worldwide, men are disproportionately likely to experience combat through military service. However, women experience unique stressors during wartime because of gender-specific violence and stressors associated with women’s roles in society, including the disproportionate impact of extreme poverty. Silove and colleagues (Silove et al., 2009) propose a model for understanding the postconflict anger and aggression observed in Timor-Leste (see Theoretical Perspectives).

Researchers have also studied how conflict, interpersonal violence, and violations of human rights have impacted the development of PTSD and IED in postapartheid South Africa in the 2000s. Apartheid, a period of institutionalized racial segregation that ended in 1994, was characterized by state-perpetrated human rights violations (including politically motivated violence) that were met with both violent and nonviolent resistance. Additionally, postapartheid South Africa in the late 20th and 21st centuries has been characterized by very high rates of interpersonal violent crime, including high rates of homicide and sexual assault. A report by the European Institute for Crime Prevention and Control (Harrendorf, Heiskanen, & Malby, 2010) found that South Africa had the second highest homicide rate of 144 countries providing data, based on data collected in 2007 (Harrendorf et al., 2010).

The South African Stress and Health Study, a nationally representative study of adult men and women in South Africa (SASH;  $N=4351$ ; 2002–2004), was conducted to assess mental health in the general population. The study used the World Mental Health Composite International Diagnostic Interview (WMH-CIDI) PTSD module to assess lifetime exposure to trauma events, including to various forms of interpersonal violence. In addition, items assessing lifetime exposure to detention, torture, and politically

motivated assaults were added to assess exposure to politically motivated violence. Using data from the SASH study, Fincham et al. (2009) examined how sociodemographic factors and trauma exposure relate to IED in South Africa. The authors estimated the prevalence of broadly and narrowly defined IED (using the same measures and criteria as the NCS-R (Kessler et al., 2006) as 9.5% and 2.0%, respectively. Sixty-eight percent of respondents with narrow IED and 61% of those with broad IED met criteria for another DSM-IV disorder. In multivariate analysis, predictors of narrow IED included white race and mixed race, psychiatric comorbidity, and exposure to multiple (i.e., 6 or more) lifetime traumatic events. Exposure to one or more traumatic events was associated with increased odds of broad IED (i.e., three lifetime aggressive events, including 1 past-year event); however, only exposure to 6 or more traumatic events was associated with the more acute, recurrent aggressive behavior captured by narrow IED criteria. Data from this study showed similar prevalence rates for IED and PTSD. The study by Fincham and colleagues showed a dose effect of trauma on likelihood of aggressive behavior (i.e., broad IED); however, only repeated exposure to trauma (6 or more events) was associated with the persistent difficulty managing aggressive behavior that is characterized by IED. Although the authors did not assess whether PTSD or other mechanisms account for the link between trauma and IED, it is reasonable to predict, given the dose effect of trauma on PTSD symptom severity and the high rate of psychiatric comorbidity among those with IED, that these factors play a role in the relationship.

Studies focusing on civilian survivors of military conflict and political violence underscore the broad range of traumas that have been associated with aggression and IED and the diverse regions of the world in which this association has been observed. The high rate of clinically significant anger (38% in Timor-Leste) points to anger as a common posttraumatic reaction, even in the absence of diagnosed PTSD. Indeed, Silove et al. (2009) consider whether anger is a normative response to the type of extreme injustices widely experienced in Timor-Leste. East Timorese respondents themselves described posttraumatic anger as normal, but also as distressing and impairing (Silove et al., 2009). In fact, the extent to which posttraumatic reactions are normative reactions to extreme life events versus a failure to recover from a stressful event has historically been a central question about the PTSD diagnosis (Yehuda & McFarlane, 1995). Although diagnosing IED carries a risk of generating stigma and medicalizing a normative response to trauma, benefits of utilizing the diagnosis include identifying needs within the population for mental health and other support resources and facilitating individual

referrals for treatment. Given that IED requires *recurring* aggressive behavior, the diagnosis identifies individuals with persistent problems with aggression that are highly likely to recur in the future.

## Early Life Trauma and IED

Research in children and adolescents points to the impact of early experiences on development, health, behavior, and psychopathology across the lifespan. ACEs are stressful or traumatic experiences in childhood that may include abuse or neglect or types of household dysfunction, such as substance use, loss, or criminality within the family (SAMHSA, 2018). Children who experience ACEs are at greater risk for negative health and mental health outcomes later in life (Felitti et al., 1998). One category of ACE, childhood maltreatment, includes childhood experiences of physical, emotional, and sexual abuse, and emotional and physical neglect. Experiencing childhood maltreatment (CM) is associated with increased risk of psychopathology (Briere and Elliott, 2003; Green et al., 2010; Lobbestael, Arntz, & Bernstein, 2010; Scott, McLaughlin, Smith, & Ellis, 2012), aggression (Briere and Runtz, 1990; Dodge, Bates, & Peitit, 1990; Singer, Miller, Guo, Flannery, & Frierson, 1999; Song, Singer, & Anglin, 1998), and suicidal behavior (Miller, Esposito-Smythers, Weismore, & Renshaw, 2013; Silverman, Reinherz, & Giaconia, 1996). In the NCS-R U.S. epidemiological study, approximately 53.4% of respondents reported at least one childhood adversity (such events included maltreatment, parental maladjustment, interpersonal losses, childhood physical illness, and economic adversity; McLaughlin et al., 2012). The most commonly reported childhood adversities were parental divorce (17.5% of respondents), family violence (14%), and family economic adversity (10.3%). The prevalence of self-reported maltreatment in childhood was as follows: physical abuse (8%), sexual abuse (6%), and neglect (6%). Exposure to multiple forms of adversity was relatively common. Among respondents who reported any childhood adversity, the mean number of adversities was 3.2. McLaughlin et al. (2012) observed, using data from the NCS-R, that indices of childhood maltreatment, family violence, parental impairment (mental illness, substance use, and criminality), parental loss, and childhood physical illness, were significantly associated with the first onset of disruptive behavior disorders, including IED, in multivariate analyses (odds ratios: 1.5 to 2.0). Another large-scale study, this one in adolescents, mirrored these findings. The 2007 Minnesota Student Survey, an anonymous survey of 136,549 6th, 9th, and 12th grade students asked students about adverse experiences and about their involvement

in several types of aggressive and self-aggressive behaviors. The results showed that both CM-related childhood adversities and family dysfunction-related adversities (family alcohol- and drug-use and family violence) uniquely predicted self-reported aggressive behaviors (bullying, physical fighting, dating violence, and weapon-carrying) in both boys and girls (Duke et al., 2010). Furthermore, the number of types of adverse events students experienced had a cumulative effect on violent risk. Among girls, each reported type of adverse event increased the risk of violence by 38%–88%; among boys each adverse event type increased risk 35%–144%.

Traumatic events that are experienced early in life may have a particularly strong impact on the development of IED. Nickerson et al. (2012) analyzed data from the NCS-R study related to types of trauma exposure and age at first exposure. Data on trauma exposure were assessed using the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI), which assessed 26 unique types of traumatic exposures, including exposure to war-related traumas, accident-related traumas, disaster-related traumas, and interpersonal traumas, among others. In a multivariate analysis, lifetime diagnosis of IED was associated with male gender, number of reported lifetime traumas, lifetime diagnoses of PTSD and generalized anxiety disorder (GAD), and exposure to a first traumatic event during childhood but not adulthood. These results extend other research on comorbidity between PTSD and IED, and suggest that early exposure to trauma is a particularly robust predictor of IED. Nickerson et al. further found that, when considering the impact of different trauma types simultaneously, only interpersonal trauma predicted IED diagnosis, and it did so both when the exposure occurred in childhood and when it occurred in adulthood. The odds of developing IED, however, were significantly higher ( $OR = 3.55$ ) when the exposure occurred in childhood versus adulthood ( $OR = 1.78$ ). These results on interpersonal trauma are also somewhat at odds with other studies linking diverse trauma exposures and diverse adverse experiences to aggressive behavior. The results highlight, however, the strength of the relationship between early traumatic experiences and interpersonal traumatic experiences, and the type of persistent, recurring, and impairing aggressive behavior that is characterized by IED.

A study conducted by our own research group investigated the relationship between childhood maltreatment, aggression, and self-directed aggression in a large sample of adults that included healthy individuals with no psychopathology, adults with IED, and psychiatric control subjects (Fanning, Meyerhoff, Lee, & Coccaro, 2014). Psychiatric control subjects met criteria for one or more lifetime Axis I or II psychiatric diagnoses.

CM was assessed using the revised Childhood Trauma Questionnaire (Bernstein et al., 2003), which scores exposure to CM along five dimensions, including physical abuse and neglect, emotional abuse and neglect, and sexual abuse. Compared to healthy subjects (HC) and psychiatric controls (PC), IED subjects reported more extensive histories of physical abuse and neglect and emotional abuse and neglect. IED subjects reported more sexual abuse than HCs and marginally more sexual abuse than PCs. Psychiatric control subjects reported more extensive abuse and neglect across all categories than healthy subjects. Lifetime aggression scores and trait impulsivity scores were significantly correlated with all aspects of CM, with effect sizes ranging from  $r=0.18$  to  $0.44$  (small to moderate). Overall, maltreatment in childhood explained about 15% of the variance in both lifetime aggression and trait impulsivity. Multivariate logistic regression analyses assessed the unique relationships between aspects of CM and IED diagnosis, controlling for demographic differences. Among the five categories of CM, only physical abuse (as well as, marginally, emotional abuse) uniquely predicted IED diagnosis. Physical abuse remained a significant predictor of IED even after controlling for comorbid antisocial personality disorder (ASPD; Fanning et al., 2014). Previous research has associated physical abuse with a diagnosis of ASPD (Cohen et al., 2013; Lobbestael et al., 2010); however, not all individuals with ASPD display aggressive behavior. This study demonstrates that childhood physical abuse is a specific risk factor for persistent, impairing aggressive behavior (IED), over and above effects on antisocial or delinquent behavior.

Taken together, these studies suggest that a variety of adverse experiences in childhood are predictive of aggressive behavior, self-directed aggression, and disruptive behavior disorders. This includes both experiences that are considered traumatic by the DSM-definition (i.e., experiences that involve threat of death or serious injury) and other events that are considered adverse stressors that might not meet the DSM definition of a traumatic event. Although there is evidence that ACEs are related to aggressive and disruptive behavior, psychopathology, and poor health outcomes, there is a relative paucity of research on the relationship between ACEs and IED diagnosis.



## Theoretical Perspectives

Theoretical models address the link between trauma and aggression from several perspectives including neurobiological, genetic, cognitive-behavioral, and sociological. In seeking to account for the prevalence of IED among the East Timor population, Silove and colleagues have considered how

socioecological factors contribute to individual experiences of posttraumatic anger. Silove and Steel (2006) note that societies vary in their capacity to respond to disasters or conflicts. Conflicts are frequently followed by periods of chaos and disorder, and in many cases the community-level socioeconomic vulnerability predates the event. According to their model ADAPT (Adaptation and Development After Persecution and Trauma), conflicts and disasters disrupt key social domains including safety, social networks, justice, identities and roles, and institutions (political, religious, cultural, and social). Disruption of these domains compounds the trauma of the initial event and contributes to the development of posttrauma psychopathology (Silove & Steel, 2006). In the case of IED in Timor-Leste, Silove and colleagues propose that traumatic experiences of violence and persecution are compounded by frustrations related to the socioeconomic environment (such as high unemployment, poverty, and lack of access to health care), which serve to maintain the anger attacks even after the conflict has ended (Silove et al., 2009). Indeed, research by this group has found that postconflict distress mediates the relationship between trauma exposure and socioeconomic disadvantage and anger (Brooks, Silove, Steel, Steel, & Rees, 2011).

Focusing at the level of the individual, Miller and colleagues have observed that trauma-exposed individuals often develop psychopathology along internalizing or externalizing behavioral dimensions (Miller, Greif, & Smith, 2003; Miller, Kaloupek, Dillon, & Keane, 2004; Miller & Resick, 2007). The internalizing dimension is characterized by high negative emotionality and low positive emotionality, while the externalizing dimension is characterized by high negative emotionality and low behavioral control. Aggressive behavior among trauma-exposed individuals is often comorbid with other disinhibited behaviors such as substance abuse, impulsivity, and antisocial behavior. The symptom profile of trauma survivors, they propose, is explained by broad personality predispositions as well as genetic and environmental factors (Wolf et al., 2010). Indeed, there is evidence that certain specific genetic variations (e.g., MAO-A, FKBP5, ankyrin-3) interact with trauma exposure to increase aggression and other impulsive behaviors (Bevilacqua et al., 2012; Caspi et al., 2005; Logue et al., 2013; Waltes, Chiocchetti, & Freitag, 2016; Zannas & Binder, 2014).

Chemtob and colleagues have proposed a cognitive-behavioral “survival mode” theory of PTSD-related anger and aggression. The authors posit that individuals with PTSD continue to function in “survival mode” for an extended period after the traumatic event has ended (Chemtob et al., 1994; Chemtob, Roitblat, Hamada, Carlson, & Twentyman, 1988;

Novaco & Chemtob, 2002). This mode of functioning is adaptive for short time periods of actual acute threat; however, persistence of this mode of operating after the threat has passed is detrimental to adaptive functioning and results in the dysregulated emotions, physiology, and behaviors that are characteristic of PTSD. According to this hypothesis, perceived threats trigger “survival-mode” behavior; once engaged this behavioral response precludes more extensive cognitive processing of new events. Instead, cognitions are biased toward perceiving threats, and the result is increased vigilance and reduced self-monitoring. These response tendencies become entrenched through a positive feedback loop (Chemtob et al., 1988).

Like Chemtob’s survival-mode model, social information processing (SIP) theories posit that biased cognitive and emotional responses to social stimuli support maladaptive social behavior including aggression and IED (Arsenio, 2000; Coccaro, Fanning, Keedy, & Lee, 2016; Crick & Dodge, 1994; Dodge et al., 1990; Taft, Schumm, & Marshall, 2008). In early work on SIP, Dodge et al. (1990) found that deficits, such as poor encoding of social cues, limited accessing of prosocial response options, facilitated access to aggressive response options, and hostile bias in interpreting social cues accounted for much of the relationship between physical abuse and aggressive behavior in children (Dodge et al., 1990). Aggressive adults with IED exhibit hostile attribution bias, more negative emotionality, and report less efficacy for engaging in prosocial responses than nonaggressive adults. They also anticipate more favorable outcomes for aggressive behavior than nonaggressive adults (Coccaro et al., 2016). Now there is evidence of cognitive biases supporting aggression in populations with PTSD and trauma exposure. Taft et al. (2008) observed that SIP deficits were associated with both physical and psychological intimate partner violence by military veterans, and SIP biases appeared to mediate the relationship between childhood maltreatment, PTSD symptoms, and IPV perpetration (Taft et al., 2008). Other cognitive-behavioral theories focus on the role of distorted cognitions and beliefs in the maintenance of PTSD. Specifically, following a traumatic event, many individuals who develop PTSD acquire overgeneralized negative beliefs about trust, self-esteem, esteem for others, power and control, and intimacy (Herman, 1997; Monson et al., 2006; Resick & Schnicke, 1993). These beliefs function to insulate the individual from further trauma, but they are maladaptive when they are extreme (unrealistic or overly rigid) and when they interfere with affective expression that is needed to reconsolidate the traumatic memories (Resick, Monson, & Chard, 2008). In cognitive processing therapy these maladaptive schemas are called “stuck points” and resolving these stuck points is a



key focus of treatment. In prolonged exposure therapy for PTSD, developed by Foa and colleagues, anger is regarded as an avoidance strategy that facilitates emotional disengagement from traumatic memories. Although reinforcing in the short term, this coping strategy is maladaptive in the long term, as it contributes to the development and maintenance of PTSD (Feeny et al., 2000; Foa, Steketee, & Rothbaum, 1989; Jaycox & Foa, 1996; Riggs et al., 1992).

Research into the neurobiology of PTSD and IED has led to the development of neural circuit models of these disorders. Specifically, PTSD and IED are associated with characteristic variations in brain structure and function in common neural circuits, offering a potential explanation for the co-occurrence of PTSD and aggression. Specifically, individuals with PTSD show abnormal neural activity in brain regions associated with *emotional reactivity* to stimuli (amygdala and insula) and brain regions mediating *emotion regulation* (regions of prefrontal cortex [PFC] including the orbitofrontal cortex [OFC]; dorsolateral prefrontal cortex [DLPFC]; dorsomedial prefrontal cortex [DMPFC]; and ventrolateral prefrontal cortex [VLPFC]). Specifically, individuals with PTSD show *increased* blood oxygen-level dependent (BOLD) activity and regional cerebral blood flow (rCBF) in the amygdala (Liberzon et al., 1999; Rauch et al., 1996; Rauch et al., 2000; Shin et al., 2004; Shin et al., 2005) and insula (Rauch et al., 1996) and *decreased* response in OFC (Britton, Phan, Taylor, Fig, & Liberzon, 2005), medial PFC (Bremner, Narayan, et al., 1999; Bremner, Staib, et al., 1999; Shin et al., 2004; Shin et al., 2005), medial frontal gyrus (Shin et al., 2004), anterior cingulate cortex (ACC) (Bremner, Narayan, et al., 1999; Bremner, Staib, et al., 1999; Britton et al., 2005; Lanius et al., 2001; Lanius et al., 2003; Shin et al., 2004), and thalamus (Lanius et al., 2001; Lanius et al., 2003) to trauma-related stimuli and non-trauma-related threat stimuli (e.g., emotional faces). Studies find positive associations between symptom intensity and regional brain activation in the insula (flashbacks; Osuch et al., 2001), amygdala (total PTSD severity; Shin et al., 2004), PFC (inversely; Osuch et al., 2001; Shin et al., 2005), and medial frontal gyrus (inversely with total PTSD severity; Shin et al., 2004) during symptom provocation and emotion processing. Aggressive individuals, including those with IED, show impaired emotion regulation (Fettich, McCloskey, Look, & Coccaro, 2015) as well as abnormal brain structure and function in brain regions that support emotion regulation (Yang & Raine, 2009). Neuroimaging studies show that aggressive individuals have: (1) impaired frontal lobe functioning; (2) hyperactive amygdala activity in response to threat; and (3) abnormal connectivity between prefrontal regions and amygdala, disrupting emotion regulation (Anderson, Bechara, Damasio,

Tranel, & Damasio, 1999; Coccaro, Sripada, Yanowitch, & Phan, 2011; Davidson, 2000; Grafman et al., 1996; Yang & Raine, 2009). Accordingly, both PTSD and aggression are associated with abnormal brain functioning, including hyperreactivity in brain regions that support threat response and negative emotionality (e.g., amygdala and insula) and hypoactivity in regions that support emotion regulation (e.g., prefrontal cortex; Coccaro, McCloskey, Fitzgerald, & Phan, 2007; Etkin & Wager, 2007; McCloskey et al., 2016).



## Summary

Exposure to trauma affects individuals in all countries whether highly developed or socioeconomically vulnerable. Research shows that anger is a central feature of the response to trauma. Empirical evidence provides robust support for the relationship between trauma exposure, anger, and hostility generally, and also evidence that trauma contributes to the persistent, recurring, distressing, and disabling aggression that is characterized by the diagnosis of IED. Adversity and trauma influence aggression through multiple pathways, including family disruption, individual and community-wide socioeconomic vulnerability, and mental health. Risk factors for posttraumatic aggression include exposure to multiple traumas, PTSD symptoms, depression, substance use, and TBI. Persistent, recurrent aggression as defined by IED appears to be robustly influenced by exposure to multiple traumatic events, childhood physical abuse, and PTSD. Research conducted across cultures (primarily the United States, Timor-Leste, and South Africa) points to the universality of the relationship between trauma, anger, and aggression but also to cross-cultural differences in manifestations of posttrauma psychopathology. Although anger is a normative response to extreme trauma and injustice, identifying cases of IED has the potential to support recovery by identifying postdisaster community needs, identifying individuals at high risk for future aggressive behavior, and facilitating referrals to treatment, and, by so doing, interrupting the cycle of violence.

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