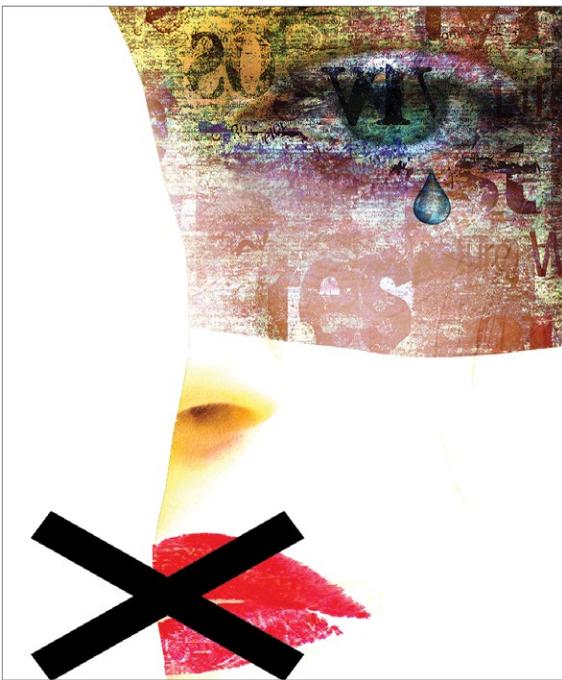


The lasting effects of childhood trauma



OLGA ZIGETTY IMAGES

Evidence-based interventions can help address PTSD, other symptoms in adulthood

Childhood trauma, which is also called adverse childhood experiences (ACEs), can have lasting detrimental effects on individuals as they grow and mature into adulthood. ACEs may occur in children age ≤ 18 years if they experience abuse or neglect, violence, or other traumatic losses. More than 60% of people experience at least 1 ACE, and 1 in 6 individuals reported that they had experienced ≥ 4 ACEs.¹ Subsequent additional ACEs have a cumulative deteriorating impact on the brain. This predisposes individuals to mental health disorders, substance use disorders, and other psychosocial problems. The efficacy of current therapeutic approaches provides only partial symptom resolution. For such individuals, the illness load and health care costs typically remain high across the lifespan.^{1,2}

In this article, we discuss types of ACEs, protective factors and risk factors that influence the development of posttraumatic stress disorder (PTSD) in individuals who experience ACEs, how ACEs can negatively impact mental health in adulthood, and approaches to prevent or treat PTSD and other symptoms.

Types of trauma and correlation with PTSD

ACEs can be indexed as neglect or emotional, physical, or sexual abuse. Physical and sexual abuse strongly correlate with an increased risk of PTSD.³ Although neglect and emotional abuse do not directly predict the development of PTSD, these

Shikha Verma, MD, FAPA

Medical Director, Northern California
Evolve Treatment Centers
Danville, California
Assistant Professor
Department of Psychiatry and Behavioral Health
Rosalind Franklin University of Medicine and Science
North Chicago, Illinois

Ruchita Agrawal, MD, FAPA

Associate Chief Medical Officer, Adult Services
Seven Counties Services
Louisville, Kentucky

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experiences foretell high rates of lifelong trauma exposure and are indirectly related to late PTSD symptoms.^{4,5} ACEs can impede an individual's cognitive, social, and emotional development, diminish quality of life, and lead to an early death.⁶ The lifetime prevalence of PTSD is 6.1% to 9.2%.⁷ Compared with men, women are 4 times more likely to develop PTSD following a traumatic event.⁷

The development of PTSD is influenced by the nature, duration, and degree of trauma, and age at the time of exposure to trauma. Children who survive complex trauma (≥2 types of trauma) have a higher likelihood of developing PTSD.⁸ Prolonged trauma exposure has a more substantial negative impact than a one-time occurrence. However, it is an erroneous oversimplification to assume that each type of ACE has an equally traumatic effect.⁶

Factors that protect against PTSD

Factors that can protect against developing PTSD are listed in *Table 1*.⁷ Two of these are resilience and hope.

Resilience is defined as an individual's strength to cope with difficulties in life.⁹ Resilience has internal psychological characteristics and external factors that aid in protecting against childhood adversities.^{10,11} The Brief Resilience Scale is a self-assessment that measures innate abilities to cope, including optimism, self-efficacy, patience, faith, and humor.^{12,13} External factors associated with resilience are family, friends, and community support.^{11,13}

Hope can help in surmounting ACEs. The Adult Hope Scale has been used in many studies to assess this construct in individuals who have survived trauma.¹³ Some studies have found decreased hope in individuals who sustained early trauma and were diagnosed with PTSD in adulthood.¹⁴ A study examining children exposed to domestic violence found that children who showed high hope, endurance, and curiosity were better able to cope with adversities.¹⁵

PTSD risk factors

Many individual and societal risk factors can influence the likelihood of developing

Table 1
PTSD: Protective factors and risk factors

Protective factors
Being male (more men than women are exposed to trauma, but PTSD is twice as common in women)
A strong relationship with family and peers
Resilience and hope
Limited genetic predisposition to psychiatric illness
Risk factors
Severity and duration of trauma
Age at trauma
Type and number of traumatic experiences
Severity of initial response to trauma
General childhood adversity
Reported childhood abuse
Gender
Low socioeconomic status
Low education
First-degree relative with a history of depression, other psychiatric illness, or substance use
Single, divorced, widowed, or socially withdrawn
Inadequate family and peer support
PTSD: posttraumatic stress disorder
Source: Reference 7

PTSD. Some of these factors are outlined in *Table 1*.⁷

Pathophysiology of PTSD

Multiple brain regions, pathways, and neurotransmitters are involved in the development of PTSD. Neuroimaging has identified volume and activity changes of the hippocampus, prefrontal cortex, and amygdala in patients with early trauma and PTSD. Some researchers have suggested a gross reduction in locus coeruleus neuronal volume in war veterans with a likely diagnosis of PTSD compared with controls.^{16,17} In other studies, chronic stress exposure has been found to cause neuronal cell death and affect neuronal plasticity in the limbic area of the brain.¹⁸

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ACEs can impede cognitive, social, and emotional development, diminish quality of life, and lead to an early death



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Lasting effects of childhood trauma

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More than 30% of individuals who experience adverse childhood experiences develop PTSD

Table 2

DSM-5 criteria for posttraumatic stress disorder

Trauma exposure	
Trauma	Actual or threatened violent death, serious injury or accident, or sexual violence
A. Exposure	Via any of the following: <ol style="list-style-type: none"> 1. Directly exposed to trauma 2. Eyewitness (in person) to others directly exposed to trauma 3. Learning of direct exposure to trauma of a close family member or close friend 4. Repeated or extreme exposure to aversive details of traumatic event (eg, trauma workers viewing human remains or repeatedly exposed to details of child abuse), in person or via work-related electronic media
Symptom groups B to E (symptoms beginning or worsening after the traumatic event)	
B. Intrusion	≥ 1 <i>intrusion symptoms</i> : <ol style="list-style-type: none"> 1. Recurrent, involuntary, distressing trauma memories 2. Recurrent, distressing trauma-related dreams 3. Dissociative reactions/flashbacks related to trauma 4. Intense or prolonged psychological distress to trauma reminders 5. Marked physiological reactions to trauma reminders
C. Avoidance	≥ 1 <i>avoidance symptoms</i> : <ol style="list-style-type: none"> 1. Avoidance of or efforts to avoid distressing internal trauma reminders (memories, thoughts, feelings) 2. Avoidance of or efforts to avoid distressing external trauma reminders (people, places, activities)
D. Negative cognition and mood	≥ 2 <i>negative cognition/mood symptoms</i> : <ol style="list-style-type: none"> 1. Amnesia for important parts of trauma exposure 2. Persistent, exaggerated negative beliefs about self, others, or the world 3. Persistent, distorted trauma-related cognitions leading to inappropriate blame of self/others 4. Persistent negative emotional state (eg, fear, horror, anger, guilt, shame) 5. Loss of interest or participation in significant activities 6. Feelings of detachment or estrangement from others 7. Persistent loss of positive emotions (eg, happiness, satisfaction, love)
E. Hyperarousal	≥ 2 <i>marked alterations in trauma-related arousal and reactivity</i> : <ol style="list-style-type: none"> 1. Irritability and angry outbursts with little/no provocation (eg, verbal/physical aggression toward people/objects) 2. Reckless or self-destructive behavior 3. Hypervigilance 4. Exaggerated startle 5. Concentration problems 6. Sleep disturbance (eg, difficulty falling or staying asleep, restless sleep)
Additional criteria	
F. Duration	>1 month
G. Distress/impairment	Clinically significant distress; social/occupational/other important functioning impairment
H. Not attributable to another disorder	Independent of physiological effects of a substance (eg, medication, alcohol) or another medical condition
PTSD: posttraumatic stress disorder	
Source: Reference 20	

Diagnosing PTSD

More than 30% of individuals who experience ACEs develop PTSD.¹⁹ The DSM-5 diagnostic criteria for PTSD are outlined in *Table 2*.²⁰ Several instruments are used to determine the diagnosis and assess the severity of PTSD. These include the

Clinician-Administered PTSD Scale for DSM-5,²¹ which is a 30-item structured interview that can be administered in 45 to 60 minutes; the PTSD Symptom Scale Self-Report Version, which is a 17-item, Likert scale, self-report questionnaire; and the Structured Clinical Interview:

PTSD Module, which is a semi-structured interview that can take up to several hours to administer.²¹

Other disorders. In addition to PTSD, individuals with ACEs are at high risk for other mental health issues throughout their lifetime. Individuals with ACE often experience depressive symptoms (approximately 40%); anxiety (approximately 30%); anger; guilt or shame; negative self-cognition; interpersonal difficulties; rumination; and thoughts of self-harm and suicide.²² Epidemiological studies suggest that patients who experience childhood sexual abuse are more likely to develop mood, anxiety, and substance use disorders in adulthood.^{23,24}

Psychotherapeutic treatments for PTSD

Cognitive-behavioral therapy (CBT) addresses the relationship between an individual's thoughts, emotions, and behaviors. CBT can be used to treat adults and children with PTSD. Before starting CBT, assess the patient's current safety to ensure that they have the coping skills to manage distress related to their ACEs, and address any coexisting substance use.²⁵

According to the American Psychological Association, several CBT-based psychotherapies are recommended for treating PTSD²⁶:

Trauma-focused-CBT includes psychoeducation, trauma narrative, processing, exposure, and relaxation skills training. It consists of approximately 12 to 16 sessions and incorporates elements of family therapy.

Cognitive processing therapy (CPT) focuses on helping patients develop adaptive cognitive domains about the self, the people around them, and the world. CPT therapists assist in information processing by accessing the traumatic memory and trying to eliminate emotions tied to it.^{25,27} CPT consists of 12 to 16 structured individual, group, or combined sessions.

Prolonged exposure (PE) targets fear-related emotions and works on the principles of habituation to extinguish trauma and fear response to the trigger. This increases

self-reliance and competence and decreases the generalization of anxiety to innocuous triggers. PE typically consists of 9 to 12 sessions. PE alone or in combination with cognitive restructuring is successful in treating patients with PTSD, but cognitive restructuring has limited utility in young children.^{25,27}

Cognitive exposure can be individual or group therapy delivered over 3 months, where negative self-evaluation and traumatic memories are challenged with the goal of interrupting maladaptive behaviors and thoughts.²⁷

Stress inoculation training (SIT) provides psychoeducation, skills training, role-playing, deep muscle relaxation, paced breathing, and thought stopping. Emphasis is on coaching skills to alleviate anxiety, fear, and symptoms of depression associated with trauma. In SIT, exposures to traumatic memories are indirect (eg, role play), compared with PE, where the exposures are direct.²⁵

The American Psychological Association conditionally recommended several other forms for psychotherapy for treating patients with PTSD²⁶:

Brief eclectic psychotherapy uses CBT and psychodynamic approaches to target feelings of guilt and shame in 16 sessions.²⁷

Narrative exposure therapy consists of 4 to 10 group sessions in which individuals provide detailed narration of the events; the focus is on self-respect and personal rights.²⁷

Eye movement desensitization and reprocessing (EMDR) is a 6- to 12-session, 8-phase treatment that uses principles of accelerated information processing to target nonverbal expression of trauma and dissociative experiences. Patients with PTSD are suggested to have disrupted rapid eye movements. In EMDR, patients follow rhythmic movements of the therapist's hands or flashed light. This is designed to decrease stress associated with accessing trauma memories, the emotional/physiologic response from the memories, and negative cognitive distortions about self, and to replace negative cognition distortions with positive thoughts about self.^{25,27}

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Before starting CBT, ensure that your patient has the coping skills to manage distress related to their ACEs



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Multiple studies have found that paroxetine, sertraline, and fluoxetine can decrease PTSD symptoms

Related Resources

- Smith P, Dalglesih T, Meiser-Stedman R. Practitioner review: posttraumatic stress disorder and its treatment in children and adolescents. *J Child Psychol Psychiatry*. 2019;60(5):500-515.
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Drug Brand Names

Duloxetine • Cymbalta	Prazosin • Minipress
Fluoxetine • Prozac	Propranolol • Inderal, Pronol
Mirtazapine • Remeron	Sertraline • Zoloft
Paroxetine • Paxil	Venlafaxine • Effexor

Accelerated resolution therapy is a derivative of EMDR. It helps to reconsolidate the emotional and physical experiences associated with distressing memories by replacing them with positive ones or decreasing physiological arousal and anxiety related to the recall of traumatic memories.²⁸

Pharmacologic treatments

Antidepressants

Selective serotonin reuptake inhibitors (SSRIs). Multiple studies using different scales have found that paroxetine, sertraline, and fluoxetine can decrease PTSD symptoms. Approximately 60% of patients treated with SSRIs experience partial remission of symptoms, and 20% to 30% experience complete symptom resolution.²⁹ Davidson et al³⁰ found that 22% of patients with PTSD who received fluoxetine had a relapse of symptoms, compared with 50% of patients who received placebo.

Serotonin-norepinephrine reuptake inhibitors (SNRIs) and other antidepressants. The SNRIs venlafaxine and duloxetine can help reduce hyperarousal symptoms and improve mood, anxiety, and sleep.²⁶ Mirtazapine, an alpha 2A/2C adrenoceptor

antagonist/5-HT 2A/2C/3 antagonist, can address PTSD symptoms from both serotonergic pathways and increase norepinephrine release by blocking autoreceptors and enhancing alpha-1 receptor activity. This alleviates hyperarousal symptoms and promotes sleep.²⁹ In addition to having monoaminergic effects, antidepressant medications also regulate the hypothalamic-pituitary-adrenal (HPA) axis response to stress and promote neurogenesis in the hippocampal region.²⁹

Adrenergic agents

Adrenergic receptor antagonists. Prazosin, an alpha-1 adrenoceptor antagonist, decreases hyperarousal symptoms, improves sleep, and decreases nightmares related to PTSD by decreasing noradrenergic hyperactivity.²⁹

Beta-blockers such as propranolol can decrease physiological response to trauma but have mixed results in the prevention or improvement of PTSD symptoms.^{29,31}

Glucocorticoid receptor agonists. In a very small study, low-dose cortisol decreased the severity of traumatic memory (consolidation phase).³² Glucocorticoid receptor agonists can also diminish memory retrieval (reconsolidation phase) through intrusive thoughts and flashbacks.²⁹

Anticonvulsants, benzodiazepines, and antipsychotics

These medications have had a limited role in the treatment of PTSD.^{26,29}

Future directions: Preventive treatments

Because PTSD has a profound impact on an individual's quality of life and the development of other illnesses, there is strong interest in finding treatments that can prevent

Bottom Line

Adverse childhood experiences (ACEs) are strong predictors for the development of posttraumatic stress disorder (PTSD) and other mental health or medical issues in late adolescence and adulthood. Experiencing a higher number of ACEs increases the risk of developing PTSD as an adult. Timely psychotherapeutic and pharmacologic interventions can help limit symptoms and reduce the severity of PTSD.

PTSD. Based on limited evidence primarily from animal studies, some researchers have suggested that certain agents may someday be helpful for PTSD prevention²⁹:

Glucocorticoid antagonists such as corticotropin-releasing factor 1 (CRF1) antagonists or cholecystokinin 2 (CCK2) receptor antagonists might promote resilience to stress by inhibiting the HPA axis and influencing the amygdala by decreasing fear conditioning, as observed in animal models. Similarly, in animal models, CRF1 and CCK2 are predicted to decrease memory consolidation in response to exposure to stress.

Adrenoceptor antagonists and agonists also might have a role in preventive treatment, but the evidence is scarce. Prazosin, an alpha-1 adrenoceptor antagonist, was ineffective in animal models.^{29,31} Propranolol, a beta-adrenoceptor blocker, has had mixed results but can decrease trauma-induced physiological arousal when administered soon after exposure.²⁹

N-methyl-D-aspartate (NMDA) receptor antagonists. NMDA receptor function decline has also been hypothesized to decrease the reconsolidation symptoms of PTSD.²⁹ One study examined the prevalence of PTSD in service members who were treated for burns in a military treatment center.³³ The use of the NMDA receptor antagonist ketamine lowered the prevalence of PTSD among service members who were treated for burns. The suggested mechanism is preventing memory consolidation after trauma exposure.³³

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Antidepressants regulate the HPA axis response to stress and promote neurogenesis in the hippocampal region



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Glucocorticoid receptor agonists can diminish memory retrieval

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