

Post-traumatic Stress Disorder

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Abstract

This writing first looks briefly at the history of posttraumatic stress disorder in the mental health field. The focus then examines the theories of how memory is processed, stored, and recalled in relation to traumatic experiences. Also explored, are the immediate physiological reaction of the body to an emotionally charged event, as well as its long term repercussions. The psychological state of dissociation as a related symptom in PTSD is discussed. The inquiry then closes with a look at various assessments and treatment for the disorder.

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## **History**

Although symptoms can be found in classical writings, such as the description of Achilles in *The Iliad*, most symptoms of war trauma were not formally documented as such until the American Civil War period. This period referred to it as melancholy, nostalgia, or irritable heart. The World War I era labeled it shell shock, hysteria, and neurasthenia. World War II and the Korean War period called it war neurosis, battle fatigue, or simply exhaustion. It wasn't until the Viet Nam War that the severity of it began to be noticed, as it began surrounding the excessive drug addiction and suicide listed along-side with fatal casualties of the war. It wasn't until 1980 that the Diagnostic and Statistical Manual of Mental Disorders (DSM- III) finally published official diagnostic criteria for the disorder.

Jacob Mendes DaCosta is credited for the first scientific study of combat related stress. He labeled it irritable heart of a soldier because the complaints were shortness of breath, palpitations, anxiety, and chest pain. He found that during the Civil War the adolescent soldiers were much more likely to show signs of cardiovascular disease alone and in conjunction with gastrointestinal conditions, and were more likely to die early. Prisoners of war also had an increased risk of combined mental and physical illness as well as early death (Coleman, 2006).

During the 1870's and 1880's, Jean-Martin Charcot, a French neurologist, was treating and experimenting with patients diagnosed with hysteria. Symptoms such as muteness, localized paralyses, and dissociative characteristics were symptoms of hysteria at that time. Charcot began to intently categorize the symptoms. But it was Pierre Janet and Sigmund Freud, both students of Charcot, who concluded that the problems were caused by trauma and unbearable memories which were hidden in the psych. Both men argued for a psychoanalysis talking cure for hysteria. But it was Janet that first used the term dissociation, which he described as a split between the conscious and subconscious mind (Coleman, 2006).

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Freud however, interpreted the etiology from a much different direction than Janet. He first argued that hysteria developed from a premature sexual encounter, but then expanded that to include repressed sexual fantasies, desires, and instincts that may have been inhibited through societal stigma. Janet thought that was absurd, although held to his inclination that it was due to an earlier traumatic event. Janet's early work developed some of today's framework studies in post-trauma, which unfortunately was not translated to English until 1965 (Coleman, 2006).

During WWI the term shell shocked became popular, coined by Charles Meyers, a British psychiatrist. He theorized that it was the constant and random concussion of guns being shot and bombs being fired which caused actual lesions in the brain. However, autopsies failed to confirm his theory. Those men who did not die in combat and chose to complain of mental problems were labeled a coward or malingerer and were used to justify a court-martial, dishonorable discharge, or even killing as an example.

Albert Glass, a military psychiatrist through WWI, WWII, and the Korean conflict, began to see that although the symptoms were often suppressed during wartime, civilian life brought with it lingering issues of wartime, chronic neurotic symptoms, personality disorders, and psychological problems. Glass was one of the first to advocate for regular rotation of duty and to have specific psychiatric care assigned to each command for long term duration and treated such as military personnel (Coleman, 2006).

By the Viet Nam war society had changed drastically, Americans did not want to go to war and the mission was vague on what the goals were. The draft deferment for college became the white boy's ticket to safety and those who served were mostly of color. No rules of war were taught which led to atrocities to civilians in the name of war. To add to that traumatic burden, upon returning home, many veterans were persecuted, dishonored, and ostracized.

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By the 1980's the situation had become much more studied. Reports began to circulate that more Vietnam veterans had killed themselves than were names on the wall. Approximately 58,000 had died in the war, but by the late 1980's there were estimated suicide numbers between 26,000 to 100,000. Not only were war traumas being studied, but also the results from trauma caused from abuse, domestic violence, murder, rape, and natural disasters. And since the tragedy of 9-11 much has been learned.

There are three distinct types of post trauma disorders, chronic traumatic stress disorder, acute stress disorder, and delayed stress disorder. Symptoms are characterized by experiencing the trauma as real as the initial experience in dreams, conscious memories, or fragmented flashbacks. Also, feelings of detachment, estrangement, diminished responsiveness, chronic physiological arousal, disturbances to sleep and mental focus, and sometimes guilt of surviving when others did not. Often depression and substance abuse co-exists. In acute stress disorder symptoms usually begin to diminish after 24–48 hours and disappear within a few days. If symptoms last for more than a month, then the diagnosis is chronic PTSD.

Most any kind of change or adjustment is known to cause stress in a person, even positive stressors, such as a wedding or birth of a baby. Stress arises by a perceived danger to one's physical or psychological well-being. A traumatic event is a situation which is considered life threatening to you or another close to you. An event is proven to be more stressful if it was an uncontrollable or unpredictable event, which makes it somehow less acceptable to internally process, such as a bystander getting murdered unintentionally. Types of trauma can include natural disasters or weather related, war or terrorism, street or domestic violence, sexual assault, child neglect, getting bullied or threatened.

## **Memory**

Memory is often defined by cognitive neuroscientists as the retention, reactivation, and reconstruction of a previous experience which was internally and cognitively represented to the individual at the time of the initial experience. This implies that memory contains two components, the memory itself at the behavioral or conscious level (nonmaterial), and the underlying physical neural changes in the brain. These neurons are sometimes called engrams or memory traces. Some neuroscientists and psychologists equate the concept of engram and memory, others argue that memory does not exist until it is revealed in behavior or thought (Moscovitch, 2007).

Experience creates activation of clusters of neurons, which sends out electrical signals. This neural firing triggers gene activation and protein production, which can stimulate the growth of new neurons, or create or strengthen existing synapses. Synapses are the functional connections between neurons. An experience becomes encoded in the neurons and the more times the clusters fire together, the more likely they are to fire together in the future. The trigger can be internal such as a thought or a feeling, or an external association or cue. Experience can create one of two different types of memory, implicit and explicit (Siegel, 2011).

Explicit (declarative) memory consciously recalls general knowledge or personal events, which were learned or experienced in the past, and brings them into present awareness. There are two forms of explicit memory, semantic and episodic. Semantic memory, maintains stored facts independent of any particular context. It allows the encoding of abstract knowledge about the world in general, learned or experienced. Episodic memory stores personal memories unique to the individual, such as sensations, emotions, or associations of a particular place or time. Autobiographical memory is considered a form of episodic memory.

In explicit memory the hippocampus is used for memory retrieval, it is found in the limbic region, and works for both sides of the brain. The left side of the brain works primarily with facts and language. The right side works on self-related episodic memories filing them by time and topic. The hippocampus contains two parts, Ammon's horn and the dentate gyrus. It is closely associated with the cerebral or rhinal cortex, and is located in the medial temporal lobe, underneath the cortical surface, along with the amygdala. Its main role in memory is to consolidate information from short-term memory to long-term memory. This area also is responsible for spatial recognition. The amygdala is the area specifically identified that maintains emotionally charged memories, especially those based on fear.

Implicit (procedural) memory is not based on a conscious recall of information, but is indirectly accessed below the level of consciousness. However, it occurs in a conscious state although it is not experienced as being recalled from the past. This is not the same concept as unconscious or repressed thoughts. It is primarily used in learning motor skills, such as walking or riding a bike. The uniqueness of implicit memory is that no conscious concentration or retrieval is needed, there is no sensation of past recall, and it does not require the hippocampus. Six domains of implicit memory are perception, emotion, bodily sensation, behavior, mental models, and priming.

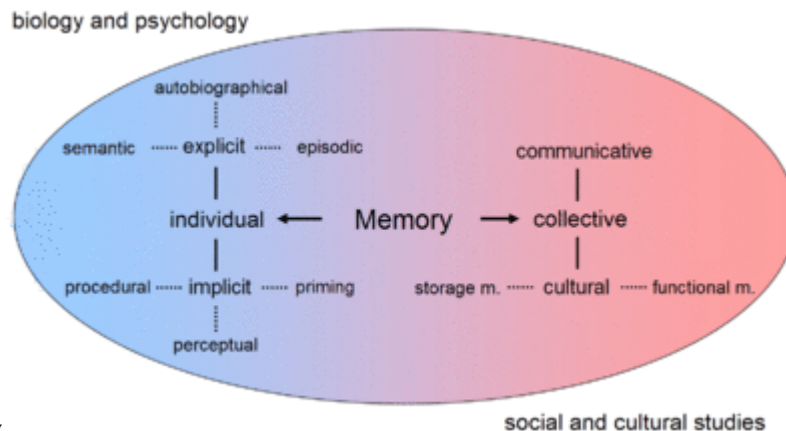


Figure: Wikipedia-Memory



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During a traumatic event implicit memory becomes enhanced and explicit memory becomes mixed with some aspects becoming enhanced, while other aspects are diminished considerably. When an extreme threat of survival is initiated the hippocampus can become impaired due to high levels of cortisol being released. Resulting memories will be different from those formed under more ordinary circumstances. Memories of trauma can become isolated fragments rather than coherent episodes of the past. This process of high levels of cortisol release by the hypothalamus creates an overload for the amygdala, which is highly sensitive to fear. This process causes a chemically induced disassociation, which gets encoded in the engrams. During trauma flashbacks, implicit memory fragments arise, but with limited ability for memory recall of the actual experience (Nadel & Jacobs, 1998).

Research suggests that although explicit memory becomes overwhelmed and disrupted with the impact of trauma, the implicit emotional and sensorimotor memories are not impaired under the same circumstances. Explicit information is processed through the cerebral cortex, while implicit information gets processed either cortically or subcortically. The cortical route, necessary for implicit conscious sensory experience,

involves transmission from the sense organs to the thalamus and preliminary processing is done up to the cortex for more complex analysis and then moves to the lower order amygdala. The subcortical route is faster transmitting sensory input directly from the thalamus to the amygdala, bypassing the cerebral cortex

(Hovdestad & Kristiansen, 1996).

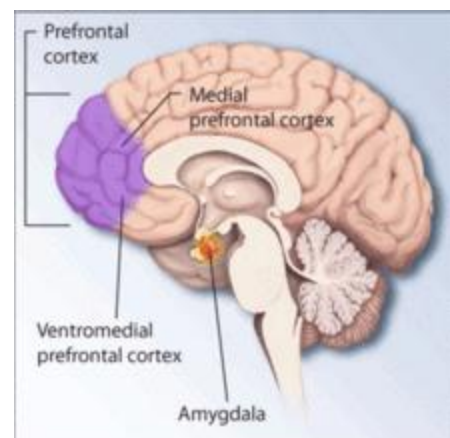


Figure: Wikipedia-amygdala

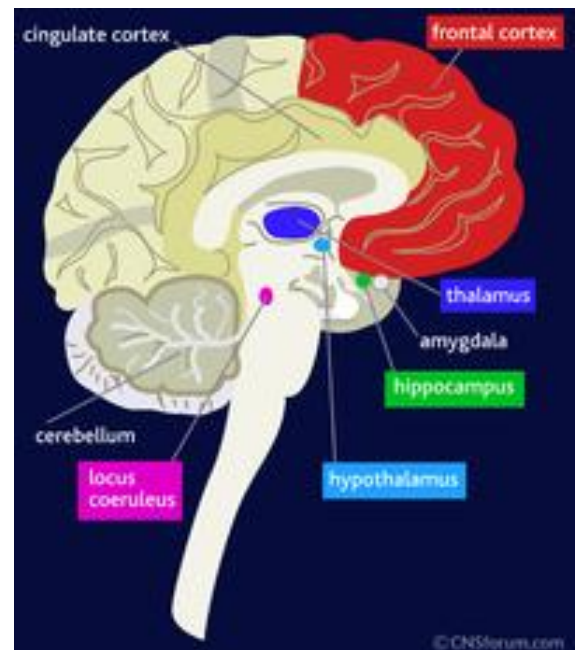
Another theory of memory is *consolidation*, which first arose over one hundred years ago in studies with amnesia patients and later resurfaced in the 1970's. Consolidation is the process which stabilizes the memory trace or engram after the initial learning or experience. It initially consisted of two specific processes, *synaptic consolidation* and *system consolidation*. Synaptic consolidation occurs quickly only taking a few minutes or hours for new experiences to stabilize into memories. System consolidation occurs when hippocampus-dependent memories become independent of the hippocampus. This is a reorganization process in which memories from the hippocampus where they are first encoded are transferred to the neo-cortex in a more permanent storage. This process is a slow dynamic move and can take a period of weeks to many years.

Over the past decade a third process concerning memory has become a focus of much research in the neurosciences. *Memory reconsolidation* is the process which consolidated memories can be retrieved in an unstable and pliable condition. Research has suggested that during the reconsolidation period certain chemicals can cause the strength of the memory to weaken and the emotional component attached to the memory to become altered and even dissipate. However, boundary conditions are known to exist in which reconsolidation does not occur. This area of boundary conditions is of current research and debate (Pittman et al, 2011).

## Physiology of Trauma

The physical response to a highly stressful or traumatic event activates two systems in the body, the sympathetic nervous system and the adrenal-cortical system, both controlled by the hypothalamus. The first system to be activated at the onset of a threat is the sympathetic nervous system. Increased heart rate, oxygen flow, and raised blood pressure begins at once. The liver releases extra sugar (glucose) to fuel the muscles. Blood moves away from the skin, liver, and digestive system, and toward your heart, muscles, and lungs to deliver more oxygen and glucose to these areas. A release of hormones, including epinephrine (adrenaline) and norepinephrine is initiated, which causes a state of hypervigilance or arousal. (Nolen-Hoeksema, 2008)

The second system that becomes activated is the adrenal-cortical system, by the release of corticotrophin-release factor (CRF) by the hypothalamus. This signals the pituitary gland to secrete adrenocorticotrophic hormone (ACTH), the major stress hormone. ACTH then stimulates the outer layer of the adrenal glands (cortex) which releases another group of hormones, primarily the major one being cortisol. The amount of cortisol in urine is often used to measure the stress level. In PTSD there appears to be lower than normal cortisol, and it is thought that a compromised hormonal response to stress may predispose a person to develop PTSD (Nolen-Hoeksema, 2008).



Affected brain areas in PTSD

Figure: Wikipedia-Stress

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This interaction between the hypothalamus, pituitary, and adrenal cortex is known as the HPA axis which is a major part of the neuroendocrine system. It monitors reactions to stress as well as regulates other processes, including the immune system, digestion, sexuality, mood and emotions, and energy storage and expenditure.

The *general adaptation syndrome* developed by Hans Selye in 1979 suggests that a person goes through three stages during extreme stress. The first phase of a trauma is *alarm*, in which the person confronts the threat. The second phase is *resistance* when the person deals with the threat by either *fighting or fleeing* the situation. The third phase is *exhaustion*, when the person reaches the point of depleting physiological resources. Prolonged exposure to a high stress situation can cause increased medical problems later. A recent study of the fight or flee component of Selye's work looked at gender, and found that a *tend and befriend* pattern is often found in women, which suggests that stress affects men and women differently (Taylor, et al., 2000). The HPA axis is the mechanism which mediates the general adaptation syndrome. Selye's discoveries were some of the first to link stress as a strong contributor to other physiological illnesses and diseases. Other research has also linked stress to immune system functioning, a system which combats disease causing microorganisms, such as cancer. Some of the corticosteroids released in the fight-or-flight response are thought to suppress lymphocytes, the cells that attach viruses in the immune system.

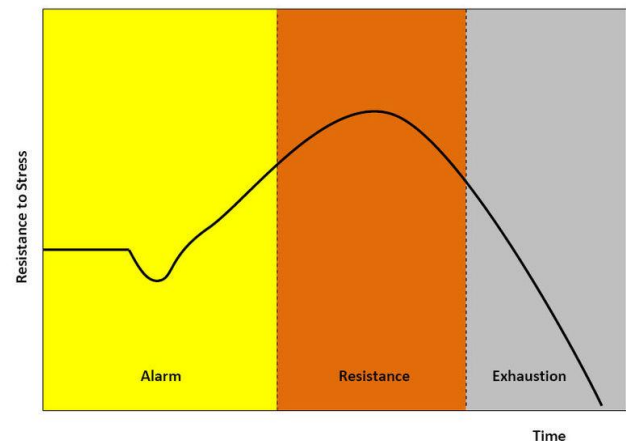


Figure: Wikipedia-Stress

## **Dissociation**

Dissociation is an important aspect of PTSD, although it is classified as an anxiety disorder rather than a dissociative disorder. It arises as a reaction to a traumatic event or highly stressful situation in that the individual splits the event into two separate components, thoughts that can be faced and stored as a regular episodic memory and those which are too traumatic for the psych to process as such. The latter is stored in the unconscious. The definition of dissociation has broadened through the years and is thought today to be experienced in various degrees in the individual. It can range from a minor lapse of forgetting what it was that was needed once at the grocery store, in a normal individual, to multiple personality disorder, one of the more serious dissociative disorders. It is characterized as an altered state of consciousness experienced as a subjective perception of one's reality being detached from one's emotions; or one's body being separated from the mind or head. It often arises intrusively and unexpectedly from a thought, memory, feeling, or physical cue, and which disrupts normal functioning.

As mentioned earlier Janet and Freud were the first to write about this state of mind and to relate it to past traumas. Not only did they disagree about the etiology of the problem, but also how the trauma was processed. Freud argued that the memories were a form of repression and used as a defense mechanism for surviving the trauma, Janet argued that it was a failure of integrating memories into the conscious and unconscious (van der Hart et al., 2008). He posited that the memories which were split from the conscious state could only be accessible through dreams and hypnosis. Today we know that Janet was on the right track, however overshadowed by Freud and soon after, the school of behaviorism, which rejected most anything related to repression, the unconscious and psychoanalytic thinking in general. The interest in dissociation was put on hold for a few decades.

During the 1970's Ernest Hilgard revitalized interest in dissociative studies with his *hidden observer* theory. In this he proposed that there is an *active mode* to consciousness and a *receptive mode*, which is passive and unaware. He argued that dissociative issues arose from problems integrating active and receptive consciousness and that the two could not communicate properly operating independently of one another (Nolen-Hoeksema, 2008).

A related form of PTSD has been proposed called *complex posttraumatic syndrome disorder* (C-PTSD). It is distinguished from PTSD by postulating a more complex structural division of the personality. Onno van der Hart has researched PTSD and argued that in severe and ongoing trauma, specifically involving prolonged torture and captivity, due to a loss of control, the identity and sense of self becomes structurally altered. He posits that structural dissociation of the personality is very different than other dissociative disorders characterized with symptoms of *alterations of consciousness* (van der Hart et al., 2005).

Peritraumatic dissociation is dissociation that occurs at the time of the initial trauma. There has been much debate on whether or not PD is a later predictor of PTSD and studies have shown on both sides of the argument. However, there is a strong relationship between the two and it is suggested that persisting peritraumatic dissociation may be more predictive of later PTSD than peritraumatic dissociation that ends quickly after the event (van der Hart et al., 2008).

Because trauma affects the way events are originally encoded into memory, it also affects the way dissociated memories return. Although traumatic memories are not encoded linguistically, they can and do reappear implicitly through the sensorimotor systems as kinesthetic sensations, smells, tastes, visual images, flashbacks, and nightmares (Hovdestad & Kristiansen, 1996). Somatic memory is the body's ability to recall physical sensations of a past experience even in the absence of a clear conscious recollection.

## **Assessment & Treatment**

Two clinical assessment scales often used in diagnosing PTSD are the Clinician Administered PTSD Scale (CAPS) and the Short PTSD Rating Interview (SPRINT). The CAPS is a structured interview based on the DSM-IV and considered the standard. It uses 30-items, measures 17 symptoms, and takes just under an hour. Each symptom is rated on frequency and intensity using a 5 point scale of 0-4 with 4 being the most frequent or distressful. A total severity score is then used. This was developed in 1995 by Dudley Blake and associates. The SPRINT is a brief appraisal created by Connor and Davidson in 2001. It is an 8-item self-report measure that assesses core symptoms and rated on a similar 5 point scale as the CAPS (Vaishnavi et al., 2006).

Two components of helping the client overcome traumatic events are intellectual and relational. Intellectually, restructuring the meaning of the trauma and its implications in the person's life through insight and integration is necessary. Relational support also needs to be developed in order to help the survivor feel valued and connected to others. Different from traditional psychotherapy where the client is encouraged to take on more responsibility of the problem, in trauma counseling the client needs to assume less responsibility of the event, understanding that they are not to blame. As in rape or abuse, many victims turn to self-loathing and self-destruction. If the abuse was by a relative in childhood, the client may need to constructively integrate the current relationship through understanding the circumstances which led to the abuse and the current reality that the abuser may have since realized the abuse and changed since the time of abuse (Classen et al., 1993). Trauma focused cognitive-behavioral approaches are generally the most effective for PTSD, however stress management and pharmacological treatments are also used.

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Systematic desensitization and exposure methods, such as imagery intervention and hypnosis, are often used for PTSD. Eye movement desensitization and reprocessing (EMDR) is specifically designed to treat PTSD and highly effective, which was developed by Francine Shapiro in 2001. EMDR attempts to fully process the memory of the event and associated stimuli which were impaired in the initial processing and distorted in storing in an isolated memory. The goal of EMDR therapy is to process distressing thoughts of the event in a more appropriate manner, which will limit the control and influence the distorted memories have over the client, allowing more adaptive coping mechanisms to develop.

Neuro-linguistic therapy (NLT) emerged as trauma treatment in the early 1970's from Richard Bandler and John Grinder. This technique attempts to change sensory perception by changing sensation and/or by changing the language used to interpret it. The method disrupts intrusive images by changing the sensory input (Rothschild, 2000).

Although there is little empirical evidence to date for using mindfulness techniques directly with PTSD, it has been proven to be effective in coping with stress and emotional problems such as anxiety and depression. It is often used as an adjunct to PTSD to improve outcomes concerning; engagement with therapist, preparation to observe and accept internal reactions without judgment, lessen rumination by gaining distance from trauma-related thoughts, and compliance to persevere through trauma-focused treatments.

Implicit memories, as previously discussed, are the unconscious side of memory, made up of emotions, sensations, movement, the non-linguistic, and body (somatic) memories. It is not the body itself that holds the memory, but rather it's the brain and the body's sensory communication. Traumatic stress is the most extreme form of stress. Stress management and body work methods help to manage the anxiety associated with PTSD.



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Ten foundations established for safe trauma therapy (Rothschild, 2000).

- 1) Establish safety for the client within and outside of therapy.
- 2) Develop good contact between client and therapist.
- 3) Client and therapist must be confident in applying breaks before beginning.
- 4) Identify and build on client's internal and external resources.
- 5) Regard defenses as resources; rather than discarding coping strategies, increase choices.
- 6) View trauma as a pressure cooker, always reduce, never increase the pressure.
- 7) Adapt the therapy to the client rather than expecting the client to adapt to the therapy.
- 8) Have a broad knowledge of theory, both psychology and physiology of trauma.
- 9) Regard the client with individual differences, do not judge for failure or non-compliance.
- 10) Therapist must be prepared to put aside techniques to simply talk with the client.

Two drugs currently being tested for use in reconsolidation memory therapy for PTSD are propranolol and mifepristone. Propranolol is a beta blocker which inhibits functioning of the sympathetic nervous system and is used to treat hypertension, anxiety and panic. Mifepristone is a synthetic steroid compound which is used as an emergency contraceptive and to induce abortions in the first months of pregnancy (Pittman et al, 2011). Other pharmacology treatments are posted in a table in the appendix.

**Appendix:**

## Psychopharmacology Treatment for PTSD (Wikipedia-PTSD)

<b>Symptom class</b>	<b>Symptom</b>	<b>Medication</b>
Reexperiencing	intrusive recall	amitriptyline; fluoxetine; imipramine; lamotrigine; sertraline
	intrusive re-experiencing	amitriptyline; fluoxetine; imipramine; nefazodone; sertraline (women only); topiramate;
	sleep disturbance, nightmares	benzodiazepines; carbamazepine; clonidine; nefazodone; phenelzine; prazosin; topiramate; trazodone; zolpidem
	dissociative recall	risperidone
	intense psychological distress (anger, anxiety) when exposed to reminders of traumatic event(s)	benzodiazepines; buspirone; carbamazepine; lithium (not for anxiety); nefazodone; trazodone
Avoidance	Avoidance	amitriptyline; fluoxetine; lamotrigine; nefazodone; sertraline
	feelings of detachment or estrangement from others	amitriptyline; risperidone
	restricted range of affect (numbing)	amitriptyline; lamotrigine; sertraline (women only)
Hyperarousal	general hyperarousal	amitriptyline; nefazodone; phenelzine; sertraline (women only)
	sleep disturbance, nightmares	benzodiazepines; carbamazepine; clonidine; nefazodone; phenelzine; trazodone; zolpidem
	irritability, anger (and impulsiveness)	carbamazepine; nefazodone; valproic acid
	Anger	buspirone; fluoxetine; lithium; trazodone
	Aggression	risperidone
	exaggerated startle response; general autonomic hyperexcitability	benzodiazepines; buspirone; carbamazepine; clonidine; propranolol; valproic acid

<b>Secondary symptom</b>	<b>Medication</b>
Depression	nefazodone; phenelzine
dream content distortions	nefazodone
relapse of symptoms	carbamazepine;
self-mutilation	clonidine; buprenorphine
sexual function reduction	nefazodone
sleep hours reduction	nefazodone

### **Diagnostic Criteria (DSM-IV-TR) Posttraumatic Stress Disorder**

- A: The person has been exposed to a traumatic event in which both of the following have been present:
1. The person has experienced, witnessed, or been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others.
  2. The person's response involved intense fear, helplessness, or horror. Note: in children, it may be expressed instead by disorganized or agitated behavior.
- B: The traumatic event is persistently re-experienced in at least **one** of the following ways:
1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. Note: in young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
  2. Recurrent distressing dreams of the event. Note: in children, there may be frightening dreams without recognizable content
  3. Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated). Note: in children, trauma-specific reenactment may occur.
  4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.
  5. Physiologic reactivity upon exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
- C: Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by at least **three** of the following:
1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma
  2. Efforts to avoid activities, places, or people that arouse recollections of the trauma
  3. Inability to recall an important aspect of the trauma
  4. Markedly diminished interest or participation in significant activities
  5. Feeling of detachment or estrangement from others
  6. Restricted range of affect (e.g., unable to have loving feelings)
  7. Sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)
- D: Persistent symptoms of increasing arousal (not present before the trauma), indicated by at least **two** of the following:
1. Difficulty falling or staying asleep
  2. Irritability or outbursts of anger
  3. Difficulty concentrating
  4. Hyper-vigilance
  5. Exaggerated startle response
- E: Duration of the disturbance (symptoms in B, C, and D) is more than one month.
- F: The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:

**Acute:** if duration of symptoms is less than three months

**Chronic:** if duration of symptoms is three months or more

**With or Without delay onset:** Onset of symptoms at least six months after the stressor

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