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Chapter 16 Post-Traumatic Stress Disorder

Relationship to Traumatic Brain Injury and Approach to Treatment

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INTRODUCTION

Post-traumatic stress disorder (PTSD) is characterized by a specific clinical syndrome including re-experiencing symptoms, avoidance, and alterations in arousal, cognition, and mood, resulting from exposure to severe traumatic events. PTSD was first officially recognized in the *Diagnostic and Statistical Manual of Mental Disorders, 3rd ed. (DSM III)* in 1980,¹ and since that time a great deal of knowledge has accumulated about the characteristics of post-traumatic symptomatology, the epidemiology of PTSD, and assessment and treatment of individuals suffering from this disorder. Traumatic events that can result in PTSD fall into a number of categories, including military combat, rape, physical assault, natural disaster, and witnessing violence.²

Since the beginning of the conflicts in Iraq and Afghanistan, it has become clear that PTSD has an important and complex relationship with traumatic brain injury (TBI). Both disorders are common in Iraq and Afghanistan veterans, and together they have been termed the “signature wounds” of these conflicts.³ TBI has emerged as a clear and important risk factor for the development of PTSD, although the reasons for this association are not fully understood.^{4,5} PTSD may also be an important mediator of the negative sequelae of TBI.⁴ At the same time, the substantial overlap in symptoms of PTSD and postconcussive symptoms may result in considerable diagnostic confusion.⁶ Finally, treatment of individuals with comorbid PTSD and TBI may present special challenges, and yet there is currently very little evidence base to guide pharmacologic and psychotherapeutic treatment in this population.

In this chapter, we begin with a brief overview of the epidemiology of PTSD, followed by a longer discussion of the epidemiology of comorbid PTSD and TBI, with special attention to the role of TBI as a risk factor for PTSD. We then consider diagnostic issues surrounding PTSD and TBI, including the substantial overlap in symptoms of PTSD and postconcussive syndrome and the resulting difficulty in attributing symptoms to either PTSD or TBI. Next, we briefly review evidence-based treatments for PTSD, including psychopharmacology and psychotherapy. Finally, we discuss special considerations in treating individuals with comorbid PTSD and TBI, as well as offer some preliminary recommendations in treating these patients while highlighting the need for more treatment studies in this population.

EPIDEMIOLOGY OF POST-TRAUMATIC STRESS DISORDER AND TRAUMATIC BRAIN INJURY

Research into the epidemiology of PTSD can be divided into studies of combat veterans and studies of civilian populations. Surveys of combat-related PTSD have focused largely on veterans of the Vietnam War and of the conflicts in Iraq and Afghanistan. It is estimated that 18.7% of male Vietnam veterans developed PTSD, and that 9.1% still suffered from PTSD in the late 1980s when surveys were conducted.⁷ Given that PTSD was not yet clinically defined during the Vietnam War, research into the epidemiology of the disorder in Vietnam veterans did not begin until years after the end of the conflict, which may affect the accuracy of the results. In contrast, research into PTSD in Iraq and Afghanistan veterans has been ongoing since soon after these conflicts began.² However, estimates of the prevalence of PTSD in these groups have varied widely, likely due in part to variations in sample populations and in how PTSD was defined. Estimates of the prevalence of PTSD in non-treatment-seeking samples of Iraq and

Afghanistan veterans have ranged from 5% to 20%.⁸ Risk of PTSD is positively associated with level of combat exposure.^{2,8}

As noted earlier, civilian populations can experience PTSD as a result of a variety of stressors including rape, assault, natural disasters, and motor vehicle accidents, among others. The lifetime prevalence of PTSD in the United States is estimated to be 6.8%.⁹ Research has indicated that a large proportion of the general population has experienced at least one such stressor, but only a fairly small percentage go on to develop PTSD. For example, in a sample of adults from the Detroit metropolitan area, 89.2% of respondents had experienced at least one qualifying trauma based on *DSM* criteria,¹⁰ yet only 9.2% of traumatic events resulted in PTSD. This rate varied depending on the type of traumatic event, with assaultive violence being most likely to lead to PTSD. Risk factors for the development of PTSD in individuals exposed to trauma include preexisting psychiatric disorders, family history of psychiatric disorders, poor social support, low IQ, and female gender.²

Understanding of the relationship between PTSD and TBI has evolved over time and has grown considerably on the basis of studies of veterans of the conflicts in Iraq and Afghanistan. Prior to these conflicts, comorbid PTSD and TBI received relatively little attention, and was considered by some authors to be a rare phenomenon. In particular, it was argued that impairment or loss of consciousness that occurs with severe TBI may prevent PTSD by interfering with the encoding of trauma-related memories.^{11,12} An early literature review concluded that PTSD could, indeed, occur after TBI even in the absence of explicit memories of trauma, through nondeclarative memories, fear conditioning occurring outside of awareness, and reconstructed memories of traumatic events.¹³

Early epidemiological studies of veterans returning from Iraq and Afghanistan revealed high rates of comorbid PTSD and TBI, and that TBI was actually an important risk factor for PTSD. For example, a study of Iraq veterans found that 4.9% reported an injury with loss of consciousness, and an additional 10.3% reported an injury with altered mental status but without loss of consciousness.⁴ The study found a strong association between TBI and PTSD: Of those who reported loss of consciousness, 43.9% developed PTSD, and of those who reported altered mental status, 27.3% developed PTSD. By contrast, in those with an injury without loss of consciousness or altered mental status, the rate of PTSD was 16.2%, and in those without an injury it was 9.1%. The relationship between TBI and PTSD remained significant after controlling for combat experiences. PTSD was also an important mediator of the relationship between TBI and poor physical health outcomes.⁴ Another study of both Iraq and Afghanistan veterans found that 11% screened positive for PTSD and 12% reported a history consistent with mild TBI.¹⁴ Mild TBI was associated with a 2.37-fold increase in the prevalence of PTSD. Of veterans with mild TBI, 34% also met criteria for PTSD. A survey of veterans performed by the RAND Corporation found that 19.5% of returned service members had sustained a probable TBI, and of these, about 34% were affected by probable PTSD (compared to an overall rate of 13.8% probable PTSD).³

Subsequent research has further clarified the relationship between TBI and PTSD. A study of U.S. Army Special Operations Command personnel found that 12.7% of subjects suffered at least one mild TBI.¹⁵ Of these, 28% reported clinical levels of PTSD symptoms. Not only was TBI associated with the development of PTSD, but there was a dose-response relationship between exposure to blast or combination blast-blunt mild TBI and levels of PTSD symptoms. Another study using retrospective chart review specifically compared blast and nonblast TBI in service members deployed to Iraq and Afghanistan. Blast TBI resulted in a higher rate of re-experiencing symptoms, but PTSD symptoms were otherwise equivalent between the two groups.¹⁶ Overall, 37.3% of those who suffered TBI met criteria for clinically significant PTSD symptoms. A prospective study of Marines who were assessed before and after deployment to Iraq and Afghanistan further probed the role of TBI as a risk factor for PTSD by accounting for combat intensity and predeployment characteristics. The study found that 56.8% of participants reported a history of predeployment TBI, while 19.8% sustained a deployment-related TBI.⁵ A regression analysis was performed to predict postdeployment symptoms of PTSD on the basis of predeployment symptoms, predeployment TBI, combat intensity, and deployment-related TBI. Both predeployment symptoms and combat intensity predicted

postdeployment PTSD symptoms. However, even when controlling for these factors, deployment-related TBI was a strong predictor of PTSD symptoms. A deployment-related TBI approximately doubled the rate of PTSD for participants with low predeployment symptoms.

Several studies have investigated the relationship between TBI, PTSD, and suicide in military populations. A study of military personnel referred for evaluation of TBI in Iraq found that the number of TBIs was associated with suicidal thoughts and behaviors, depression, PTSD, and TBI symptom severity.¹⁷ The number of TBIs was associated with suicide risk after controlling for depression, PTSD, and symptom severity. It is important to note that this study assessed suicide based on questionnaire data and did not measure actual suicides. Another study of Iraq and Afghanistan veterans used psychological and social risk factors to estimate suicide risk, and was unable to find clear evidence that veterans with PTSD and TBI were at greater risk for suicide than those with PTSD alone.¹⁸ A study of veterans deployed to Iraq and Afghanistan found that, after controlling for psychiatric comorbidities, TBI increased the risk for current suicidal ideation in male but not female veterans.¹⁹ A case-control study of suicides in the U.S. Armed Forces from 2001 to 2009 found that TBI and PTSD did not increase the odds for suicide (although mood disorders did).²⁰

Estimates of the connection between TBI and PTSD in civilian populations are variable; among those with TBI in cases of nonmilitary trauma, 14% to 56% have been found to have PTSD.²¹ One study found no difference in rates of PTSD among those exposed to motor vehicle accidents with or without TBI.²² However, a prospective cohort study of traumatically injured civilians found that those with traumatic brain injury were more likely to develop PTSD, with an odds ratio of 1.92.²³ Furthermore, patients with TBI were also more likely to develop other psychiatric illnesses including panic disorder, agoraphobia, and social anxiety compared to those with traumatic injuries but without TBI.

The aforementioned research has provided compelling evidence that TBI is a risk factor for PTSD. However, the causal mechanisms by which TBI increases the risk of PTSD remain unclear. Some authors have argued that damage to the brain may directly contribute to PTSD by compromising neural circuitry required to regulate fear.^{24,25} Alternatively, TBI may increase the risk of PTSD by depleting the cognitive resources required to cope with stressors.²⁴ One possibility is that circumstances that surround TBI tend to be more emotionally traumatic than those that do not cause TBI. While studies have attempted to address this by controlling for combat severity or comparing TBI patients to those who have suffered other traumatic injuries, it is difficult to definitively control for all aspects of the traumatic situations.⁵ It is also possible that in some cases, postconcussive symptoms (caused directly by trauma to the brain) are being mistaken for symptoms of PTSD, raising the probability of a PTSD diagnosis.⁵ Overlap between postconcussive and PTSD symptoms will be discussed in the next section.

In summary, understanding of the epidemiologic relationship between TBI and PTSD has evolved rapidly over the past decade, and TBI has emerged as an important risk factor for the development of PTSD in both military and civilian populations. Several studies have shown that this relationship holds when controlling for preexisting psychiatric symptoms as well as when attempting to control for trauma severity. The role of TBI as a risk factor for psychiatric disorders appears not to be specific to PTSD but also to extend to other disorders. Given the high rates of comorbid TBI and PTSD, it has been difficult to disentangle the causal relationships between TBI and subsequent symptoms (i.e., which symptoms result from direct neurological insult and which are related to stress or emotional trauma). The diagnostic difficulties resulting from the overlap in symptoms of PTSD and postconcussive syndrome are discussed in the next section.

DIAGNOSIS OF PTSD AND TBI

PTSD as described in the American Psychiatric Association's *DSM-5* requires a history of exposure to a traumatic event meeting certain criteria, along with symptoms from each of four symptoms clusters (see Table 16.1).²⁶ The first cluster is intrusion, which includes intrusive memories, nightmares, or flashbacks. The second symptom cluster involves avoidance of trauma-related thoughts and feelings or external reminders. The third symptom cluster consists

of negative alterations in cognitions and mood, including dissociative amnesia; negative emotions such as fear, horror, and guilt; loss of interest in activities; and detachment from others. The final symptom cluster involves alterations in arousal and reactivity, which include irritability, reckless behavior, hypervigilance, difficulty concentrating, and sleep difficulties.

There is significant overlap between PTSD and postconcussive symptoms. In particular, both syndromes can involve depressed mood, anxiety, insomnia, irritability, difficulty concentrating, fatigue, hyperarousal, and avoidance.⁶ Emotional numbing, derealization, reduced awareness of one's surroundings, depersonalization, and amnesia can also be related to either PTSD or TBI.^{24,27} Symptoms that are more specific to PTSD include re-experiencing symptoms, shame, and guilt. Headache, sensitivity to light and sound, and dizziness are more specific to postconcussive syndrome. Beyond the overlap in symptoms, there may also be more complex interactions between the symptomatology of PTSD and TBI. For example, pain related to a traumatic injury may serve as a trigger for the re-experiencing symptoms of PTSD.²⁷ Another difficulty in diagnosis is the possible presence of other comorbid conditions. For example, depression is often comorbid with both TBI and PTSD, and can result in concentration problems, memory problems, irritability, reduced motivation, and fatigue.²⁴ The overlap in symptoms makes differential diagnosis difficult in patients at risk for both TBI and PTSD, and careful attention must be paid to the presentation and history in each individual case. It has also been noted that several symptoms characteristic of postconcussive syndrome are fairly nonspecific in general, including headaches, sleep difficulty, irritability, and memory problems.²⁴ In some individuals, these symptoms may be unrelated to either TBI or PTSD.

Researchers have debated whether postconcussive symptoms in general may be caused by emotional and psychological stress, direct neurological injury, or both.²⁸ A cross-sectional study of Iraq and Afghanistan veterans found that PTSD was the strongest factor associated with postconcussive symptoms, even after removing overlapping symptoms from the PTSD score.¹⁴ A prospective study of patients admitted to a hospital for trauma found that acute postconcussive symptoms were not specific to mild traumatic brain injury but were predicted by prior affective or anxiety disorders.²⁹ A subsequent follow-up study found that mild TBI did not predict postconcussive symptoms at 3 months, but that PTSD was related to postconcussive symptoms.³⁰ A retrospective study of National Guard members using a self-report measure of postconcussive symptoms found that National Guard members with a TBI reported more postconcussive symptoms than those in a nonclinical group, but that those with PTSD reported higher postconcussive symptom severity than those with TBI.³¹ Some studies have found an association between TBI and certain postconcussive symptoms after controlling for PTSD. For example, a large study found that TBI was associated with headaches after controlling for PTSD and depression.⁴ Another study found that TBI with loss of consciousness was associated with headaches, memory problems, balance problems, and pain in the extremities after controlling for PTSD and depression.³² One cross-sectional study found that PTSD and TBI were independently associated with postconcussive symptoms, and that those patients with both disorders were at greater risk of postconcussive symptoms than those with only PTSD, TBI, or neither.³³

Several studies have found a role for PTSD as a mediator between TBI and poor health outcomes and functional impairment. One cross-sectional study of combat veterans found that PTSD is an important mediator between TBI and poor health outcomes.⁴ Similarly, another study found that the association between TBI and functional impairment disappeared after controlling for PTSD.³⁴ A study examining neuropsychological outcomes in Iraq and Afghanistan veterans with PTSD, TBI, or both, found that PTSD contributed to objective cognitive deficits, but TBI in and of itself did not.³⁵ However, another study found that PTSD was associated with functional impairment, but that TBI with loss of consciousness was also associated with functional impairment even after controlling for PTSD and depression.³⁶ In considering the literature on PTSD, TBI, postconcussive symptoms, and poor outcomes, it is important to note that biomechanical injury to the brain may contribute to PTSD itself. The role of PTSD as a mediator between TBI and postconcussive symptoms, health outcomes, and functional impairment therefore does not

rule out a role for neurological injury, as opposed to emotional trauma. For this reason, the cause of postconcussive symptoms and poor outcomes in TBI patients remain difficult to disentangle, despite ongoing research.

Some authors have expressed concern that in some cases PTSD symptoms caused by emotional stress may be incorrectly attributed to physical brain injury, and that this misattribution may actually cause harm to patients by reducing their expectations of recovery.²⁴ This process has been termed “diagnosis threat.”³⁷ In order to avoid diagnosis threat, it may be advisable to be cautious when definitively attributing symptoms to neurological injuries rather than other causes, and also to emphasize that recovery from these symptoms is possible and that prognosis is not necessarily poor.

Because PTSD may contribute to postconcussive symptoms and poor outcomes, evaluation and treatment of comorbid PTSD is crucial in individuals with TBI. It should be noted that PTSD might be difficult to recognize in TBI patients, because there is evidence that some of these patients have a tendency to underreport symptoms.²⁸ TBI patients may have difficulties monitoring and summarizing their symptoms. It is important to be cognizant of the possibility of underreported symptoms when assessing PTSD symptoms in this population.

In summary, assessment of comorbid PTSD and TBI presents multiple diagnostic and conceptual challenges. There is significant overlap in diagnostic criteria between PTSD and postconcussive syndrome, although a few symptoms are more specific to each disorder. However, several symptoms of postconcussive syndrome are relatively nonspecific, and in some cases may be related to neither PTSD nor TBI. Despite ongoing research, there continues to be controversy over whether postconcussive symptoms are caused by biomechanical injury to the brain, by emotional and psychological stress, or both. PTSD also appears to be an important mediator between TBI and poor health outcomes and functional impairment in general. Some authors have argued that misattribution of PTSD symptoms to TBI may cause harm to patients by decreasing expectations for recovery. Given the probable role for PTSD in worsening postconcussive symptoms and more general outcomes in TBI patients, it is important to diagnose and treat PTSD in TBI patients. However, it should be noted that some TBI patients may be prone to underreporting symptoms of PTSD.

PTSD TREATMENT

Treatment for PTSD can be categorized as pharmacologic and nonpharmacologic. Among pharmacologic treatments, the strongest evidence exists for selective serotonin reuptake inhibitors (SSRIs). The only FDA approved medications for PTSD are sertraline and paroxetine, which are both SSRIs and have been shown effective in randomized controlled trials.^{38–40} There is also strong evidence for fluoxetine, another SSRI, and venlafaxine, a serotonin norepinephrine reuptake inhibitor (SNRI).^{41–44} Prazosin, an alpha-1 adrenergic antagonist, has shown efficacy in decreasing nightmares associated with PTSD and may also decrease other PTSD symptoms.^{45–47}

Certain psychotherapies have been found effective for PTSD. Prolonged exposure (PE) is a type of trauma-focused cognitive behavioral therapy (CBT) that aims toward fear extinction through imaginal exposures (in which a patient repeatedly recounts memories of a trauma) and in vivo exposures (in which a patient is exposed to distressing situations in the present). PE has been shown to reduce symptoms of PTSD.⁴⁸ Another type of trauma-focused CBT, cognitive processing therapy (CPT) focuses on restructuring dysfunctional cognitions related to a traumatic event. It has also been found to be effective for PTSD.^{49,50} Eye movement desensitization and reprocessing therapy (EMDR) is another evidence-based psychotherapy for PTSD that involves the use of bilateral eye movements in addition to other psychotherapy elements.⁵¹ Within the Veterans Affairs system, both PE and CPT have been widely disseminated and are widely available.⁵²

TREATMENT OF COMORBID PTSD AND TBI

Because PTSD is common in TBI patients and may be an important contributor to poor outcomes in these patients, it is important to identify and treat PTSD in this population. However, treatment of PTSD may present special challenges when comorbid with TBI. Unfortunately, there is currently little evidence to guide treatment in this population. Many PTSD treatment studies actually exclude individuals with TBI.⁵³ Therefore, treatment in this population must take account of the available evidence but also be adapted based on individualized considerations. Such considerations may include cognitive and other sequelae of TBI that may interfere in treatment, overlapping symptoms between PTSD and TBI, and possible tradeoffs when treatments are helpful for one condition but potentially harmful for the other.

Sequelae of TBI may require special attention in trauma-focused CBT for PTSD. For example, as discussed earlier, patients may sometimes attribute nonspecific symptoms to TBI and consequently assume that prognosis for recovery is poor. It may therefore be helpful to address these attributions and normalize the symptoms, reducing distress and increasing expectations for recovery.²⁴ It is also possible that cognitive dysfunction related to TBI may impair patients' ability to understand, remember, and engage with material in the context of cognitive therapy. This may be addressed by simplifying the delivery of therapy, providing written instructions for exercises to compensate for memory problems, and using other strategies to minimize reliance on attentional focus.^{27,28} Impulse control problems related to TBI may also make exposure exercises more difficult to tolerate. These patients may therefore benefit from greater emphasis on the rationale for these exercises in order to encourage engagement with treatment.²⁷ Amnesia related to TBI may interfere in imaginal exposures in PE, in which the patient repeatedly recounts a traumatic experience in order to facilitate fear extinction. In patients who cannot remember the trauma, imaginal exposures may focus on reconstructions of the traumatic experience rather than direct memories. Alternatively, therapy may emphasize in vivo exposure, in which patients are exposed to distressing situations in the present, rather than to distressing memories.^{24,28} To date, no controlled trials have been performed on psychotherapy for PTSD with comorbid TBI. Two early case reports described treatment of individuals with PTSD and TBI using CBT with modifications, such as the use of personal digital assistants and cognitive breaks,^{21,54,55} with improvements in mood and anxiety. More recently, a retrospective study of patients undergoing CPT for PTSD found similar treatment adherence in patients with or without mild TBI.⁵⁶ A case series of slightly modified PE treatment for individuals with comorbid PTSD and TBI found that the subjects significantly improved in symptoms of PTSD and depression from pre- to posttreatment.⁵⁷ Studies of a residential treatment program for comorbid PTSD and TBI using a modified version of CPT found a reduction in both PTSD and postconcussive symptoms over the course of treatment.^{58,59} A controlled trial of CBT for acute stress disorder after TBI showed efficacy in preventing PTSD, providing further evidence that TBI patients are able to benefit from CBT.⁶⁰ Overall, more research is still needed to determine optimal approaches to psychotherapy in this population.

Given the overlapping domains of dysfunction in both TBI and PTSD, treatments that target symptoms common to both conditions may be especially helpful in this population. For example, SSRIs may be beneficial for both PTSD and TBI.⁵³ Additionally, stimulants may be prescribed for attentional dysfunctions, hypnotics for sleep difficulties, and anticonvulsants for affect dysregulation.⁶ The risks of such treatments must also be taken into account (e.g., substance use disorder).

Some pharmacologic treatments for PTSD may carry special risk in TBI patients. For example, individuals with a history of TBI have a higher rate of seizures, gait and balance problems, and deficits in sensory processing. Certain psychotropic medications may worsen sensory or balance problems. Other medications, including bupropion, maprotiline, and amoxapine, can increase the risk for seizures.⁵³ These risks should be considered before starting psychotropic medications, and patients should be monitored for worsening of symptoms. Several types of medications, including antipsychotics, anticonvulsants, anxiolytics, and any anticholinergic medication, may contribute to cognitive deficits associated with TBI.⁵³ Medications often used for TBI may also worsen PTSD symptoms. For example, stimulants to combat fatigue and attentional problems related to TBI may theoretically

worsen hyperarousal in PTSD,⁵³ although empirical evidence that this is commonly encountered as an adverse event is lacking. Finally, many psychotropic medications have complex effects on sleep, which is often impaired in both TBI and PTSD.⁵³ Considering the potential risks of psychotropic medications in these populations, it may be advisable to start at low doses and titrate slowly with careful monitoring for adverse effects.

The prevalence of comorbid TBI and PTSD, and the complexities of clinical care in this population, require special approaches in the delivery of care. The diversity of symptoms in this population, including both medical and mental health problems, means that coordination of care between specialists is crucial.⁶¹ The need for coordination also extends to research, as better design and interpretation of studies in this population will benefit from expertise in psychiatry, neuropsychology, neurology, neurosurgery, and physical medicine and rehabilitation, among others.⁶

In summary, there is currently very little evidence base for the treatment of comorbid PTSD and TBI. Treatment must be individualized based on the presentation of each patient. Cognitive sequelae of TBI may interfere with trauma-focused psychotherapy (though preliminary evidence suggests that many patients with mild-to-moderate cognitive deficits do benefit from such therapies), and therapy may need to be modified to account for cognitive impairment. Certain medications may carry benefit for both disorders, such as antidepressants, stimulants, anticonvulsants, and hypnotics. However, careful attention must be paid to the risks of each medication. In general, it is advisable to start at a low dose, titrate slowly, and monitor closely. This population also requires attention in terms of delivery of care, including special screening procedures and coordination between specialties. More research is clearly needed to determine the best treatments for comorbid PTSD and TBI.

CONCLUSIONS

Comorbid PTSD and TBI is a common and challenging clinical situation that requires attention to develop better strategies for assessment and treatment. Accumulating evidence has identified TBI as an important risk factor for PTSD. The causal relationship between TBI and PTSD remains unclear, but may involve both neurological and psychological factors. Further, there is significant overlap in symptoms of PTSD and TBI, making differential diagnosis difficult. Multiple studies have shown that PTSD is associated with greater reporting of postconcussive symptoms, creating debate over whether these symptoms are related to neurological injury, psychological stress, or both. When assessing this evidence, it is important to note that PTSD itself may be related to neurological injury, and that the association between PTSD and post-concussive symptoms cannot definitively implicate a psychological cause for these symptoms. There are a number of effective pharmacologic and nonpharmacologic treatments for PTSD, but the treatment of comorbid PTSD and TBI may be complicated by several considerations. These include overlapping symptoms, cognitive and other sequelae of TBI that may interfere in treatment, and trade-offs in which a treatment for one condition may adversely affect the other condition. Unfortunately, there is currently very little research to guide treatment in this population, and there is a pressing need for treatment studies in this population.

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Tables

TABLE 16.1

Diagnostic Criteria (*DSM 5*) for Post-Traumatic Stress Disorder

Criterion	Symptom or Description
Criterion A: Stressor (one required)	The person was exposed to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence, as follows: 1. Direct exposure 2. Witnessing, in person 3. Indirectly, by learning that a close relative or close friend was exposed to trauma 4. Repeated or extreme indirect exposure to aversive details of the event(s), usually in the course of professional duties
Criterion B: Intrusion symptoms (one required)	1. Recurrent, involuntary, and intrusive memories 2. Traumatic nightmares 3. Dissociative reactions (e.g., flashbacks), which may occur on a continuum from brief episodes to complete loss of consciousness 4. Intense or prolonged distress after exposure to traumatic reminders 5. Marked physiologic reactivity after exposure to trauma-related stimuli
Criterion C: Avoidance (one required)	1. Trauma-related thoughts or feelings 2. Trauma-related external reminders
Criterion D: Negative alterations in cognitions and mood (two required)	1. Inability to recall key features of the traumatic event 2. Persistent (and often distorted) negative beliefs and expectations about oneself or the world 3. Persistent distorted blame of self or others for causing the traumatic event or for resulting consequences 4. Persistent negative trauma-related emotions 5. Markedly diminished interest in (pre-traumatic) significant activities 6. Feeling alienated from others 7. Constricted affect: persistent inability to experience positive emotions
Criterion E: Alterations in arousal and reactivity (two required)	1. Irritable or aggressive behavior 2. Self-destructive or reckless behavior 3. Hypervigilance 4. Exaggerated startle response 5. Problems in concentration 6. Sleep disturbance
Criterion F: Duration Criterion	Persistence of symptoms for more than one month
Criterion G: Functional significance	Significant symptom-related distress or functional impairment (e.g., social, occupational)

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