



Severity and Symptom Trajectory in Combat-Related PTSD: a Review of the Literature

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Abstract

Purpose of Review Combat-related posttraumatic stress disorder is increasingly recognized as having a variable course in returning veterans. Relatively few studies have identified predictors of illness duration or severity in this population. This review sought to synthesize the existing literature.

Recent Findings The existing literature remains limited and heterogeneous. However, several studies identified hyperarousal and pre-deployment dissociation as predictive of disease severity, and re-experiencing as predictive of suicidality in veterans with combat-related PTSD. No other pre-, peri-, or posttraumatic psychosocial predictors of individual symptoms or overall disease severity have been identified in replicated studies.

Summary Important clinical factors to explore in the assessment of PTSD in combat veterans may now include hyperarousal and a history of dissociation as these may predict disease severity, and re-experiencing as this has been identified as a significant predictor of suicidality. Further study into this topic may reveal biological or more sensitive psychosocial markers predicting illness severity and prognosis.

Keywords Posttraumatic stress disorder · PTSD · Symptom cluster · Posttraumatic growth · Psychosocial risk factor · Combat experience

Introduction

Posttraumatic stress disorder (PTSD) is a constellation of emotional, cognitive, and behavioral symptoms following a traumatic experience. Examination of these variable symptoms has led to the development of multiple “symptom clusters” that permit diagnosis and can be used to characterize the predominant symptomatology: hyperarousal, re-experiencing, avoidance, and negative cognitions and mood [1]. Although the pathophysiology and specific symptoms of PTSD have become clearer since the first descriptions of its archaic

predecessors (i.e., “shellshock” or “soldier’s heart”), clear associations between traumatic experiences and PTSD presentation or prognosis remain elusive. This is not surprising given the observation that not all individuals in the military exposed to combat trauma go on to develop PTSD.

The challenges associated with predicting the course and severity of PTSD after combat prove especially problematic for clinicians caring for military and veteran populations. Despite a better understanding of the pathogenesis of PTSD and the emergence of evidence-based treatments, veterans of Operation Iraqi Freedom and Operation Enduring Freedom demonstrate a prevalence of PTSD markedly higher than civilian counterparts [2, 3]. Heterogeneity within the patient population has prompted the medical community to investigate for the presence of specific biological, psychological, social, or other environmental moderators which might predict specific presentations for—or prognoses of—PTSD. The discovery of such moderators would be of substantial benefit, as future clinicians aware of an individual’s unique characteristics may later be able to cater patient care with precise, symptom-specific interventions. Additionally, any social or psychological predisposing factors for the development of specifically combat-related PTSD could aid the military in

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developing focused Department of Defense-wide interventions to enhance resiliency and limit the negative impact of combat trauma on troops.

This study sought to conduct a systematic review of the available literature to identify and synthesize our present understanding of predisposing or protective factors within combat-exposed military populations linked to specific symptoms, symptom clusters, or the severity and duration of PTSD.

Methods

As this review focused on unique associations of PTSD within a specific sub-population (troops exposed to combat), inclusion and exclusion criteria were developed to ensure relevancy. The preliminary exclusion criteria required a focus on the development, severity, prognosis, and cluster association of PTSD symptoms in relation to pre-, peri-, and posttraumatic psychosocial factors in any given population. Final inclusion criteria after studies were screened necessitated a focus on combat-exposed military populations. In order to ensure the symptomatology of PTSD most closely reflected contemporary understanding, studies were collected between 1995 and 2018 which incorporated DSM-III, DSM-IV, and DSM-5 diagnostic criteria. Studies were collected through PubMed, Embase, and PsycINFO databases. Search terms included “stress disorders,” “post-traumatic,” “ptsd,” “posttraumatic stress disorder,” “combat disorder,” “factor analysis,” “cluster analysis,” “clustering,” “symptom cluster,” “symptom trajectory,” “military,” “military personnel,” “active duty,” “army,” “air force,” “navy,” “soldier,” “warfighters,” “combat,” “deployed,” “deployment,” “predictor,” and “risk factor.” Submission of search terms returned 414 results. Of the 414 results, 83 duplicates were removed and the remaining 331 were evaluated with the exclusion criteria. Two hundred eighty studies were initially excluded primarily for a lack of sufficient attention to symptomatology within a broader PTSD diagnosis. For example, multiple studies focused on the impact of psychosocial factors in relation to PTSD diagnosis; however, they did not relate these factors to specific symptomatology or prognosis. Studies that evaluated PTSD diagnosis as a predisposing factor for issues such as substance abuse and domestic violence were excluded, as this review’s predominant view of PTSD is as an outcome of interest rather than an independent risk factor. As this review’s chief focus was to identify immediately modifiable psychosocial risk factors, genomic studies and pharmacological trials were excluded. Active duty, reservist, National Guard, and veteran populations from American and international populations were all included. No specific conflict or branch of service was emphasized by the inclusion criteria. After full

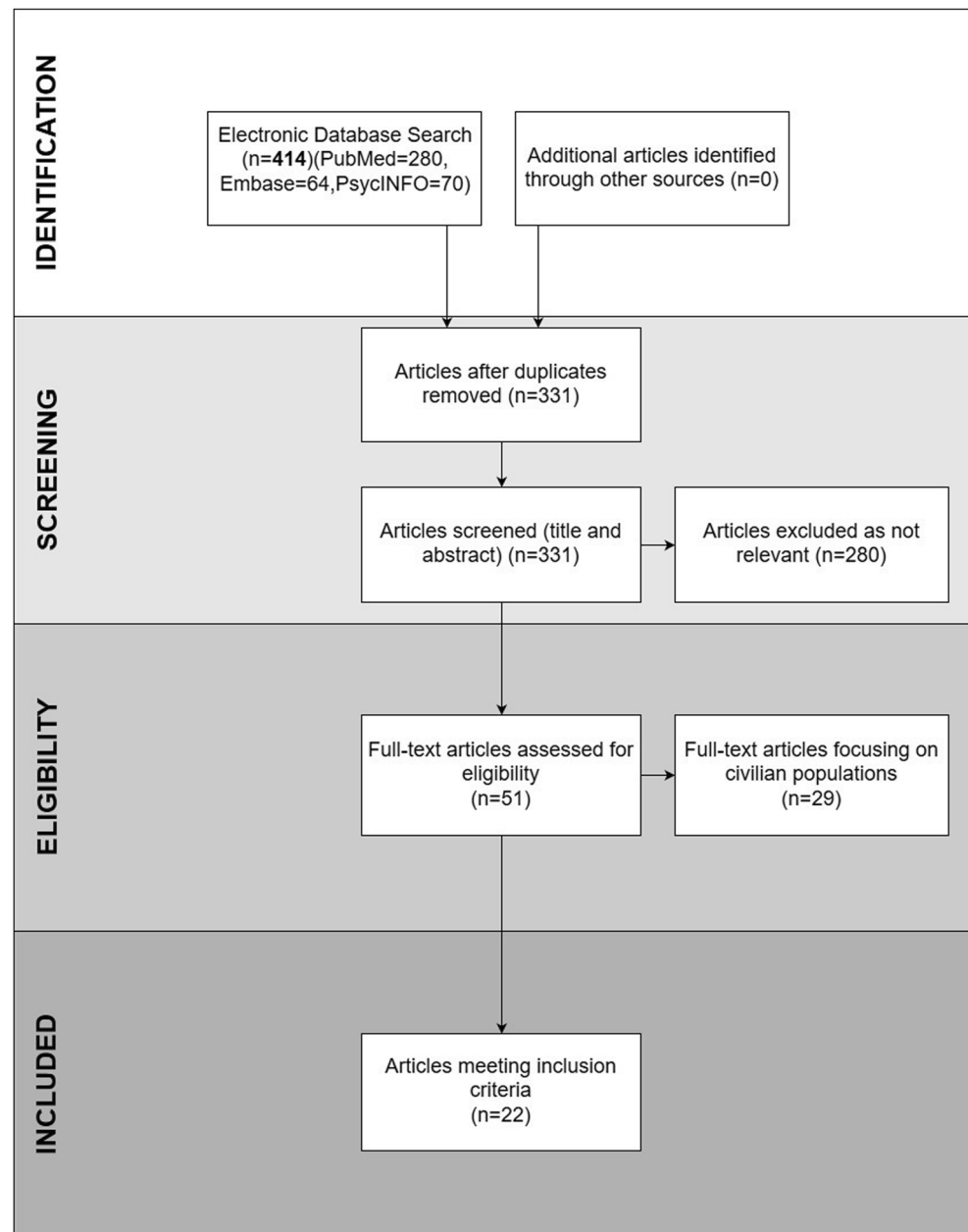
application of the criteria to the remaining 51 studies, 22 were eligible for final review. The screening process is illustrated in Fig. 1 as a variant representation of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) format [4].

Results

Initial review of the remaining 22 studies permitted the identification of several consistent themes, which led to their further analysis after placement into the following groups based on these themes: combat experiences, emotional regulation and personality, social environment, dissociation, and illness trajectory. Lastly, a comorbidity category was developed to evaluate three studies that did not fall within the above broader categories.

Combat Experiences

Combat experiences and their contributions to the development, severity, and symptom profile of PTSD in military populations were discussed to some degree in 10 of 22 studies. Studies focusing on combat experiences largely centered around severity or type of combat trauma and subsequent symptomatology or severity of PTSD symptoms. Generally, a dose-dependent relationship between combat exposure and PTSD severity was supported [5]. However, one study evaluating the mediating effects of social support and trauma among US servicemembers deployed to Afghanistan suggested that PTSD symptoms are mediated by trauma only at high trauma levels [6•]. Further emphasizing the unique etiological role of combat trauma in PTSD, combat was found to have a significantly higher association with subsequent PTSD symptoms when compared with pre-accession risk factors including personal or family psychiatric history and family instability [7]. In several studies, specific symptom cluster patterns were also noted to maintain a dose-response relationship to combat exposure. One evaluation of the association between symptom clusters and operational experiences in UK soldiers deployed to Afghanistan found that re-experiencing and numbing symptoms predominate with greater degrees of exposure to violent combat. This study also demonstrated a significant relationship between a soldier’s proximity to death or wounding and subsequent development of re-experiencing and hyperarousal symptoms, and significant associations between improvised explosive device (IED) exposure and hyperarousal predominant symptom patterns [8••]. Broad associations between combat exposure and avoidance, hyperarousal, and intrusive symptoms were found among Croatian prisoners of war, yet many of these associations were moderated by measurements of subjective quality of life [9]. Pietrzak et al., in an assessment of 285 Connecticut Army Reserve and

Fig. 1 Overview of article selection

National Guard soldiers, found that of their evaluated combat traumas only witnessing allies being wounded or killed, being exposed to friendly fire, and exposure to landmines were the experiences associated with the severity of general PTSD symptoms. When evaluating the associations between predominant symptom cluster patterns and combat experiences, they noted significant associations between exposure to friendly fire and re-experiencing and dysphoric symptoms but not avoidance or hyperarousal predominant symptomatology [10]. Consistent with the above studies, Shea et al. identified significant associations between exposure to personal life threat and death and injury of others with hyperarousal and dysphoria respectively among Reserve and National

Guard soldiers deployed to Iraq and Afghanistan. However, this same study found no support for the hypothesis that predictive value existed for personal life threat for anxiety, exposure to death for numbing symptoms, and experience of killing enemy combatants for subsequent feelings of guilt [11••]. In their assessment of combat experiences as mediator of current or past PTSD symptoms, O'Toole et al. found significant associations between exposure to injury of civilians and lifetime avoidance and hyperarousal, as well as current re-experiencing symptoms but not current PTSD. Additionally, they noted a positive association between exposure to mutilation and avoidance symptoms, but not with lifetime or current PTSD diagnosis [5]. Similar findings were recorded by Nye

and Bell in their assessment of combat-exposed veterans with PTSD diagnosis, which noted significant correlations between degree of re-experiencing symptoms and degree of exposure to combat atrocities [12]. This positive association between exposure to wartime atrocities and re-experiencing symptoms is supported by earlier works by Yehuda et al. and Beckham et al. [13, 14]. Consistent with the previous studies' findings, Cox et al. also noted significant predictive associations between combat exposure and re-experiencing symptoms, but found no significant relationship between combat exposure and avoidance or hyperarousal [15].

Emotional Regulation and Personality

Multiple studies within this category centered around the mediating effects of self-compassion on PTSD symptomatology and severity. Self-compassion has been defined as a positive mechanism of emotional regulation in which an individual maintains a forgiving outlook towards oneself and others, a perception that one's own experience is connected with the greater world, and a resistance to overidentify with one's painful experiences [16]. In their study on the benefits of meditative practices designed to develop greater self-compassion, Kearney et al. demonstrated a significant reduction of the severity of PTSD and depressive symptoms in veterans with higher measures of self-compassionate behavior [17]. These results closely mirror those found by others exploring the association between measurements of self-compassion and PTSD symptom severity in trauma-exposed Iraq and Afghanistan veterans. After accounting for combat experience and baseline PTSD severity, Hiraoka et al. noted a statistically significant association between self-compassion measurements and reported PTSD symptom severity. Measurements of self-compassion were also found to have robust predictive value for PTSD symptom severity at a 12-month follow-up interval [18]. Indirectly related to the notion of self-compassion, a servicemember's feelings of guilt or shame regarding his or her combat experiences have been found to maintain a significant positive correlation with general PTSD severity, and in particular, with re-experiencing and avoidant predominant symptomatology [19]. Like self-compassion, the expression of mindful non-judging (reviewing personal experiences through a non-evaluative lens) was observed to be lower among veteran groups with PTSD. Not only was this broad association appreciated, but it was also found that mindful non-judging behaviors contributed to significant variations in PTSD symptoms even after adjusting for combat exposure. The value of mindful non-judging starkly contrasted that of mindful awareness (the capacity to focus one's attention on current sensations and experience) which demonstrated no relationship between PTSD diagnosis or symptom variations [20]. Looking at a broader concept of emotional management, Kaczurkin et al. evaluated the predictive value of emotional

regulatory strategies for PTSD symptom clusters among 365 active duty servicemembers with PTSD. Among what they referred to as "dysfunctional cognitions," thought patterns of catastrophizing were associated with predominately intrusive symptom patterns ("Recurrent, involuntary, and intrusive distressing memories of the traumatic event(s).") [1]. Additionally, personal predilections for self-blame and negative cognitions about self and the world were more readily associated with predominant symptoms of negative alterations in cognition and mood [21]. The cognitive-affective disturbance "alexithymia" was also demonstrated to have large positive associations with clinical measurements of PTSD. Alexithymia has been described as a combination of four cognitive-affective features: "(1) difficulty in identifying and describing feelings; (2) difficulty in distinguishing between feelings and the bodily sensations of emotional arousal; (3) constricted imaginative processes, as evidenced by a paucity of fantasies; and (4) an externally oriented cognitive style." [22, 23] Of note, Badura suggests that in the case of patients with PTSD, alexithymia may be more reflective of emotional numbing symptoms as opposed to a preexisting pattern of emotional regulation [24]. Beyond emotional regulatory mechanisms, specific personality components have been seen to have predictive or mediating value on PTSD. Among Danish soldiers deployed to Afghanistan in 2009, pre-deployment factors including dissociation, previous trauma, and neuroticism were observed to be independently significant risk factors for post-deployment PTSD [25]. Naifeh et al., having developed a measurement tool for sensitivity to blood, injury, and mutilation (SBIM) in American special operations soldiers, reported a positive association between SBIM and overall PTSD symptom severity. This association maintained statistical significance even after controlling for lifetime trauma, demographics, and the presence of neurotic personality traits [26].

Social Environment

In an analysis of challenges to community reintegration and their association with PTSD symptoms among Danish soldiers returning from Afghanistan, clear positive associations were observed. Up to 18% of the assessed population reported "... some, a lot, or extreme difficulties ..." in domains including interpersonal functioning and community involvement, with poorer prognoses associated with greater difficulty with homecoming and community reintegration [27]. Similar findings were reported by Vuksic-Mihaljevic et al. who observed a relatively greater etiological role of homecoming reception in PTSD than examined premilitary risk factors [7]. Using self-reported measures of social support as a grouping variable, Moore et al. found that although trauma severity affected overall trajectory of posttraumatic growth, these associations were to some degree mediated by perceived social

support [6•]. Of particular interest to this review are the findings by Loncar et al. in their evaluation of PTSD symptomatology relative to subjective quality of life (SQOL). It was found that in addition to combat experiences, SQOL was inversely associated with the predominance of both hyperarousal and intrusion symptoms while maintaining no predictive value for avoidant symptoms [9].

Dissociation

A history of pre- or peritraumatic dissociation was unique among examined psychosocial risk factors as the available literature demonstrated evidence for it not only as an independent etiological predictor of PTSD and mediator of functional impairment but also as a predictor of specific trajectories of posttraumatic growth [5, 7, 28••]. In an assessment of Danish soldiers for baseline predilection for dissociation, it was observed that soldiers with high baseline levels of pre-deployment dissociation experienced different posttraumatic growth trajectories than those with low baseline levels. Soldiers with high dissociation were observed to generally experience one of three trajectories: (1) severe baseline PTSD symptoms that initially remitted but later decompensated, (2) initially severe illness at baseline with progressive remission, and (3) persistently low symptom severity at baseline with mild fluctuations. The above trajectories were distinct from the following low-dissociation trajectories: (1) persistently low and stable symptom burden, (2) initially low symptoms at baseline that reached moderate severity during and after deployment, and (3) low baseline symptoms that rapidly decompensated at approximately 7 months after deployment [25••].

Illness Trajectory

The manuscripts placed in this category focused primarily on the illness trajectories predicted by predominating symptom clusters as well as clusters' interactions with each other over time. Among a sample of 348 Gulf War reservists evaluated 1–2 years after completing their service, emotional numbing and hyperarousal symptoms progressively worsened, while re-experiencing and avoidance symptoms remained relatively stable. Of note, the same study found that numbing and hyperarousal at 1 year predicted general distress, depression, anxiety, and somatic symptoms at 2 years whereas re-experiencing and avoidance demonstrated no such predictive ability [29]. The significance of hyperarousal is emphasized in more recent work as well, and contemporary studies have observed it to be more stable and predictive of PTSD severity than other symptom clusters [20, 30, 31]. Work by Doron-LaMarca et al. offers further evidence of the value of hyperarousal in predicting fluctuations of other symptom clusters, and also suggests a possible interplay between other clusters

throughout the progression of the illness. Numbing was observed to influence later re-experiencing and avoidance, while re-experiencing was found to influence later hyperarousal. This led the authors to consider a possible “chain of symptoms” in which initial hyperarousal leads to numbing, followed by predominance of re-experiencing which in turn produces more hyperarousal [32]. One study examining cluster associations with suicidality in a small population of Vietnam veterans noted a significant association between re-experiencing and current suicidal ideation, but found no significant relationship between severity of combat exposure and overall PTSD severity or suicidal ideation [12]. In their 2006 evaluation of symptom clusters and their associated comorbidities among combat veterans with PTSD, Kashdan et al. demonstrated that emotional numbing maintains the greatest predictive value for subsequent development of comorbid major depressive disorder [33].

Comorbidity

Within this category are noteworthy assessments of the impact of anhedonia and sleep disturbances that fulfilled inclusion criteria (i.e., were specific to combat-exposed troops). Of considered PTSD symptoms, anhedonia has been observed to maintain positive associations only with emotional numbing. In addition to reporting numbing's predictive value for comorbid MDD, the authors noted a greater likelihood of comorbid generalized anxiety disorder with greater degrees of anhedonia [33]. Contrary to previous studies describing combat experiences as the chief moderator of PTSD symptoms and severity, work by Cox et al. reported larger associations between insomnia and all PTSD clusters than with trauma severity. Not only was insomnia observed to have more significant associations with symptom severity, but it also mediated the ability of combat exposure to predict re-experiencing predominant symptomatology [15].

Discussion

Overall, the available literature examining symptom-specific trajectory and severity in combat-related PTSD remains scarce and results are somewhat heterogeneous. However, this review identified some consistent findings within the literature that may be of clinical value to physicians caring for military and veteran patients. Taken as a whole, the studies evaluating the impact of combat experiences tended to demonstrate that the intensity of combat exposure predicts severity of PTSD. Beyond intensity, the type of exposure predicts the presence of certain symptoms. Specifically, exposure to death, injury, and IEDs predicts hyperarousal, while exposure to atrocities, collateral damage, and friendly fire predicts re-experiencing. Therefore, clinical inquiry into the specific nature of these

combat experiences—common among veterans of the Global War on Terror—may help inform prognostic assessments with regard to these particular symptom clusters [5–15]. Along these lines, three psychiatric symptoms described in the literature may hold significant clinical and prognostic value and may serve as targets for future intervention and study: hyperarousal, re-experiencing, and pre-deployment dissociation. While other predictors of illness persistence and severity have been described in this review, these symptoms bear significant clinical value and thus deserve special consideration.

Hyperarousal was generally observed as the most stable symptom as well as the one most closely associated with PTSD severity, functional impairment, and the later development of other symptom clusters [20, 29–32]. Identifying the presence and degree of hyperarousal may serve for clinicians as a predictive standard of measurement for the overall severity of subsequent PTSD and comorbid symptoms in combat-exposed veterans. Similarly, the effects of interventions specifically targeting hyperarousal should be a focus of future study. One possible limitation on the use of hyperarousal to guide a clinical approach is that the cited research predominantly used the PTSD Checklist-Military Version (PCL-M) to measure symptom severity. Although it demonstrated significant validity and internal consistency, the version used in reviewed studies made use of DSM-IV criteria and thereby may not be as useful when applied to new military populations or used in conjunction with the DSM-5 [29, 32]. An updated measurement tool has been developed that is consistent with DSM-5 criteria and may be a focus of future research [34].

Perhaps the most tragic and severe trajectory of PTSD (or any mental illness) is one ending with suicide. Although only one study related to suicidality was included in this review, the clinical significance of Nye and Bell's findings cannot be understated. The U.S. Department of Veteran Affairs recently published their assessment of nationwide suicide data among veterans, estimating approximately 20 deaths by suicide daily between 2005 and 2015. For patients diagnosed with PTSD, the report estimated 40 to 50 deaths by suicide per 100,000 person-years between 2005 and 2015 [35]. The risk of suicide in active military and veteran populations, particularly those suffering from mental illness, continues to be an obstacle to the preservation of national strength and the successful reintegration of veterans into the civilian population. The recognition of re-experiencing predominant symptomatology as predictive for suicidal ideation could be used to better stratify the risk of suicide among current and former servicemembers with PTSD and in effect preserve the lives of those at greatest immediate risk for suicide [12]. While suicidal ideation is certainly a significant risk factor for suicide, further study will be necessary to determine if the presence or severity of re-experiencing

predicts the transition from ideation to attempted or completed suicide.

As with hyperarousal, a servicemember's experience of dissociation was observed to be an effective means of predicting overall functional impairment and chronicity of symptoms. However, studies reviewed suggested that the experience of dissociative symptoms prior to trauma predicted that patients would fall into generally less favorable prognoses compared with those without a history of dissociation [5, 7, 25••, 28••]. Identifying a history of pre-accession, pre-deployment, or peritraumatic dissociation may afford clinicians a more robust idea of how their patients may progress or respond to treatment. Additionally, these insights could be implemented at a broad policy level as pre-accession standards limiting its prevalence among military personnel. The applicability of dissociation is limited given the variable populations, measurement tools, and nature of dissociation evaluated between the reviewed studies. There was no standardized measurement scale among reviewed studies, which included the Peritraumatic Dissociative Experience Questionnaire and Dissociative Experience Scale [7, 25••]. The clarification of dissociation's effects on PTSD may require focused investigation of the effects of pre-, post-, and peritraumatic dissociation timeframes on symptomatology and prognosis with a standardized measurement tool.

To the authors' knowledge, this is the first comprehensive review of the literature within specific military and veteran populations on risk factors and symptom-specific trajectories in combat-related PTSD.

This review does have several limitations. This review's focus on exclusively military patients may have limited generalizability to civilians who may not have similar traumatic exposures. Furthermore, exclusion of civilian studies may have overlooked factors observed in general populations relevant to military populations. The fact that risk factors including traumatic brain injury, substance use, or genetic variations were not reviewed means that the impact of these phenomena or their interaction with identified risk factors and symptoms was not explored. Finally, reviewed studies predominately made use of the DSM-IV. The modified definitions of criterion A traumatic experience and the addition of another symptom cluster in DSM-5 beg the question of the applicability of DSM-IV- or DSM-III-based findings to new populations diagnosed by a different standard.

Conclusion

This review provides a summary of how the specific nature of an active duty or veteran servicemember's post-traumatic symptoms may be affected by various psychosocial factors. The more consistently observed findings of

the importance of hyperarousal and dissociation (either before, during, or after trauma) as predictive of symptom severity, and re-experiencing phenomena as predictive of suicidal ideation may help inform particular areas of clinical inquiry after treatment is initiated. Other risk factors such as emotional regulatory strategies, insomnia, and social dynamics provide additional opportunities for future study and clinical application. As the medical community continues to develop a more complete understanding of PTSD, the characterization of both psychosocial and biological risk factors not only for PTSD but also for specific symptoms of or often associated with PTSD will hopefully allow clinicians to more comprehensively understand a patient's unique presentation and tailor care individualized to a patient's specific symptoms, risks, and needs.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

DoD Disclaimer The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense.

References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. Diagnostic and statistical manual of mental disorders, 5th edn. American Psychiatric Association, Washington, DC; 2013.
2. Tanielian T, Jaycox L, editors. Invisible wounds of war: psychological and cognitive injuries, their consequences, and services to assist recovery. Santa Monica: RAND Corporation; 2008.
3. Kessler RC, Berglund P, Delmer O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005;62(6):593–602.
4. Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: the PRISMA Statement. *Open Med*. 2009;3(3):123–30.
5. O'Toole BI, Marshall RP, Schureck RJ, Dobson M. Combat, dissociation, and posttraumatic stress disorder in Australian Vietnam veterans. *J Trauma Stress*. 1999;12(4):625–40.
6. Moore TM, Risbrough VB, Baker DG, et al. Effects of military service and deployment on clinical symptomatology: the role of trauma exposure and social support. *J Psychiatr Res*. 2017;95: 121–8. **Among a large-scale servicemember population (1444 infantrymen exposed to varying intensities of combat trauma), this study replicated previous findings suggesting a positive moderating effect of social support on PTSD symptoms. This study encourages further investigation into the role of early social interventions in mitigating the severity of PTSD symptoms.**
7. Vuksic-Mihaljevic Z, Bencic M, Begic D, et al. Combat-related post-traumatic stress disorder among Croatian veterans: the causal models of symptom clusters. *Eur J Psychiatry*. 2004;18(4):197–208.
8. Osório C, Jones N, Jones E, Robbins I, Wessely S, Greenberg N. Combat experiences and their relationship to post-traumatic stress disorder symptom clusters in UK military personnel deployed to Afghanistan. *Behav Med*. 2018;44:131–40. **This study is noted by its authors as new among studies on this topic from UK researchers. Overall, their findings suggested that different types of combat trauma bear unique contributions to what symptom clusters predominate in their resultant presentation of PTSD (i.e., greater exposure to violent combat predictive of re-experiencing and numbing symptoms).**
9. Loncar M, Plasc ID, Bunjevac T, et al. Predicting symptom clusters of posttraumatic stress disorder (PTSD) in Croatian War veterans: the role of socio-demographics, war experiences and subjective quality of life. *Psychiatr Danub*. 2014;26(3):231–8.
10. Pietrzak RH, Whealin JM, Stotzer RL, Goldstein MB, Southwick SM. An examination of the relation between combat experiences and combat-related posttraumatic stress disorder in a sample of Connecticut OEF-OIF veterans. *J Psychiatr Res*. 2011;45:1579–84.
11. Shea MT, Presseau C, Finley SL, Reddy MK, Spofford C. Different types of combat experiences and associated symptoms in OEF and OIF National Guard and Reserve veterans. *Psychol Trauma*. 2017;9(S1):19–24. **An American counterpart to the UK study by Osório et al., this study adds to the growing body of literature suggesting that differing symptomatology of PTSD or other psychiatric comorbidities may be influenced by specific combat experiences.**
12. Nye EC, Bell JB. Specific symptoms predict suicidal ideation in Vietnam combat veterans with chronic post-traumatic stress disorder. *Mil Med*. 2007;172(11):1144–7.
13. Yehuda R, Southwick SM, Giller EL. Exposure to atrocities and severity of chronic posttraumatic stress disorder in Vietnam combat veterans. *Am J Psychiatry*. 1992;149:333–6.
14. Beckham JC, Feldman ME, Kirby AC. Atrocities exposure in Vietnam combat veterans with chronic posttraumatic stress disorder: relationship to combat exposure, symptom severity, guilt and interpersonal violence. *J Trauma Stress*. 1998;11:777–85.
15. Cox RC, McIntyre WA, Olatunji BO. Interactive effects of insomnia symptoms and trauma exposure on PTSD: examination of symptom specificity. *Psychol Trauma*. 2017;10:508–14. <https://doi.org/10.1037/tra0000336>.
16. Neff KD. Self-compassion: an alternative conceptualization of a healthy attitude toward oneself. *Self Identity*. 2003;2:85–102.
17. Kearney DJ, Malte CA, McManus C, Martinez ME, Felleman B, Simpson TL. Loving-kindness meditation for posttraumatic stress disorder: a pilot study. *J Trauma Stress*. 2013;26:426–34.
18. Hiraoka R, Meyer EC, Kimbrel NA, DeBeer BB, Gulliver SB, Morissette SB. Self-compassion as a prospective predictor of PTSD symptom severity among trauma-exposed U.S. Iraq and Afghanistan War veterans. *J Trauma Stress*. 2015;28(2):127–33.
19. Henning KR, Frueh BC. Combat guilt and its relationship to PTSD symptoms. *J Clin Psychol*. 1997;53:801–8.
20. Wahbeh H, Lu M, Oken B. Mindful awareness and non-judging in relation to posttraumatic stress disorder symptoms. *Mindfulness (N Y)*. 2011;2(4):219–27.

21. • Kaczurkin AN, Zang Y, Gay NG, et al. Cognitive emotion regulation strategies associated with the DSM-5 posttraumatic stress disorder criteria. *J Trauma Stress*. 2017;30:343–50. **In assessing for the predictive value of emotion regulation strategies for DSM-5 PTSD symptom clusters, the authors found clear relationships between an individual's cognitive behavioral strategies and distinct PTSD symptomatology. These findings altogether suggest that certain symptoms of PTSD may be mitigated with interventions focused on modifying an individual's emotional regulatory patterns.**
22. Taylor GJ. Alexithymia: concept, measurement and implications for treatment. *Am J Psychiatry*. 1984;141:725–32.
23. Taylor GJ, Bagby RM, Parker JDA. The alexithymia construct: a potential paradigm for psychosomatic medicine. *Psychosomatics*. 1991;32:153–64.
24. Badura AS. Theoretical and empirical exploration of the similarities between emotional numbing in posttraumatic stress disorder and alexithymia. *J Anxiety Disord*. 2003;17:349–60.
25. •• Ponce de León B, Andersen S, Karstoft K-I, Elklit A. Pre-deployment dissociation and personality as risk factors for post-deployment post-traumatic stress disorder in Danish soldiers deployed to Afghanistan. *Eur J Psychotraumatol*. 2018;9(1):1443672. <https://doi.org/10.1080/20008198.2018.1443672>. **This work introduces the novel concept that pre-traumatic dissociative experiences may bear an impact on posttraumatic growth distinct from other pre-traumatic risk factors. The observed symptom trajectories influenced only by baseline dissociation provide an innovative look at pre-traumatic dissociation as a significant prognostic factor in combat-related PTSD.**
26. • Naifeh JA, Ursano RJ, Benfer N, et al. PTSD symptom severity and sensitivity to blood, injury and mutilation in U.S. Army special operations soldiers. *Psychiatry Res*. 2017;250:78–83. **This study established a standardized definition and means to measure sensitivity to blood, injury, and mutilation (SBIM) and its unique contribution to PTSD development and severity. It adds to the growing body of evidence signifying the impact of individualized personality traits and personal resiliency as risk factors for maladaptive responses to combat trauma.**
27. Karstoft K, Armour C, Andersen SB, Bertelsen M, Madsen T. Community integration after deployment to Afghanistan: a longitudinal investigation of Danish soldiers. *Soc Psychiatry Psychiatr Epidemiol*. 2015;50:653–60.
28. •• Boyd JE, Protopopescu A, O'Connor C, et al. Dissociative symptoms mediate the relation between PTSD symptoms and functional impairment in a sample of military members, veterans, and first responders with PTSD. *Eur J Psychotraumatol*. 2018;9(1):1463794. <https://doi.org/10.1080/20008198.2018.1463794>. **This study regarded dissociation as a more significant member of the PTSD symptom constellation rather than a risk factor altering posttraumatic growth. The authors not only found that it is more prevalent among active and veteran servicemembers with PTSD but also replicated other reviewed findings that dissociative symptoms may be a harbinger for greater functional impairment and worse prognoses.**
29. Thompson KE, Vasterling JJ, Benetsch EG, Brailey K, Constans J, Uddo M, et al. Early symptom predictors of chronic distress in Gulf War veterans. *J Nerv Ment Dis*. 2004;192:146–52.
30. Schell TL, Marshall GN, Jaycox LH. All symptoms are not created equal: the prominent role of hyperarousal in the natural course of posttraumatic psychological distress. *J Abnorm Psychol*. 2004;113(2):189–97.
31. Solomon Z, Hoshesh D, Ein-Dor T. The longitudinal course of post-traumatic stress disorder symptom clusters among war veterans. *J Clin Psychiatry*. 2009;70(6):837–43.
32. Doron-LaMarca S, Niles BL, King DK, King LA, Kaiser AP, Lyons MJ. Temporal associations among chronic PTSD symptoms in U.S. combat veterans. *J Trauma Stress*. 2015;28:410–7.
33. Kashdan TB, Elhai JD, Frueh BC. Anhedonia and emotional numbing in combat veterans with PTSD. *Behav Res Ther*. 2006;44:457–67.
34. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): development and initial psychometric evaluation. *J Trauma Stress*. 2015;28:489–98.
35. VA National Suicide Data Report 2005-2015. U.S. Department of Veterans Affairs. 2018. https://www.mentalhealth.va.gov/docs/data-sheets/OMHSP_National_Suicide_Data_Report_2005-2015_06-14-18_508-compliant.pdf. Accessed 21 Sept 2018.

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