

## Posttraumatic Stress Disorder, Part I

### Overview

The Integrative Health approach can be built around the Circle of Health, which emphasizes the importance of personalized, values-based care that draws in mindful awareness and eight areas of self-care: Physical Activity, Surroundings, Personal Development, Nutrition, Recharge, Family, Friends and Coworkers, Spirit & Soul, and Mind and Emotions. Conventional therapies, prevention, complementary and integrative health (CIH) approaches, and community also have important roles. The narrative below describes how Integrative Health can support people with different types of posttraumatic stress disorder (PTSD).

Depending on individual needs, an Integrative Health approach to PTSD may vary greatly from person to person. A person's health plan may incorporate a variety of self-care, conventional care, and complementary health approaches, as described below. Mind-body approaches (including an array of specific psychotherapies developed for PTSD), healthy nutrition, and an array of other approaches can support people with this challenging health problem.

**Note:** This overview is different from others, in that it features three different patients as examples. Key details from their Personal Health Inventories (PHIs) are offered, but there are not separate documents with their PHIs or health plans. A significant amount of the research in this area has been related to veterans and active-duty military personnel; special thanks to VA for all the contributions they have made with their Whole Health approaches to care of people with PTSD.

### Meet the Patients—Todd, Erica, and Melissa

**Todd** is a 28-year-old veteran of Operation Iraqi Freedom (OIF). He “saw a lot go down” during his time in Iraq, but he felt like he was doing fairly well when he completed his tour and returned to the United States in 2009. Six months after his return, however, he developed a number of troubling symptoms:

- He began to have flashbacks, focused on when his teammate, Hal, lost his leg in an explosion.
- He finds himself wanting to avoid crowded areas or places where there is a lot of noise. He tells you, “I can’t set foot in a mall, a theater, or some other crowded place like that.”
- He finds it is impossible to trust anyone now, and he hasn’t felt relaxed or happy in years. He gets into fights easily. He always positions himself in a room so he can see the doors and windows.
- He is haunted by the thought that he should have been the one to lose a leg, not Hal.
- He finds it difficult to maintain romantic relationships or friendships. His concentration is poor, and he is frustrated that he has not done well in college courses he has tried taking. He says, “Every time I try to do something new, it’s like I sabotage myself. Or I get all wired and reactive and it makes everything go wrong.”

To cope, Todd drinks, sometimes as much as a case of beer daily, but on good days, he does not drink at all. He does not own a gun or have plans for harming himself, but it has occurred to him that, as he puts it, “my life has been so hard that I am not so sure I want it anymore.” He was initially diagnosed with anxiety, until he sought out the advice of a psychiatrist who made the diagnosis of PTSD. He takes his medications as prescribed by his psychiatrist, and wants to do “anything and everything” he can to improve his quality of life.

**Erica** is a 34-year-old who was raped by a coworker when she was 22. She did not press charges due to various circumstances, including being threatened by her manager when she went to him for help. Erica quit her job at that time. She tells her primary care provider, “I just can’t stand to be around other people, especially men, because it all takes me back to when I was attacked.” For a year, she worked out of her home. However, she developed worsening depression and attempted suicide via an overdose of one of her sleep medications in 2012. In the wake of the suicide attempt, her worsening concentration, sleep problems, and periodic anxiety attacks, she lost her home-based job. She was evicted and has been homeless for several years. She currently lives in a women’s shelter.

**Melissa** is a 48-year-old oncology nurse. In her role taking care of children with cancer, she feels she has “been able to do a lot of good over the years.” However, lately, particularly after some unexpected losses related to COVID-19 infection complications, she notes, “I still feel like something is broken inside me.” Melissa continues to work, noting she has some good days and some bad days. It is increasingly difficult for her to go to work due to the fear that she will lose another patient to COVID and “lose it to the point where I can’t do my job well.” She has used up all of her sick time, and her supervisor recommended that she seek help.

Todd, Erica, and Melissa all receive their care in the same health care system, where they all registered for “[Self-Care for PTSD](#)” resources. Each of them, when given the option, agreed to work with mental health providers (including psychiatrists) to explore their options. They also all chose to see an Integrative Health consultant to explore additional options.

## Introduction

*These are men whose minds the Dead have ravished.  
Memory fingers in their hair of murders  
Multitudinous murders they once witnessed.  
Wading sloughs of flesh these helpless wander,  
Treading blood from lungs that had loved laughter.*

—Wilfred Owen, English poet and WWI soldier, 1893-1918

PTSD affects 7%-8% of all Americans at some point during their lifetimes, with women being affected twice as often as men (10% versus 5%).<sup>1</sup> The National Vietnam veterans Readjustment Study estimated the lifetime prevalence of PTSD for male and female Vietnam veterans as 31% and 27% respectively.<sup>2</sup> Prevalence for Gulf War veterans is about 12%, and for OEF/OIF veterans, it is around 14%.<sup>3,4</sup> Studies in veterans indicate that the risk of developing PTSD increases for many people over time after they experience trauma, especially in the first three to six months after the trauma occurs.<sup>5</sup>



The etiology of PTSD is complex and arises out of a complex interaction of biological, psychosocial, and cognitive factors.<sup>6,7</sup> Genetic studies indicate that some people with PTSD may be genetically predisposed to have more inflammatory dysregulation, and this is likely linked to why people with PTSD have a higher risk of inflammatory disorders.<sup>8</sup>

According to a 2015 review of 116 studies of veterans, the following can be said about risk factors for PTSD<sup>9</sup>:

- It is not clear if overall risk is higher for males or females.
- Risk is higher for younger people; it is higher for males who are under 40 years of age and females under 30.
- Lower level of education correlates with greater risk.
- Black/African American people have been noted to have lower risk.
- Not being in a relationship increases risk.
- In terms of military-specific factors, being in the Army or the Marines versus other military branches increases chances of developing PTSD. Risk is higher for enlisted personnel compared to officers. Risk also goes up based on what one does during deployment; it is higher for health care, service and supply, and combat personnel.

Childhood experiences also increase PTSD risk.<sup>10</sup> A 2019 study including 1501 people from China found that the adjusted odds ratio for having PTSD in adulthood for people who had traumatic experiences in childhood was 1.32.<sup>11</sup> Severity of trauma in childhood had a dose-dependent effect, PTSD was also linked more strongly to specific types of trauma at specific ages.<sup>12</sup>

## Diagnosing PTSD

Historically, it was argued by some that PTSD is not an actual diagnosis; however, research indicates that there are a variety of neurological and psychobiological reactions to trauma that occur, many of which are linked to the development of PTSD.<sup>13</sup>

After it is established that a person has experienced trauma, there are four main criteria for a PTSD diagnosis outlined in the *Diagnostic and Statistics Manual of Mental Disorders*, 5<sup>th</sup> edition.<sup>14</sup> The four general classes of PTSD symptoms include the following:

1. **Intrusion symptoms.** These can include recurrent, involuntary, or intrusive memories or dreams. Distress may be triggered by events that have something in common with the traumatic experience(s). Flashbacks may occur.
2. **Avoidance.** People with PTSD typically attempt to avoid memories, thoughts, feelings, or external reminders related to traumatic experiences.
3. **Cognitive and/or mood disturbances** tied to the traumatic event(s). A person may experience impaired memory, exaggerated negative beliefs, inappropriate blame, persistent negative emotions, and other similar symptoms.
4. **Hyperarousal and reactivity.** This can manifest as irritable behavior, recklessness, hypervigilance, exaggerated startle responses, and sleep problems, among other symptoms.

Symptoms within each category must be present for more than a month for PTSD to be diagnosed. Otherwise, the diagnosis of Acute Stress Disorder is made instead. For more information about diagnosis (useful to both patients and clinicians), refer to the [National Center for PTSD \(NCPTSD\)](#) website.<sup>15</sup> You also can connect with the PTSD Consultation program by emailing [PTSDconsult@va.gov](mailto:PTSDconsult@va.gov).

## Etiology

An estimated 60% of men and 51% of women in the U.S. experience trauma at some point in their lives; however, only 8% of men and 20% of women develop PTSD.<sup>16</sup> Why do some people develop PTSD and others do not? Genetics, the environment,<sup>17</sup> and adverse childhood experiences all can have a profound impact, as can many other factors.<sup>18</sup> The goal is to stack the odds so as to prevent PTSD from ever even developing, and to focus on healing at all levels if PTSD already has occurred.

Fight or flight, perhaps the most familiar stress response, is linked to activation of the sympathetic nervous system. Polyvagal theory may explain some aspects of the development of PTSD by focusing on the vagus nerve, which is linked with the parasympathetic nervous system. This theory, proposed by Stephen Porges, holds that behavior can be affected differently depending on which part of the vagus nerve is activated. When the ventral vagus is activated, a person feels safe and tends to build connections with others. Conversely, when a person (or other animal) feels that their survival is threatened, the dorsal vagus can be activated. Dorsal vagal activation is associated with withdrawing, even shutting down altogether. This is linked to the avoidance and withdrawal symptoms so commonly observed in [PTSD](#).

Recent research indicates that people with PTSD have significant increases in levels of inflammatory markers, such as interleukins 1 $\beta$  and 6, tumor necrosis factor- $\alpha$ , and C-reactive protein. It is thought that inflammation is not only an effect of having PTSD, but also a causative factor.<sup>19</sup> Neuroinflammation, anxiety, and chronic stress may all contribute to PTSD development.<sup>20</sup>

## Comorbidities

PTSD is associated with poorer functioning, lower quality of life, and earlier onset of a number of physical and mental health problems.<sup>21</sup> It is vital to account for these during personal health planning, since they strongly influence overall patient outcomes.<sup>22</sup> PTSD never exists in a vacuum. Just as an integrative approach using the Circle of Health can help account for each individual's unique array of PTSD symptoms, it also can help organize the plan with respect to a person's multiple comorbid conditions.

People with PTSD have more somatic symptoms, health care visits, and work absenteeism than average.<sup>23</sup> Of particular concern, as noted in a 2013 systematic review of 16 studies, Veterans with PTSD are much more likely to be suicidal.<sup>24</sup> In fact, the United States National Comorbidity Study found people with PTSD are six times more likely to attempt suicide than their peers.<sup>25</sup> The reasons for this are complex, as noted in a recent factsheet published by the [National Center for PTSD](#). Risk increases if someone has more distressing trauma memories, poorer impulse control, or a tendency toward a higher level of anger than average. A 2017 study suggested that targeting depression and internal hostility might be particularly beneficial for



PTSD patients. There is a link between suicide and combat guilt, and the risk is greater in combat trauma survivors who were wounded more than once or hospitalized as a result of their injuries.

Suicide risk is significantly higher in people with PTSD for many reasons. Clinicians should ensure the following numbers are easily accessed by all patients and their family/friends:

[National Suicide Prevention Lifeline](https://www.suicidepreventionlifeline.org/): **1-800-273-8255**

Fortunately, a landmark 2013 review by Gradus and colleagues indicated that the reverse is also true; successful treatment of PTSD significantly lowers suicide risk.<sup>26,27</sup> Researchers are actively exploring which suicide prevention measures are most effective for people with PTSD.<sup>28</sup>

Specific comorbidities related to PTSD include the following<sup>29</sup>:

- **Sleep disorders.** Sleep problems, including insomnia and nightmares, are reported by 70%-87% of people with PTSD and have a significant impact on quality of life and overall outcome.<sup>30</sup>
- **Anxiety.** What first may seem to be anxiety could actually be part of the hyperarousal symptom cluster that defines PTSD.<sup>23</sup>
- **Depression.** Depression is four to seven times more likely in people with PTSD, particularly in women.<sup>31</sup>
- **Personality disorders.** Examples include borderline, bipolar, and narcissistic personality.<sup>32</sup>
- **Substance use disorders.** Alcohol and other substance use disorders are problematic for many people with PTSD.<sup>22</sup>
- **Pain disorders.** These include chronic pain, fibromyalgia, chronic musculoskeletal disorders, and osteoarthritis.<sup>33</sup>
- **Metabolic syndrome.** People with PTSD have higher rates of obesity, hypertension, dyslipidemia, diabetes, and vascular disease.<sup>34</sup> This is thought to be in part due to higher cortisol levels that predispose to inflammation. PTSD may be considered an independent heart disease risk factor (pooled hazard ratio was 1.55 with 95% CI of 1.34-1.79).<sup>35</sup>
- **Impaired immunity.** This is associated with increased infections, gastric ulcers (H. pylori infection), and risk of HIV positivity.<sup>32</sup>
- **Autoimmune disorders.** These include thyroid disease and rheumatoid arthritis, among others.<sup>32</sup>
- **Grief.** Grief and traumatic stress are closely connected. Veterans with PTSD who have unresolved loss from trauma may be limited in their ability to grieve more recent losses, and this can result in challenging emotions or behaviors. They may experience depression, low self-esteem, isolation, and an increase in nightmares.<sup>36</sup> A study of 114 Vietnam-era combat Veterans admitted to a PTSD inpatient rehabilitation unit identified that 70% scored higher (i.e., worse) on standardized measures of grief symptoms related to friends lost in combat 30 years previous than did spouses who were bereaved in the past six months.<sup>37</sup> The investigators ultimately concluded that treating the symptoms of unresolved grief may be as important as treating fear-related symptoms of PTSD. More information on this topic is available in the [Grief](#) overview.

- **Traumatic brain injury (TBI).** PTSD and TBI share a number of characteristics, including sleep disruption and cognitive impairment.<sup>38</sup>

Fortunately, many problems that co-occur with PTSD often resolve or show improvement when PTSD is successfully treated. For additional information on PTSD and comorbidities, along with a helpful list of resources related to various comorbid conditions, refer to the [National Center for PTSD](#) website.<sup>39</sup>

The symptoms of PTSD seldom exist in isolation. Always keep comorbidities in mind when working with people with PTSD. Pain, substance use disorders, affective disorders, autoimmune issues, and sleep problems are among the many comorbidities that may be present. Each of these, when present, can make the risk of suicide even greater.

## Patient-Driven Care

The three patient narratives at the beginning of this overview offer a snapshot of the varied ways PTSD can present.<sup>40</sup> A traumatic event can involve an actual or perceived threat to life, personal safety and security, or physical integrity.<sup>14</sup> It can be directly experienced, witnessed in person, or heard about (in cases of family members or close friends). As in the case of Melissa, PTSD can also arise after someone witnesses traumatic events being experienced by others.

Combat trauma, as experienced by Todd, is perhaps the most familiar traumatic precursor to PTSD for most clinicians, but PTSD has different causes—and effects—for each person who suffers with it. Unfortunately, Erica's situation of PTSD due to sexual trauma (MST) is not uncommon. One in six civilian women experience sexual assault, and for military women the frequency climbs to an estimated one in three.<sup>41</sup> Forty percent of homeless women veterans report a history of sexual trauma in the military.<sup>42</sup> MST is the main causal factor of PTSD in women, in contrast to combat experience being the strongest predictor in men.<sup>43,44</sup> Male veterans (1.1%, versus 21% of women) also experience military sexual trauma.<sup>45</sup> Risk of suicide markedly increases (hazard ratios of 1.7 and 2.3 for men and women respectively) with a history of MST.<sup>45</sup>

## Education

For some time, the Veterans Administration/Department of Defense Practice Guideline for the [Management of PTSD and Acute Stress Disorder](#)<sup>46</sup> emphasized patient education as part of the treatment for all patients with PTSD and their family members, but the latest version has scaled back with this given a paucity of research support. Nevertheless, clinicians can consider offering the following (and these steps are very much in keeping with patient centered and patient-driven care):

1. Describe to anyone with PTSD the range of available and effective therapeutic options, emphasizing that PTSD is a highly treatable disorder.
2. Inform the patient about evidence-based psychotherapy and/or evidence-based pharmacotherapy as first-line treatments, allowing patient and clinician preferences to drive the selection of therapies. Psychotherapies should be offered by practitioners with adequate training in the preferred treatment methods. These are described more in the conventional approaches section below.



3. Support them with self-care. There are a number of excellent [educational products](#) developed by the National Center for PTSD for veterans and their family members, and these can be useful in the non-veteran population as well. These include “[Understand PTSD](#)” and “[Understanding PTSD Treatment](#),” as well as a broad range of smartphone apps and online products. Clinicians can recommend smartphone apps and online tools that allow Veterans to self-monitor symptoms. These include the following:
  - [PTSD Coach](#)
  - [PTSD Coach Online](#)
  - [Moving Forward](#)

## Collaborative Treatment Planning

A collaborative care approach to therapy, including care management, can be considered; however, supportive evidence for this -specifically for PTSD - is currently lacking. Given that the average dropout rate in trials of exposure-based and cognitive interventions for PTSD is 20%-25%, and given that it is often difficult to convince those with PTSD to seek any form of treatment,<sup>47</sup> it is vital that clinicians carefully match individual patients with the therapies and practitioners most appropriate for them. This can be accomplished through a collaborative process between people with PTSD and their health care teams that includes the following steps:

1. Identify realistic, stepwise functional goals including a list of key activities/domains.
2. Choose specific treatment goals and patient centered indicators of progress that include self-care strategies across the Personal Health Inventory (PHI) domains. Treatment preferences and self-care strategies should be specific, promote recovery, and be strength-based.
3. Problem-solve around barriers to getting care, such as transportation and availability to attend daytime appointments.

## Tailored Follow-Up

As part of ongoing care, it is important for clinicians and patients to:

- Monitor patient centered progress indicators.
- Adjust the treatment plan accordingly over time based on monitoring.
- Re-evaluate and renegotiate treatment focus and components.
- Provide support surrounding barriers and challenges.

A 2019 article noted a number of new directions being taken for PTSD care, including non-trauma-focused interventions, new medications, personalized medicine, family-based therapies, and enhanced focus on physical health (again, in support of working with PTSD comorbidities).<sup>7</sup>

## Author(s)

“Posttraumatic Stress Disorder (PTSD)” was adapted for the University of Wisconsin Integrative Health Program from the original written and updated by J. Adam Rindfleisch, MPhil, MD (2016, updated 2019).



*This overview was made possible through a collaborative effort between the University of Wisconsin Integrative Health Program, VA Office of Patient Centered Care and Cultural Transformation, and Pacific Institute for Research and Evaluation.*

## References

1. Gradus JL. Prevalence of PTSD. Accessed January 28, 2020, <https://www.ptsd.va.gov/professional/treat/essentials/epidemiology.asp>
2. Kulka RA, Schlenger, W.A., Fairbanks, J.A., Hough, R.L., Jordan, B.K., Marmar, C.R., Cranston, A.S. *Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study*. Brunner/Mazel; 1990.
3. Kang HK, Natelson BH, Mahan CM, Lee KY, Murphy FM. Post-traumatic stress disorder and chronic fatigue syndrome-like illness among Gulf War veterans: a population-based survey of 30,000 veterans. *Am J Epidemiol*. Jan 15 2003;157(2):141-8. doi:10.1093/aje/kwf187
4. Tanielian T, Jaycox L. *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery*. RAND Corporation; 2008.
5. Gates MA, Holowka DW, Vasterling JJ, Keane TM, Marx BP, Rosen RC. Posttraumatic stress disorder in veterans and military personnel: epidemiology, screening, and case recognition. *Psychol Serv*. Nov 2012;9(4):361-82. doi:10.1037/a0027649
6. Shalev A, Liberzon I, Marmar C. Post-traumatic stress disorder. *N Engl J Med*. Jun 22 2017;376(25):2459-2469. doi:10.1056/NEJMra1612499
7. Forbes D, Pedlar D, Adler AB, et al. Treatment of military-related post-traumatic stress disorder: challenges, innovations, and the way forward. *Int Rev Psychiatry*. Feb 2019;31(1):95-110. doi:10.1080/09540261.2019.1595545
8. Hollifield M, Moore D, Yount G. Gene expression analysis in combat veterans with and without posttraumatic stress disorder. *Mol Med Rep*. Jul 2013;8(1):238-44. doi:10.3892/mmr.2013.1475
9. Ramchand R, Rudavsky R, Grant S, Tanielian T, Jaycox L. Prevalence of, risk factors for, and consequences of posttraumatic stress disorder and other mental health problems in military populations deployed to Iraq and Afghanistan. *Curr Psychiatry Rep*. May 2015;17(5):37. doi:10.1007/s11920-015-0575-z
10. Karatzias T, Shevlin M, Fyvie C, et al. Adverse and benevolent childhood experiences in Posttraumatic Stress Disorder (PTSD) and Complex PTSD (CPTSD): implications for trauma-focused therapies. *Eur J Psychotraumatol*. Aug 11 2020;11(1):1793599. doi:10.1080/20008198.2020.1793599
11. Chang X, Jiang X, Mkandawire T, Shen M. Associations between adverse childhood experiences and health outcomes in adults aged 18-59 years. *PLoS One*. 2019;14(2):e0211850. doi:10.1371/journal.pone.0211850
12. Schalinski I, Teicher MH, Nischk D, Hinderer E, Müller O, Rockstroh B. Type and timing of adverse childhood experiences differentially affect severity of PTSD, dissociative and depressive symptoms in adult inpatients. *BMC Psychiatry*. Aug 19 2016;16:295. doi:10.1186/s12888-016-1004-5
13. Carvajal C. Posttraumatic stress disorder as a diagnostic entity - clinical perspectives. *Dialogues Clin Neurosci*. Sep 2018;20(3):161-168.
14. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. American Psychiatric Association; 2013.
15. Anand P, Kunnumakara AB, Sundaram C, et al. Cancer is a preventable disease that requires major lifestyle changes. *Pharm Res*. 2008;25(9):2097-2116.
16. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National Comorbidity Survey. *Arch Gen Psychiatry*. Dec 1995;52(12):1048-60.
17. Warner CH, Warner CM, Appenzeller GN, Hoge CW. Identifying and managing posttraumatic stress disorder. *Am Fam Physician*. Dec 15 2013;88(12):827-34.
18. Hughes K, Bellis MA, Hardcastle KA, et al. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health*. Aug 2017;2(8):e356-e366. doi:10.1016/s2468-2667(17)30118-4





19. Hori H, Kim Y. Inflammation and post-traumatic stress disorder. *Psychiatry Clin Neurosci*. Apr 2019;73(4):143-153. doi:10.1111/pcn.12820
20. Zass LJ, Hart SA, Seedat S, Hemmings SM, Malan-Muller S. Neuroinflammatory genes associated with post-traumatic stress disorder: implications for comorbidity. *Psychiatr Genet*. Feb 2017;27(1):1-16. doi:10.1097/ypg.000000000000143
21. Boscarino JA. Posttraumatic stress disorder and physical illness: results from clinical and epidemiologic studies. *Ann N Y Acad Sci*. Dec 2004;1032:141-53. doi:10.1196/annals.1314.011
22. McFarlane AC. The long-term costs of traumatic stress: intertwined physical and psychological consequences. *World Psychiatry*. Feb 2010;9(1):3-10.
23. Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. *Am J Psychiatry*. Jan 2007;164(1):150-3. doi:10.1176/appi.ajp.164.1.150
24. Pompili M, Sher L, Serafini G, et al. Posttraumatic stress disorder and suicide risk among veterans: a literature review. *J Nerv Ment Dis*. Sep 2013;201(9):802-12. doi:10.1097/NMD.0b013e3182a21458
25. Ferrada-Noli M, Asberg M, Ormstad K, Lundin T, Sundbom E. Suicidal behavior after severe trauma. Part 1: PTSD diagnoses, psychiatric comorbidity, and assessments of suicidal behavior. *J Trauma Stress*. Jan 1998;11(1):103-12. doi:10.1023/a:1024461216994
26. Gradus JL, Suvak MK, Wisco BE, Marx BP, Resick PA. Treatment of posttraumatic stress disorder reduces suicidal ideation. *Depress Anxiety*. Oct 2013;30(10):1046-53. doi:10.1002/da.22117
27. McKinney JM, Hirsch JK, Britton PC. PTSD symptoms and suicide risk in veterans: Serial indirect effects via depression and anger. *J Affect Disord*. May 2017;214:100-107. doi:10.1016/j.jad.2017.03.008
28. Bryan CJ. Treating PTSD within the context of heightened suicide risk. *Curr Psychiatry Rep*. Aug 2016;18(8):73. doi:10.1007/s11920-016-0708-z
29. Walter KH, Levine JA, Highfill-McRoy RM, Navarro M, Thomsen CJ. Prevalence of posttraumatic stress disorder and psychological comorbidities among U.S. active duty service members, 2006-2013. *J Trauma Stress*. Dec 2018;31(6):837-844. doi:10.1002/jts.22337
30. Schoenfeld FB, Deviva JC, Manber R. Treatment of sleep disturbances in posttraumatic stress disorder: a review. *J Rehabil Res Dev*. 2012;49(5):729-52.
31. Stander VA, Thomsen CJ, Highfill-McRoy RM. Etiology of depression comorbidity in combat-related PTSD: a review of the literature. *Clin Psychol Rev*. Mar 2014;34(2):87-98. doi:10.1016/j.cpr.2013.12.002
32. Levine AB, Levine LM, Levine TB. Posttraumatic stress disorder and cardiometabolic disease. *Cardiology*. 2014;127(1):1-19. doi:10.1159/000354910
33. Gibson CA. Review of posttraumatic stress disorder and chronic pain: the path to integrated care. *J Rehabil Res Dev*. 2012;49(5):753-76.
34. Michopoulos V, Vester A, Neigh G. Posttraumatic stress disorder: A metabolic disorder in disguise? *Exp Neurol*. Oct 2016;284(Pt B):220-229. doi:10.1016/j.expneurol.2016.05.038
35. Edmondson D, Kronish IM, Shaffer JA, Falzon L, Burg MM. Posttraumatic stress disorder and risk for coronary heart disease: a meta-analytic review. *Am Heart J*. Nov 2013;166(5):806-14. doi:10.1016/j.ahj.2013.07.031
36. Daniels LR. Grief and traumatic stress: Conceptualizations and counseling services for veterans. In: Doka KJ, Tucci As, eds. *Improving Care for Veterans Facing Illness and Death*. Hospice Foundation of America; 2013:85-93.
37. Pivar IL, Field NP. Unresolved grief in combat veterans with PTSD. *J Anxiety Disord*. 2004;18(6):745-55. doi:10.1016/j.janxdis.2003.09.005
38. Tanev KS, Pentel KZ, Kredlow MA, Charney ME. PTSD and TBI co-morbidity: scope, clinical presentation and treatment options. *Brain Inj*. 2014;28(3):261-70. doi:10.3109/02699052.2013.873821
39. Anderson WP, Reid CM, Jennings GL. Pet ownership and risk factors for cardiovascular disease. *Med J Aust*. 1992;157(5):298-301.



40. Waddington A, Ampelas JF, Mauriac F, Bronchard M, Zeltner L, Mallat V. [Post-traumatic stress disorder (PTSD): the syndrome with multiple faces]. *Encephale*. Jan-Feb 2003;29(1):20-7. Etat de stress post-traumatique: le syndrome aux differents visages.
41. Sadler AG, Booth BM, Cook BL, Doebbeling BN. Factors associated with women's risk of rape in the military environment. *Am J Ind Med*. Mar 2003;43(3):262-73. doi:10.1002/ajim.10202
42. Williamson V, Mulhall E. Invisible wounds: Psychological and neurological injuries confront a new generation of veterans. *IAVA*. 2009;7:291-310.
43. Street AE, Stafford J, Mahan CM, Hendricks A. Sexual harassment and assault experienced by reservists during military service: prevalence and health correlates. *J Rehabil Res Dev*. 2008;45(3):409-19.
44. Kang H, Dalager N, Mahan C, Ishii E. The role of sexual assault on the risk of PTSD among Gulf War veterans. *Ann Epidemiol*. Mar 2005;15(3):191-5. doi:10.1016/j.annepidem.2004.05.009
45. Kimerling R, Makin-Byrd K, Louzon S, Ignacio RV, McCarthy JF. Military sexual trauma and suicide mortality. *Am J Prev Med*. Jun 2016;50(6):684-691. doi:10.1016/j.amepre.2015.10.019
46. The Management of Post-Traumatic Stress Working Group. Accessed February 21, 2014, [http://www.healthquality.va.gov/ptsd/ptsd\\_full.pdf](http://www.healthquality.va.gov/ptsd/ptsd_full.pdf)
47. Hembree EA, Foa EB, Dorfan NM, Street GP, Kowalski J, Tu X. Do patients drop out prematurely from exposure therapy for PTSD? *J Trauma Stress*. Dec 2003;16(6):555-62. doi:10.1023/B:JOTS.0000004078.93012.7d