

Dealing with invisible scars of war: PTSD in Veterans

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AUTHOR BIO

Alexandra Dimitrova was born in Crescent City, California and is of Bulgarian descent. She is a student in the 11th Grade at University High School in Fresno, California. She dedicates much of her time to a variety of activities such as academic decathlon, musicianship, and pre-med; all of which have led to her interest in the ways that music is interpreted by the brain, human behavior, and microbiology. Specifically, she hopes to study the physical underpinnings behind the brain's responses, and, by extension, how the mind incorporates new information and uses it to learn and adapt. She plans to major in psychology.

ABSTRACT

The long-term effects of war are extremely present in modern society. However, mental injuries such as posttraumatic stress disorder are commonly overlooked, as they are more obscure than physical wounds and casualties. Today, PTSD continues to affect veterans, and many treatments that have been developed so far are still lacking in effectiveness or have not been thoroughly tested. Prevention treatments can target groups that match characteristics such as deployment details and demographics of those who are most likely to develop PTSD. These can include both demographics and details about deployment. HRVB and CBM-I have been able to decrease PTSD scores in certain populations. Social support, specifically from civilians, is also crucial in protecting veterans from developing PTSD or worsening the severity of PTSD symptoms. Various first-line treatments such as evidence-based psychotherapies and pharmacotherapies show significant lowering in symptoms as well as PTSD remission rates, but these treatments are still ineffective for many patients, whether this is because of personal preference or a general lack of efficacy of therapies. The use of psychedelics and psychedelic-assisted psychotherapy, alcohol interventions, breathing-based meditative sessions, and potentially 3-MDR have shown a decrease in PTSD symptoms for those who preferred not to use first-line treatments or found them to be ineffective. More research should be done to find and assess the current alternative treatments. They have generally proven to be less effective than other, common evidence-based treatments, but are still possible replacements for traditional treatments for some veterans with PT

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INTRODUCTION

Humanity has always been evolving and will continue to do so, developing new technologies and life-saving medications to improve society, and discovering new regions of the world and universe; however, there seems to be a perpetual, unavoidable pitfall that has followed society during all of its successes: war. Its effects can easily be observed by simply viewing and comparing maps, as the world's countries' borders are constantly being established and fluctuate throughout history. Earth is divided by extremely precise borders of nations, and relentless wars and conquests have been the primary factors in determining these barriers. There are various types of wars, some of which hold much more devastating effects on life than others. The world is perhaps most familiar with traditional, physical, army-against-army warfare. However, there are types of silent wars which precede actual combat. Physical war is often the last resort, and it, along with its devastating effects, could perhaps be prevented if we invest in these preceding events before engaging in physical war—which has devastating effects on all sides.

Combat has terrible consequences in the surrounding environment, which is demonstrated in the enormous amounts of both civilian and military deaths. Casualties of United States military personnel reached a total of 364,511 in the Civil War, 116,516 in World War I, 405,399 in World War II, and 58,220 in the Vietnam conflict (DeBruyne, 2017). These statistics do not account for injuries or the multitude of additional civilian deaths, which are harder to accurately survey and record. In addition to these reductions in physical health, many veterans are subjected to posttraumatic stress disorder as a result of enduring horrendous events. During recent wars, high percentages of returning US soldiers were recorded to have PTSD: a population-based survey of 30,000 participants concluded that PTSD's prevalence in Gulf War veterans was 10.1% or about 70,000 deployed troops (Kang, et al. 2003), and a

RAND study conducted with 1,965 participants showed that the probable rate of PTSD in Operation Iraqi Freedom and Operation Enduring Freedom was 13.8% (Tanielian, et al., 2008).

PTSD can present long-term limitations in veterans' ability to re-assimilate to their society and return to civil life. PTSD can also predict lower quality of family relationships and work function in addition to dissatisfaction with life (Vogt, et al. 2016). Studies are necessary to determine which current and new treatments can reliably reduce PTSD symptoms and cause remission in patients. This field is still somewhat lacking in data since most studies conducted to test the severity of symptoms and improvements are undertaken by self-response surveys administered to groups with limited diversity.

Certain preventive measures and various treatments, including pharmacological and physiological therapies, psychedelics, and various new alternatives to first-line treatments can reliably diminish the severity and development of PTSD and improve the quality of life in returning veterans. Although current treatments have limited success rates, more experiments and research will further our knowledge of new improvements and alternatives and will allow us to deal with the invisible wounds of war.

RISK FACTORS

Although we are unable to make completely accurate predictions about which individuals may be subjected to the development of PTSD, certain demographic factors and characteristics have been found to result in an increased risk. Such factors are observable in pre-trauma characteristics as well as in during and post-trauma situations. These factors primarily include age, gender, the area of deployment, whether or not the military agent had previous exposure to deployment, and, importantly, the overall amount (or lack) of social support upon returning from deployment.

A meta-analysis of 32 studies (comprised mainly of studies using self-surveying methods) shows pre-traumatic demographics and peri-traumatic characteristics which a majority of veterans who suffer from PTSD are more likely to have; these include having prior traumatic experiences or psychological health problems, lower education, being of the female gender, being non-white, undergoing more or longer deployments as opposed to little or no combat exposure, weapon discharge and extreme conditions (Xue et al., 2015). Perhaps military leaders can watch out for peri-traumatic risks and retain contact with individuals. They can also administer specific prevention treatments to those who have been exposed to prior trauma, mental problems, or the aforementioned demographics to limit the possibility of developing PTSD before it has already affected veterans' lives and requires treatment. Higher levels of social care after deployment contribute to a positive environment which can also lower the advancement of PTSD in veterans (Xue et al., 2015).

PREVENTION

Preventative measures and training have been developed to prepare military personnel for coping with the events of the war. While they may not result in a major, observable effect, they have been shown to profoundly help certain sub-groups. Two of these interventions are heart rate variability biofeedback (HRVB), a mechanism that may be able to regulate cognitive control, and cognitive bias modification for interpretations (CBM-I), a “cognitive vaccine” that can build resilience to the development of PTSD symptoms (Pyne et al., 2019). A randomized control trial tested the effectiveness of these two preventative interventions; it should be noted that the use of interventions during deployment was largely untrackable and determined by self-report methods and that soldiers encountered multiple circumstantial challenges in using these apps. Results showed that the use of the intervention app BreathPacer (HRVB) demonstrated a

3-month benefit after deployment in reducing PCL scores in groups of older age and had no prior combat exposure than in the control group which did not receive this intervention, as well as producing a noticeable 12-month benefit in soldiers who were of ages 45 and older (Pyne et al., 2019). IMAT (CBM-I) was able to also lower symptom scores in soldiers with previous combat exposure and with ages ranging from 23 to 42 (Pyne et al., 2019), while no benefit was observed during the 12-month follow-up.

In addition to prevention apps, long-term memory inhibitors can be used to block the formation of posttraumatic memories. However, some of the primary drugs used in prevention, which are administered before a possibly traumatic event, may affect the health or critical performance during a mission—unlike HRVB and CBM-I. Sympatholytic medications such as alpha and beta blockers, drugs that prevent the binding of norepinephrine and epinephrine to certain receptors and therefore suppress their stress effects, were shown to have some undesirable physical effects and relatively no undesirable mental effects, but had the highest potential to be effective out of other tested drugs when used in PTSD therapy (Burbiel 2015). Further research is needed to continue to test alpha and beta blockers and other methods' true efficacy, especially since current primary prevention methods can contribute to decreased tactical performance.

Social support after traumatic combat-related experiences functions as another crucial protector against the development of PTSD in returning veterans. A meta-analysis of 37 studies noted that lower levels of social support were associated with higher levels of posttraumatic stress disorder symptoms, along with indicating that support that veterans received from non-military sources was more effective in protecting against PTSD as opposed to that of military sources—although support from both populations led to a significant decrease in PTSD symptom severity (Blais et al., 2021). This means that support from the veterans' civilian community and families is

critical in preventing PTSD, and more protective community measures should be established to help veterans who have experienced scarring events.

PSYCHOTHERAPIES

Among current first-line treatments for PTSD are cognitive processing therapy (CPT) and prolonged exposure therapy (PE), which are both non-pharmacological therapies. Cognitive processing therapy is one of the most commonly used evidence-based treatments in war veterans. The United States Departments of Veterans Affairs and Defense recommend first-line psychotherapy treatments which include cognitive processing therapy and prolonged exposure therapy (Card 2017). A small controlled trial that used both a control and test group evaluated veterans with chronic posttraumatic stress disorder, demonstrating that the test group, to which individual, 12-session cognitive processing therapy was administered by thoroughly-trained therapists, showed a reliable decrease in PTSD symptoms in about 50% of patients; a regression analysis of change also revealed that average Clinician administered PTSD scale (CAPS) scores decreased by about 20 points (a score of 35 or less is considered remission on this scale) from baseline scores to the 1-month follow-up, and re-experiencing and emotional numbing symptoms significantly improved when compared to the control group (Monsoon et al., 2006). During CPT, a type of cognitive behavioral therapy, instructors teach participants how to identify and manage memories and unwanted re-experiences of such traumatic events. Although it is one of the more effective and reliable treatments for PTSD, many patients are still unresponsive to CPT and drop-out rates are high. These individuals require other methods to improve their quality of life and mitigate the effects of PTSD. Prolonged exposure therapy is another commonly used evidence-based treatment. Guided by instructors, patients can process traumatic memories and manage PTSD symptoms. In a randomized clinical trial in which 67 participants attended 13

sessions of prolonged exposure therapy over 24 weeks (and no other treatments), CAPS scores declined by about 29.4 points (Rauch et al., 2019). Both cognitive processing therapy and prolonged exposure therapy in these studies met the criteria of a significant change of 20 points and can be considered effective treatments.

Compressed and intensive outpatient programs have been gaining popularity in treating PTSD. A recent study with 234 randomized participants conducted a randomized clinical trial comparing massed prolonged exposure therapy (M-PE) and intensive outpatient prolonged exposure therapy (IOP-PE), both of which are compressed forms of prolonged exposure therapy. This study showed that CAP-5 scores declined from a mean of 37.5 to 22.5 for both treatments and 53% remission rates for patients who went through IOP-PE and 52% remission rates of participants in M-PE after a 6-month follow-up, and it demonstrated that compressed treatments likely will result in more patients completing the treatment program and smaller drop-out rates (Peterson 2023). Intensive treatments can quickly deliver therapies and still significantly improve symptoms and remission rates. Another IOP study (self-report reliant) recorded data from 191 patients undergoing a 3-week long intensive outpatient program comprised of group and individual CPT, mindfulness, yoga, and psychoeducation in 15 daily sessions; its results showed that 92.1% of participants completed the program and PCL (self-report PTSD checklist containing 20 items) scores declined from a mean of 57 to 40 (Zalta et al., 2018). These two studies imply that compressed formats of widely used psychotherapies can effectively decrease symptom scores and retain remission rates/scores over time, despite patients learning the material in a short period.

PHARMACOTHERAPIES

A common form of pharmacological therapy is selective serotonin reuptake inhibitors (SSRIs). These pharmacotherapies prevent the

reabsorption of serotonin and are used to relieve depression. The Departments of Veterans Affairs and Defense recommend pharmacotherapy—including SSRIs such as sertraline and paroxetine as first-line treatments—when individual psychotherapy is unavailable or is not preferred (Card 2017). SSRIs are a viable alternative to psychotherapies if patients do not achieve either desired effects or wish not to use cognitive processing or prolonged exposure therapies. The least emotional regulatory brains likely stand to benefit the most from SSRIs since they appear to adjust abnormal BOLD signals in the prefrontal cortex (MacNamara 2016).

A randomized clinical control trial testing the effectiveness of SSRI sertraline and its combination with prolonged exposure therapy demonstrated a decline of the mean CAPS score from 75.5 to 41.7 when 71 patients were only administered sertraline and similar scores of 76 to 43.3 in 69 participants when administered both the psychotherapy and pharmacotherapy (Rauch et al., 2019). This result was also similar to the control PE group, whose scores declined 29.4 points, showing that sertraline, its combination with PE, and PE did not show any significant differences in treatment effectiveness.

PSYCHEDELICS

Individual veterans may be either reluctant to use first-line therapies or might find that they, along with popular pharmacotherapies such as SSRIs, have limited efficacy in treating PTSD. Lesser-known psychedelics such as ibogaine and 5-MeO-DMT have been used in assisted therapy as an alternative method to treat such individuals. In a study testing the effectiveness of these drugs in Special Operations Forces (SOF) military personnel (many of whom served in either Operation Iraqi Freedom or Operation Enduring Freedom and had previously attempted various psychotherapies, yoga, and pharmacotherapy), therapy assisted with psychedelics was shown to significantly reduce cognitive impairment and

PTSD symptoms (change in symptom score was -34.2) after a small amount of time and limited doses of ibogaine and 5-MeO-DMT, and 84-88% of participants reported this experience as being extremely spiritually significant, psychologically insightful, and personally meaningful (Davis et al., 2020). Unlike some SSRIs, continued consumption of psychedelics seemed to not be required for significant, lasting effects. However, for potential adverse effects and other qualities to be determined, further research is needed.

In addition to the effectiveness of psychedelics in mitigating PTSD, they can potentially also be paired with evidence-based psychotherapies for improved effects. After a preparatory phase in which participants are briefed about the treatment and expectations, the psychedelic drug can be individually distributed to patients in a relaxed environment, potentially allowing participants to open up about their conditions and thoughts during a final integration session; this process is thought to allow a comfortable exchange between participants and their therapist(s) and allow them to work through painful memories together (Reiff et al., 2020). The use of psychedelics may also encourage veterans suffering from PTSD to meaningfully interact with therapists.

ALTERNATIVE TREATMENTS

Although conventional methods are extremely effective in some cases, they have limited success rates among certain individuals and alternative methods have similarly been proposed and tested. These include non-trauma-focused, breathing-based meditations such as Sudarshan Kriya yoga (SKY) as well as brief alcohol interventions. A clinical trial with 21 Iraq and Afghanistan war veterans, which tested the efficacy of the Sudarshan Kriya yoga experiment, expressed a mean 36.6 to a 25.6 PTSD checklist score as opposed to the control groups in which PCL scores increased over the same time, as well as showing high completion rate (over 90% of

participants remained in the program), implying that the program yielded high acceptability among veterans (Seppala et al., 2014). A study with a moderate sample size of 88 participants presented a claim that SKY met non-inferiority criteria to traditional CPT since PCL-C score symptoms presented a mean decline of 6.8 with CPT and 5.2 with SKY (Bayley et al., 2022). The SKY form of breathing-based meditation yielded a score decline that was comparable to first-line treatments, suggesting that it is a feasible alternative to psychotherapy. Sudarshan Kriya yoga also correlates with more improvement in emotional regulation (poor emotional regulation is a symptom of PTSD) than cognitive processing therapy (Mathersul et al., 2022).

Alcohol misuse tends to be common in veterans with PTSD as demonstrated by misuse in Operation Enduring Freedom and Operation Iraqi Freedom veterans; furthermore, emotional numbing and hyperarousal post-traumatic stress disorder symptoms are correlated with alcohol misuse (Jakupcak et al., 2010). Successful alcohol interventions have therefore been associated with higher PTSD scores. A larger clinical analysis trial with 523 participants showed a positive correlation between PTSD symptom severity and alcohol misuse, and participants with higher PCL scores had a greater reduction in alcohol misuse than scores of patients with lower levels of PTSD symptoms (Brief et al., 2018). This meant that veterans who had high levels of PTSD stood to benefit the most from alcohol interventions, and, in addition to improving misuse issues, PTSD symptoms could also be addressed during alcohol interventions. Another study of 68 combat veterans undergoing a brief, one-session alcohol intervention to decrease alcohol misuse and distribute individualized feedback on coping with PTSD revealed decreased CAPS scores from 51.22 at baseline and 35.56 during the later 6-month follow-up (Luciano 2019). PTSD symptom scores were found to decrease along with the decrease in alcohol misuse after a short intervention, indicating an important relationship between the two.

Moral injury also highly correlates to treatment-resistant posttraumatic stress disorder, and, in an attempt to provide alternative treatments for resistant PTSD and moral injury, Multi-modal Motion-Assisted Memory Desensitization and Reconsolidation (3MDR) can potentially be used to reduce PTSD symptom severity. A mixed methods study explains that 3MDR is an exposure-based therapy assisted by technology that has been used in treating PTSD; it determines that it may be a potential treatment for treatment-resistant PTSD since participants reported that 3-MDR was accepted by veterans as an acceptable treatment and repaired damaged global beliefs and re-interpreted meaning and purpose, based on a small preliminary study (Smith-MacDonald 2023). 3-MDR seems to be a possible solution for treatment-resistant PTSD, but more research must be done to determine its full quantitative efficacy.

CONCLUSION

Since the war, and therefore combat and deployment-related posttraumatic stress disorder, continues to plague our society, traditional psychotherapies, and pharmacotherapies, which are known to cause relatively high remission rates and significantly lower symptom severity, and potential new treatments continue to be tested and improved. As a result, the effects of both these traditional and newer treatments (both positive and adverse) are becoming more well-known. In addition to treatments after the fact, prevention methods are also being developed to address the risks of certain populations—such as age, gender, deployment length, and frequency—and protect against PTSD development. Although first-line treatments recommended by the VA/DoD are effective for a majority of individuals, many others may seek different, yet still effective, non-trauma-focused alternatives. The use of psychedelics and psychedelic-assisted psychotherapy, breathing-based exercises, and alcohol intervention have all shown a decrease in PTSD symptoms for those who preferred not to

use traditional first-line treatments or attempted to use them and found them to be ineffective.

FUTURE DIRECTIONS

It should also be noted that studies of these treatments are subjected to multiple limitations. Many lack generalizability to other non-veteran populations suffering from posttraumatic stress disorder, while others have relatively underpowered test groups. Some studies were also unable to retain contact with participants for a longer period for follow-up appointments to track participant retention of positive effects. Additionally, many studies were conducted with self-surveying methods, which can be subject to user bias. For these reasons, additional research is crucial in understanding and managing combat-related PTSD in veterans.

More resources and effort should be put into creating more extensive research on both PTSD and its treatments which could take the form of clinical trials assessing more diverse populations' reactions to treatment methods and prevention methods that are effective for a larger variety of veterans. They can also examine new potential solutions to treatment-resistant PTSD. Becoming knowledgeable about treatments may also expand the scope of their effectiveness, and allow use for various other groups, including civilians exposed to war, and suffering from posttraumatic stress disorder.

Involvement and awareness in communities with veterans is also a vital factor in protecting against PTSD. This can take both the forms of military leaders keeping watch for potential, well-known risk factors and civilian community and family support.

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