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The Current Military Response to Combat-Related PTSD: A Qualitative Analysis on Treatment, Prevention, and Genetic Implications

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The Current Military Response to Combat-Related PTSD: A Qualitative Analysis on Treatment, Prevention, and Genetic Implications

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By

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Abstract

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Combat-related post-traumatic stress disorder (PTSD) is a recognizable psychological concern within our military. The lifetime prevalence of combat-related PTSD within the population of the United States veterans ranges from 6-31%. Therefore, out of the 21.2 million veterans in the United States military, 1.3 to 6.6 million are expected to experience PTSD in their lifetimes. The military has taken action towards addressing the increase of combat-related PTSD cases with various treatment options, preventative measures, and newly identified genetic research. The most efficacious treatment options include selective serotonin reuptake inhibitors, prolonged exposure therapy, cognitive behavioral therapy, as well as eye movement desensitization and reprocessing. Preventative measures include pharmaceutical interventions that interfere with memory consolidation, resilience training, and psychological debriefing programs such as Battlemind that help soldiers cope with trauma and ease their transition back to noncombat life. The possible genetic implicates are still in the early stages of research but many genes have been implicated with the disorder such as FKBP5 and 5-HTT/5HTTLPR. The Department of Defense plans to launch a Million Veterans Program that will take genetic information from one million veterans in order to discern a genetic predisposition profile. This information will be used to help provide better understanding of PTSD development and treatment. There may be alternative military uses for this genetic information that are not known yet. Overall, combat-related PTSD is under researched and more in-depth studies need to be done in order to accurately assess the United States' approach towards combat-related PTSD.

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Introduction

Background of Military-Related PTSD: Why is it a Problem?

Post-traumatic stress disorder (PTSD) is a psychological disorder that results from experiencing a traumatic event. This traumatic event elicits emotional stress and a mental interference in the victim. Post-traumatic stress disorder has been a signature injury in all of our military branches. It has been a recognizable issue as early as World War I, and in subsequent military actions related to World War II, the Vietnam War, and the United States most recent involvement within the Middle East [1]. However, combat-related PTSD did not receive attention until post-Vietnam. According to the Department of Veterans Affairs, the recognition of PTSD did not become finalized until 1980 when the Diagnostic and Statistical Manual of Mental Disorders (DSMMD) approved the criteria for the disorder [2]. Because of the delay in recognition of the existence of the disorder and treatment protocols, as well as the stigma associated with being diagnosed with a medical disorder, many veterans from the Vietnam War era are still struggling with the disorder today.

The etiology for military-related PTSD falls into several categories, including military combat, rape, physical assault, and natural disaster. Military personnel in combat roles have the highest prevalence of probable PTSD [3]. Combat-related PTSD includes PTSD that has resulted from intense combat exposure, killing an enemy, or witnessing another soldier being wounded or killed. The most common types of combat exposure in Iraq and Afghanistan were identified in many studies. Eighty-seven percent of militants reported an exposure to mortar fire, 80% reported exposure to gunshots, 65% reported

exposure to seeing dead bodies or human remains, 74% reported being attacked, and 63% reported that they knew someone who was seriously injured or killed [4]. According to the U.S Department of Veteran Affairs, the prevalence of PTSD development is broken down by wars. Approximately 30 percent of veterans are from Vietnam between the years of 1955-1975 have been diagnosed with PTSD and 12 percent of veterans from Gulf War between the years of 1990-1991 have been diagnosed with PTSD [5]. For our current involvement, the prevalence can vary in different locations. In one study, the prevalence rates of PTSD were higher among studies of Iraq-deployed personnel at 12.5% (95% CI 11.3% to 14.4%) and in Afghanistan rates were averaged at 7.1% (95% CI 4.6% to 9.6%) [6]. Overall the current prevalence of PTSD in Iraq and Afghanistan as of 2016 is between 5-20% [7]. Our current involvement in Middle Eastern countries such as Afghanistan and Iraq has increased the prevalence of PTSD because our military personnel are being exposed to severe violence and mortality. One study measured the lifetime prevalence for combat-related PTSD in the U.S to be between 6-31% [8]. However the statistic for lifetime prevalence for combat-related PTSD is always changing and hard to measure definitively. There are currently 21.2 million veterans in the U.S military and approximately 1.3 to 6.6 million veterans are predicted to experience PTSD in their lifetime [9]. The political intentions and goals of these military operations are mentally difficult and hard to cope with after deployment is complete. During the two year span of 2013 to 2015, approximately 1.6 million service members of our military underwent treated for PTSD and it cost approximately five billion dollars to provide these treatments [9]. This led the Department of Veterans Affairs to use 39% more of its mental health care budget [9].

Post-traumatic stress disorder is now getting the attention it deserves and research is focused on learning how it develops, how it can be treated most effectively, and how it may be prevented. Post-traumatic stress disorder is a serious concern for our veterans because it interferes with mental stability, occupational stability, social stability, and can ultimately have long-term effects. The psychological impact of war should not be ignored, and the military is responding. The question is whether their response is appropriate and effective. The Department of Defense, Department of Veterans Affairs, and the Veteran Health Administration are currently introducing initiatives to better address the disorder in terms of treatment, preventative measures, and genomic analysis.

PTSD and its Diagnostic Criteria?

Post-traumatic stress disorder is a stress and anxiety disorder that is triggered by a traumatic event. Victims of PTSD need to cope with severe mental trauma and experience a broad spectrum of symptoms. These symptoms include mental reoccurrences of the traumatic event, nightmares, hyperarousal, emotional stress, depression, insomnia, and social avoidance [10]. There are both acute and chronic forms of PTSD, depending on the duration of the acquired symptoms.

The authors for the Diagnostic and Statistical Manual of Mental Disorders have developed specific criteria for PTSD [11]. The individual must have flashbacks, memories, or nightmares about the traumatic event for at least one month in order to be officially diagnosed [10]. In addition, he or she must also have associated symptoms such as avoidance, negative moods, and hyperarousal activity for at least one month [4]. The DSMMD makes it clear that these symptoms must not be the result of other factors, such as illicit drug use, or any other underlying medical condition.

The term avoidance refers to the reluctance to acknowledge or relieve the distressing memories or triggers that remind him or her of the traumatic event. Negative moods are characterized by self-blame, and the individual experiencing PTSD may become more introverted in social situations. Hyperarousal refers to overly aggressive behavior, self-destructive behaviors, and may include sleep disturbances. Therefore overly aggressive behavior may be heightened by alcohol dependency. PTSD is also associated with alcohol dependency [12].

The Qualitative Analysis and Approach

The purpose of this thesis is to perform a qualitative analysis of the manner in which the United States Military is currently responding medically to PTSD. The components of my analysis will include PTSD treatments, preventative measures, and genetic implications. This thesis will only address combat-related PTSD. Combat-related PTSD is caused by experiencing combat violence, the act of killing enemy combatants, or witnessing the death of another soldier. This thesis will not include an analysis of PTSD that occurs from sexual abuse or rape experienced by some military personnel because it does not fall into the category of combat-related PTSD.

There is no cure for PTSD, however there are different treatment options for PTSD including psychotherapies and pharmacotherapies. The most common psychotherapy treatments include trauma focused cognitive behavior individual therapy, trauma focused cognitive behavior group therapy, non-trauma cognitive behavioral individual therapy, non-trauma cognitive behavioral group therapy, prolonged exposure therapy, exposure virtual reality therapy, stress inoculation training, hypnotherapy, and eye movement desensitization and reprocessing. The most common pharmacotherapy

treatments include selective serotonin reuptake inhibitors (SSRI), mood stabilizers, atypical antipsychotics, sympatholytic drugs, monoamine oxidase inhibitors, and benzodiazepines. In addition, there are other supportive therapies such as the use of therapy dogs designated for PTSD victims. I plan to compare these treatments in terms of efficiency, patient preference, and patient compliance. My goal is to determine which treatments have been most successful and to interpret the different outcomes among the three types of treatments. I will also plan to analyze the combination of pharmacotherapy and psychotherapy.

This qualitative analysis will also provide treatment options that are available for use by the military. Though there is no definitive evidence that these strategies are being used by our military. One thing that is clear is that there is a great deal of research being conducted on how to prevent PTSD and the military is considering weather this research will significantly help prevent PTSD. These preventative measures include pharmacological interventions before trauma is introduced or immediately after the exposure to trauma. Prevention of PTSD also includes psychological education that prepares soldiers with methods of trauma coping and fear resilience. The Defense Advanced Research Projects Agency (DARPA) is currently working on a brain monitoring chip that may predict differences in anxiety levels and other cognitive processes in military personnel. This newly arising research raises ethical concerns that are important to consider. These ethical concerns are in regard to taking over one's mental control and possible interferences with other mental processes. Some also feel that this is a form of mind control and violates one's free will.

This qualitative analysis will also analyze the current association between PTSD and the possible genetic implications. The United States Military has taken interest in the application of genomics to help minimize the risk for PTSD. Genomics is the study of the entire genetic material within a specific organism. This genetic material is called a genome. In this case the genomics analysis is the human genome. Genomics will analyze patterns of DNA bases and other biological mechanisms. Research is still being done on possible genetic sequences that could indicate a likelihood for developing PTSD. The JASON (advisory board of the Department of Defense and other government services on science and technology) supports this upcoming genetic research and believe it will minimize the damage caused by PTSD [9]. The Department of Defense believes that identifying a genetic link will be beneficial to military performance and medical costs [9]. There are ethical concerns for the application of preventative genomic sequence analysis because some veterans may think that these genetic attributions are unconstitutional and could provide a foundation for job discrimination.

Who will Benefit from this analysis?

This qualitative analysis does serve a relevant purpose and will be beneficial to all branches within the United States Military, the United States Department of Defense, the United States Department of Veterans Affairs, and the Veterans Health Administration. This qualitative analysis provides an extensive examination of how PTSD is being treated and approached. From this examination, one can determine if the United States Military is approaching PTSD appropriately and if improvement is needed. This qualitative analysis has the potential to benefit military personnel on a more individual or personalized level. This analysis may provide insights for current military personnel with

combat-related PTSD because it could help them interpret how effective their treatment is and could allow them to analyze what has been successful overall within the military. This analysis has the potential to clarify new approaches and may open new doors for military personnel in regard to treating and preventing combat-related PTSD. As a consequence, this analysis may also be beneficial to future military personnel who are thinking about joining the military. This analysis will inform future military personnel about the risks of PTSD, the prevalence of PTSD, and how the military is responding to it. Future recruits should be aware of the possible genetic screenings for PTSD during medical examinations. This information may also provide insights to family members of soldiers who are suffering from PTSD so that they can develop an understanding of how the disorder is being approached. Lastly this information may also be of benefit to other victims of PTSD who are not military combat related. Victims of PTSD from other sources may also think this information is useful in regard to treatment options and protocol.

Literature Review

Analysis of Previous Studies for PTSD Research

A meta-analysis was constructed by C. Xue and co-authors that supports the necessity for PTSD research. The desire to create this analysis is based on the prevalence rates of combat-related PTSD and a need for greater clarification of the factors that influence the susceptibility to developing PTSD [13]. The article highlighted that PTSD research has been ongoing for approximately thirty years from different angles such as disease epidemiology, clinical manifestation, pathologic factors, diagnostic criteria, treatment, and prevention [13]. This current analysis fully supports the need for

expansion on combat related research in order to build on and provide more definitive answers [13]. The main emphasis of this current analysis was to highlight risk factors that explain why some military personnel are more likely to experience PTSD.

The systematic approach for this analysis was to examine scholarly and peer reviewed articles from various databases including PubMed, Embrace, PsycINFO, and Web of Science. The method of examination required studies that specifically have military personnel who have been diagnosed with PTSD based on diagnostic criteria. The analysis covers 32 articles from which the following data were extracted: The best estimate for the prevalence of combat-related PTSD between the years of 1995-2014 was ranged from of 1.09 % to 34.84% [9]. The prevalence of combat-related PTSD is not an easy statistic to determine because it is constantly changing and varies with the geographical location of war [9]. This explains the wide range of prevalence that is reported. That is why there is an emphasis on more combat related PTSD research because it increases the accuracy of understanding the disorder better.

From the data collection, the analysis suggests specific susceptibility factors that could be classified into one of the three categories. These three categories are 1) factors before trauma, 2) factors while the victim is experiencing trauma, and 3) factors after trauma. Factors before the trauma include gender, ethnic status, education level, military characteristics, number and length of deployments, prior life events, and prior psychological problems [14]. This analysis suggested that the female gender is more susceptible to PTSD because of an increased likelihood of sensitivity which can affect their coping mechanisms in response to trauma. The analysis also suggested that a minority ethnic status is more prone to the development of PTSD. The reason for this

suggestion is not definitive though, however it is believed that members of minority ethnic groups might be exposed to more stressful events prior to joining the military [9]. Studies also suggest that higher education levels correlate with a decreased likelihood of developing combat-related PTSD because presumably these individuals will have better coping methods, healthier behavior, and good emotional management [9]. Specific military characteristics such as the branch one serves in may also affect the susceptibility to developing this disorder. Specifically this analysis suggests that military personnel in the United States Army are more likely to develop combat-related PTSD than other branches such as the Marines, Air Force, Navy, National Guard, or Coast Guard [9]. IN addition an extended deployment duration, or being involved in multiple deployments have been shown to increase the likelihood of developing combat-related PTSD because one is more likely to be exposed to more traumatic events [9]. This factor should be further investigated. Prior life events and psychological distress are also implicated in influencing PTSD susceptibility but additional research is needed to further clarify the role of this factor [9].

Interestingly, factors that occur during the trauma period and after the trauma period are suggested to have a greater impact on the susceptibility to developing combat-related PTSD when compared to factors that occur before trauma occurs. However these factors should also be studied in combination in order to develop a comprehensive susceptibility profile. Factors that occur during trauma include intensity of combat exposure, having to discharge a weapon, witnessing someone being wounded or killed, and other deployment-related stressors [9]. A major contributing factor to PTSD onset

following trauma exposure is the lack of support given to military after deployment is over [9].

On the medical front, findings suggested that combat-related PTSD is associated with hypothalamic-pituitary-adrenal axis disorder [9]. The hypothalamic pituitary-adrenal axis is an essential neurological aspect of the brain that regulates stress, mood, and energy. Another finding was that combat-related PTSD is associated with certain chemical imbalances such as cortisol and catecholamines [9]. Cortisol is a stress hormone that helps to regulate the body's various chemical stress responses. Examples of catecholamines include dopamine, norepinephrine and epinephrine. Catecholamines contribute function for motor control, cognition emotion, and memory processing. The analysis did not find a significant correlation that supports a role for age or marital status being factors for an increased likelihood of developing combat-related PTSD. Overall, there is a wealth of possible contributing factors, each of which deserves further investigation.

Relation to Philosophical Issues:

The philosophical perspective of ontology highlights a theory of nature and the state of being. An ontological perspective for combat-related PTSD would be taken on by a realist. A realist critically analyzes a situation and draws a perspective that is independent from naturally perceived thinking. A realist would consider how the existence of the disorder came about. It can be difficult to understand the associations between combat exposure and the development of PTSD in United State military personnel because PTSD is a complex disorder [14]. There are similarities among individuals experiencing combat-related PTSD and it is important to study these

similarities in order to construct a susceptible map of the disorder. However there are also distinct differences that are important to consider. Genetics is now considered a viable approach for the elucidation of why people experience trauma differently. Consequently, differences on a neurochemical level and specific biomarkers are now being investigated [14]. An individual's psychological resilience to certain disorders like PTSD is not easy to map. A realist would consider that the reason for the existence of a high level of PTSD is due to the decrease number in combat- related mortality. Therefore current military personnel are more likely surviving traumatic combat exposure and ultimately develop the invisible wound of PTSD [14]. The number of total military personnel deaths measured each year from 1980 to 2010 fell to a range between 796-2,392 mortality deaths [15]. The combat mortality was much higher in WWI and WWII [10]. For World War I there was a combat mortality rate of approximately 116,000 and for WWII the mortality rate was approximately 405, 000 within the Allied Forces [15]. Therefore it is possible to make an assumption that the current high prevalence of PTSD is due to the number of soldiers surviving at significantly higher rates than previously. It would be interesting to suspect if the mortality rates were lower for WWI and WWII, we might have seen a greater rate of PTSD cases. The number of casualties resulting from the Iraq and Afghanistan operations is approximately 6,855 which is significantly fewer than the causalities resulted from WWI and WWII [16]. The measurement of probability for PTSD within the population of veterans who served in Iraq and Afghanistan veterans ranges from 5-20% [7]. With these two statistics in mind, it seems to present a reasonable assumption and that our current military personnel are more likely to 1) survive combat and 2) suffer psychological consequences.

A social constructivist would approach combat-related PTSD by highlighting specific concerns that are associated with daily functions of socially constructive living. A social constructivist perspective would see that PTSD can affect functionality aspects of an individual. These functionality aspects include normal socialization and occupational function. A social constructionist would be concerned with how an individual who is diagnosed with PTSD seeks help and how the person is treats his or her family or supporters. Avoiding most social encounters is associated with PTSD as is the tendency to hide the disorder. Those trying to cope with PTSD also might have difficulty with alternative employment outside of military operations. A social constructionist would highlight this concern.

The philosophical perspective of axiology focuses on the nature of value. An axiological standpoint for PTSD would highlight that the victims of PTSD would lose value in enjoying or fulfilling other life purposes. These other life purposes could include a relationship with a significant other or having a family. An axiological perspective would be concerned that PTSD would inhibit personal growth and would be a detrimental interference for the individual with the disorder. The axiological perspective would also be concerned with some of the ethical considerations that are associated with some of the preventative measures tied to the assessment of genetic predispositions. Lastly, an axiological perspective would also be concerned that PTSD prohibits its one from having emotional control.

The philosophical perspective of epistemology approaches the value of knowledge and the act of understanding. The epistemological perspective is usually taken by an objectivist. An objectivist believes that human beings have direct contact with

reality and have logical explanations. An objectivist would approach combat-related PTSD by looking at statistics and facts that explain the rate of prevalence. A high prevalence of a disorder like combat-related PTSD deserves considerable attention. The objectivist would argue that support should be given to all military personnel before, during, and after deployment to help prevent loss of personal value.

Independent and Dependent Variables

The independent and dependent variables involved in this study are as followed. I propose that more research should be done on treatment for combat-related PTSD. This research should critically assess which treatments are most effective, which treatments do victims feel most satisfied or comfortable with, and which treatments do PTSD sufferers comply best with. One independent variable for this analysis would be an increase in the success rate of PTSD treatments. The dependent variable would be a decreased prevalence in combat-related PTSD. An extensive review of treatment options and their efficacies might provide insights to individuals who are struggling to find a treatment that is optimal for their condition. Therefore knowing how to better treat PTSD may have an impact towards decreasing the prevalence of PTSD. A second independent variable is to propose more research on possible preventative methods for combat related PTSD. The dependent variable would a decrease in the prevalence of PTSD. A final independent variable is to propose more research for the possible genetic implications for PTSD. This might provide a possible approach to screen for military personnel who are fit for combat exposure. Genetic studies might allow the military to properly screen for risk and resilience factors that are related to combat-related PTSD. With these three independent

variables in mind, the dependent variable would be how the prevalence of combat-related PTSD changes.

My Hypotheses

The following hypotheses were formed based on previous Internet research done for the current military response for PTSD. These hypotheses should be explored more extensively for the possible discovery of patterns that are associated with combat related PTSD.

Hypothesis 1 predicts that a combination of treatments will be most beneficial to the individuals with PTSD with regard to efficiency and compliance. I do not believe that one form of treatment will outweigh others. I also believe that victims may have higher preferences for specific treatments that allow them to better comply with their treatment process.

Hypothesis 2 predicts that my analysis will support the role of preventative research. This preventative research includes both pharmaceutical preventative approaches and non-pharmaceutical approaches. I predict that there may be ethical concerns with these preventative methods, which may delay or indefinitely prevent the development and implementations of these methods.

Hypothesis 3 predicts that my analysis may also present significant findings for the genetic predisposition of combat-related PTSD. I predict that there may be ethical and legal concerns with this genetic research and how the genetic information will be applied to the United States Military.

Methodology

How will I test the Hypotheses?

For my qualitative analysis, I will be researching using an inductive approach. I will be analyzing data that have already been collected. I will be using Internet databases provided by Barry University. These databases include PubMed, MEDLINE Complete, PsycArticles, Google Scholar, and AccessMedicine. I will then be critiquing this information and proposing new perspectives on this information. For Hypothesis 1, I will be reviewing scholarly and peer-reviewed articles that discuss treatment efficiency for psychotherapies and pharmacotherapies used in the treatment for PTSD. These articles will fall into the time frame of the last 16 years (2000-2016), a period of time during which there has been a significant increase in PTSD prevalence. I will be critiquing these articles based on how effective the treatment has been, individual preference, and how well victims comply with the treatment. For Hypothesis 2, I will be reviewing scholarly and peer-reviewed articles that discuss the preventative measures for PTSD. These preventative measures include pharmaceutical methods. I will be analyzing this information by assessing how well the risks outweigh the benefits. Risks of preventative measures may include side effects from specific pharmaceutical drugs and also the ethical considerations associated with how these preventative methods work. These articles will also be from the last 16 years. For Hypothesis 3, I will be reviewing scholarly and peer-reviewed articles that discuss the probability of discerning an association between PTSD and genetics. I will be critiquing this information based on how conclusive these findings are and if they may serve a beneficial purpose. These articles will also be from the last 16 years. For each article I plan to document a brief summary of key points for the data

analysis and discussion. A brief summary of each article will allow me to see specific patterns and trends across studies.

Results

Data Analysis: Treatment Effectiveness

The following treatment definitions in Table 1 are referenced from the Sharpless' and Barber's *Clinicians Guide to PTSD Treatments for Returning Veterans* (2011) [24].

Table 1. Most Common Types of Psychotherapy for Combat-Related PTSD

Type of Psychotherapy	**Definition of Psychotherapy**
Prolonged Exposure Therapy (PET)	Modifies memory structures and approaches fear and other underlying emotions. Can include sessions for revisiting the traumatic event through imagination. Usually done individually, not in group setting
Cognitive Behavior Therapy or Cognitive Processing Therapy (with Trauma or without Trauma)	More academic therapy, victims are asked to write about trauma, and recite the writing they create back themselves. This therapy can be done individually or in a group with other victims.
Exposure to Virtual Reality Therapy	Similar to Prolonged Therapy but uses 3D effects to make the traumatic event more vivid. Uses a virtual traumatic combat event. Includes enhanced smells, sounds, and visuals that may simulate symptoms of the disorder.
Stress Inoculation Training or Relaxation Therapy	Manages anxious symptoms and relaxation techniques to help with anxiety. Some forms of treatment include imaginary traumatic exposure.
Eye Movement Desensitization and Reprocessing	Purpose is to desensitize negative thoughts and emotions. Victims are asked to picture traumatic event while tracking a clinician's finger with their eyes. The rapid eye movement is analyzed each session. Victim will work their way up to tracking the finger while holding positive thoughts.

Table 2. Most Common Types of Pharmacological Drugs for Combat-Related PTSD

Type of Pharmacological Drug	**Example**
Selective Serotonin Reuptake Inhibitors (SSRI) **classed as Antidepressants**	Paroxetine (Paxil), Sertraline (Zoloft), Fluoxetine, Venlafaxine
Mood Stabalizers	Lamotrigine
Sympatholytic (anxiety and tremor reducer)	Beta Blockers used to treat PTSD
Monoamine Oxidase Inhibitors **classed as Antidepressants**	Alpha Blockers, Clonidine, Gleanfacine
Atypical Antipsychotics	Olanzapine
Benzodiazepines	Beta Blockers
Preventative Drugs	Propranolol, Prazosin, Morphine, Hydrocortisone, Oxytocin, and Ketamine

Table 3. Scholarly Articles on Effective Treatments for Combat-Related PTSD

Author(s)	**Year of Article**	**Optimum Treatment Preference**	**Other Details**
Goetter et al. [17]	2015	Individual psychotherapy – cognitive therapy without trauma exposure.	High dropout rates (DOR) of treatment with trauma exposure. Individual therapy with trauma exposure DOR- 31.1%. Group therapy with trauma exposure DOR- 54.4%
Ehlers et al. [18]	2010	Trauma-focused psychological treatments	Trauma focused cognitive behavior therapy. Eye movement desensitization and reprocessing.
Kehle-Forbes et al. [19]	2014	Prolong Exposure Therapy (PET)	53.4% of veterans in study would go to PET. 36.2 % of study would prefer using antidepressant pharmaceutical

			treatment. 8.6% of veterans would choose no treatment.
Stewart and Worbel [20]	2009	Pharmacotherapy; Depart. Of Veterans Affairs advocates for SSRI as first choice of Pharmacotherapy for PTSD.	Mainly fluoxetine as a SSRI. Tricyclic antidepressants, monoamine oxidase inhibitors, anticonvulsants such as divalproex.
Writer et al. [21]	2014	Pharmacotherapy-Prazosin	Prazosin effectively helps reduce trauma nightmares more efficacious than SSRI.
Ready et al. [22]	2012	Group prolong exposure therapy; combination of Psychotherapy and Pharmacotherapy.	Group prolonged exposure therapy helps with psychosocial skills training. Therapy lasted for 16 weeks, victims met twice a week for 3 hrs. 267 victims were analyzed. 36% no longer met the criteria for PTSD. 44% reported reduced depressive symptoms. In VA hospitals most employed treatment approach was a combination of Pharm. and Psych. Therapy.
Steenkamp et al. [23]	2015	Most efficacious is Cognitive Processing therapy and Prolonged Exposure Therapy	Prefer trauma exposure therapies over non-trauma exposure therapies. PTSD in military has high dropout rates for treatments.
Reger et al. [24]	2013	Prolonged Exposure Therapy and Virtual Reality Exposure Therapy	Victims had preference for prolonged exposure therapy and virtual reality exposure therapy over pharmacological therapies. Would recommend these two psychotherapies.
Sharpless and Barber [25]	2011	Supportive of both Psychotherapy and Pharmacotherapy. Most effective psychotherapies were Prolonged Exposure Therapy, Cognitive Processing Therapy, and Eye Movement Desensitization Reprocessing.	Have to consider specific factors when deciding appropriate treatment. Such factors include the victim's attitude and goals for the treatment, their degree of suffering, and how resistant one is to exposure.
Burbiel [26]	2015	Pharmacotherapies	Prazosin is a successful anti-hypertensive for sleep disturbances and trauma related nightmares.

			Antidepressants are the most common form of treatments. Benzodiazepines should be avoided and could enhance symptoms or harm patient with other side effects.
Lake [27]	2014	Discussed both Pharmacotherapies and Psychotherapies.	Pharmacotherapy and psychotherapy have limited effective outcomes. Should look into alternative forms of treatment such as acupuncture and relaxing techniques. Victims are more likely to prefer these treatments, however they are not 100% effective. Virtual exposure therapy, SSRI, and Eye Movement Desensitization shows more success. Preventative measure should be researched. Virtual reality exposure therapy should be used to analyze neurological responses to stress and to build resilience training.
Peterson et al. [4]	2011	Prolonged Exposure Therapy and Cognitive Behavior Therapy. SSRI	Prolonged Exposure Therapy and Cognitive Behavior Therapy have the most empirical support for efficiency. Pharmacological treatments are still the most common treatments especially SSRI of paroxetine and sertraline. Benzodiazepines should be avoided. Although they could be efficacious they could lead to more dangerous side effects. The lack of outcome data on treating combat-related PTSD in active military must change.
Puetz et al. [28]	2015	Pharmacotherapy	The efficacy of pharmacotherapy for combat related PTSD is not well established. Pharmacotherapy need to consider the interventions a veteran has had and his or her personal characteristics. Study supports that pharmacotherapy significantly reduces anxiety and depression. The most efficacious drugs were SSRI and tricyclic antidepressants. 54% of Iraq and Afghanistan veterans utilize the veterans' mental health administrations. Future research

			should include more clinical reviews on PTSD treatment, and there should be research on a combination of Pharmacotherapies, also called polypharmacy.
Suliman et al. [29]	2015	Trauma focused Cognitive Behavior Therapy for Psychological therapies. SSRI for Pharmacotherapy.	The psychological treatment with the best evidence for efficacy in treating and preventing PTSD is Trauma focused cognitive behavior therapy. SSRI are efficacious in relieving PTSD symptoms of anxiety and depression.
Hoskins et al. [30]	2015	Pharmacotherapy SSRI	SSRI reduced PTSD symptoms effectively, specifically fluoxetine, paroxetine, and venlafaxine. However more research is needed to support the efficiency of SSRI for PTSD, especially for Military related PTSD.
Smith-Forbes [31]	2014	Animal Assisted Therapy	Animal assisted therapy has been successful. Therapy dogs provide pleasurable interactions and help motivate social improvement and positive emotions.
Yount [32]	2012	Animal Assisted Therapy	This article discusses Warrior Canine Connection as an adjunctive treatment. Therapies dogs enhance wellness and provide sufficient support. Lack of social support can worsen PTSD symptoms. Therapy Dogs have exhibited a lot of improvements for such as an increase in patience, control, and emotional regulation sleep regulation also increases. A decrease in depression and stress levels is also seen. Therapies present trust and help promote anti-stress agents in the brain.
Cukor et al. [33]	2012	Psychotherapy is the most efficacious	Psychotherapy is the most efficacious. The top psychotherapies include cognitive behavioral therapies, Exposure therapies, and Eye movement desensitization. Stress management and relaxation methods had a lesser degree of efficiency for

			combat related PTSD. Pharmacotherapy is still effective as well, with SSRI of sertraline and paroxetine. As well as prazosin for nightmares.
Wisco et al. [34]	2012	Psychotherapies that expose trauma. SSRI	Cognitive behavioral therapies and prolonged exposure therapies are efficacious. SSRI are efficacious too.
Foa et al. [35]	2013	Psychotherapies	Prolonged exposure therapy and Cognitive behavioral therapies are efficacious. Also suggest that web-based therapies should be available. Individuals will be able to access which treatments are most efficacious.
Ready et al. [36]	2012	Group Based Prolonged Therapies	Duration of a 16 week program. Included individual imaginable exposure and group sessions. Significant reduction of PTSD symptoms were seen. Dropout rates were recorded at 20%.
Alino et al. [37]	2013	Surgical procedure of stellate ganglion block	Article discussed how veterans underwent surgery of stellate ganglion block on the right side of C6 vertebrae. Surgical procedure was successful in relieving symptoms of PTSD especially hyperagressiveness and anxiety.

Discussion of Treatment Analysis:

The data analysis of the most efficacious treatments for combat-related PTSD contains information from 22 scholarly and peer reviewed articles. From this data, the most efficacious treatments for combat-related PTSD were exposure therapy, cognitive focusing therapy, eye movement desensitization and reprocessing, and selective serotonin reuptake initiators. The results did not significantly favor psychotherapy as a better choice than pharmacotherapy or vice versa. Overall the research for the most efficacious combat-related PTSD is not well established. More clinical reviews and trials need to be

performed on treatment for combat-related PTSD. The accessibility and availability of information was greater for psychotherapies. This presumes that more studies and clinical trials need to be done for pharmacological treatments. Another consideration is that maybe pharmacological treatment studies are not free and accessibility may require compensation. Both types of treatment categories had different benefits related to their assessment of their efficacy.

The psychotherapies were efficacious in providing support to individuals with PTSD and tend to relieve symptoms without the tradeoff of other side effects. Throughout all of the psychotherapies, exposure therapy was seen as most efficacious. Both imaginary exposure and virtual exposure were deemed successful. In was considered successful in 13 of the 22 articles. However, some articles reported dropout rates for some exposure therapies because some victims may feel that the exposure is too intense. Cognitive behavior therapy and eye movement desensitization reprocessing were both highly recommended as well. Stress inoculation therapy was not a significant therapy for combat related-PSTD. Stress inoculation therapy was seen to be more efficient for military PTSD caused by sexual assault or rape. Group therapies of exposure therapy and cognitive behavior therapy seemed to be helpful but it could be difficult for the victim to disclose disorders to others due to personal shame. Overall, psychotherapies are preferred because they approach the disorder directly and try to increase cognitive control against symptoms. However the downfall to psychotherapies is that the therapies are time consuming and have to be patient in order to receive results.

The pharmacotherapies that were most recognized and efficacious were the selective serotonin reuptake inhibitors fluoxetine, paroxetine, and sertraline. Selective

serotonin reuptake inhibitors were considered the first line of treatment in most of the articles and have proven to relieve symptoms of anxiety and depression. The antihypertensive prazosin was also efficacious in relieving traumatic nightmares. Tricyclic antidepressants were not as successful according to this analysis, but their efficacious ability was supported in two articles. Therefore tricyclic antidepressants should not be a neglected form of treatment for combat related PTSD and more research should be conducted. Benzodiazepines' efficacy was ambiguous and not certain. In some studies benzodiazepines were proven successful, however many clinicians suggest that they should be avoided because victims may become dependent on the drugs. Also some studies suggest that benzodiazepines may actually enhance PTSD symptoms. Victims of combat related PTSD might comply well with pharmaceuticals because a result is seen quickly as opposed to psychotherapies. Pharmaceuticals drugs are also easy to comply with because they are less time consuming.

New therapies that I found during my research include animal based therapies. Animal based therapies provide the use of therapeutic dogs to support the PTSD victim. Therapy dogs have been efficacious for improving the transition from combat to home. Therapy dogs significantly improve social skills, decrease depression, and increase anti-stress agents in the victim's brain. This is a very promising strategy and should individuals with combat related PTSD should consider if this therapy seems beneficial for them. Another new therapy that I found was the surgical procedure called stellate ganglion block. This surgical procedure was proven successful with veterans and could be a great alternative for victims who are resistant psychotherapies and pharmaceuticals.

Overall, the appropriate treatment choice for PTSD needs to take into account an individual's attitude about the disorder, goals for relief from disorder, the victim's degree of suffering, and how resistant one is to trauma exposure. More research is needed to understand that some victims may comply better with specific treatments. Future research should include more clinical trials that test the combination of psychotherapies and pharmacotherapies. Also research is trying to conduct a web-based systematic database that is accessible to PTSD victims via the internet. This treatment database should be resourced from graduate school studies, health care organizations, top clinicians, and the Department of Veteran Affairs. This will inform PTSD victims about the most efficacious treatments and which treatments may be the best fit for themselves.

Data Analysis: Preventative Measures

Table 4. Scholarly Articles on Preventative Measures for Combat-Related PTSD

Author	Year	Prevention Details
Burbiel [26]	2015	Discusses the application of drugs before a traumatic event takes place. Stress on memory formation is a key point in development of PTSD. Analyzes stress hormones and receptors. Important anatomical systems are hypothalamic pituitary adrenal axis, Sympathetic nervous system, and Interactions with prefrontal cortex. Sympathetic nervous system looks at acetylcholine, norepinephrine, and epinephrine. Most of the drug trials are ambiguous and its safety and effectiveness is hard to track. **Primary Prevention**- Pharmaceutical prevention given to military personnel before going into combat or traumatic event. The primary drugs with most successful trials are beta-blockers such as propranolol, which inhibits the binding of adrenaline and nor-adrenaline to certain receptors that suppress the psychological and physiological effects of stress hormones. Propranolol can pass the blood brain barrier. Alpha blockers such as Prazosin an antihypertensive drug that blocks alarm related cognitive mechanisms mediated by norepinephrine and memory formation. **Secondary Prevention:** Pharmaceutical Prevention given immediately after trauma exposure, 2-4 hours after. Opiates such as morphine may reduce the likelihood of PTSD if

		given directly after event. These include morphine and the anesthetic ketamine. However opioids cause hallucinations and psychomotor retardation. Article did not give too much insight on ethical considerations. However prophylactic use of chemical substances is approved by the Biological Weapons Convention.
Lake [27]	2014	Preventative measure should be researched. Virtual reality exposure therapy should be used to analyze neurological responses to stress and to build resilience training.
Peterson et al. [4]	2011	The Department of Defense mandated that all service members complete post deployment assessment to check a veteran's mental stability, depression, suicidal ideation, aggression, and if they wish to seek mental health services. Also suggested that beta blockers are a good form of primary prevention before trauma.
Kearns et al. [38]	2012	Psychological debriefing right after deployment has not been efficacious. These interventions seem like a good idea but may interfere with natural recovery and says that these interventions may increase risk of PTSD. Pharmacological prevention include propranolol used as a primary and secondary method against trauma. Benzodiazepines are not useful and may cause higher rates. Hydrocortisone may prevent symptoms of hyperactive fear if administered after trauma. Morphine and ketamine are used as secondary prevention. Beta blockers and opiates analgesic medications may prevent traumatic memory consolidation.
Searcy et al. [39]	2012	Prevention can have a significant impact on military readiness and quality of life. There is a lack of clinical reviews for prevention of combat related PTSD and more research needs to be done. Research on PTSD prevention is still in the early stages. Prevention focuses on the nervous system and neurotransmitters. Such systems include hypothalamic pituitary adrenal axis, limbic system, and central autonomic nervous system. The primary norepinephrine and epinephrine adrenergic receptors are alpha and beta blockers. Prazosin is alpha blocker and Propranolol is a beta blocker. Propranolol seems to be more promising. Corticosteroids are also effective in preventing the development of PTSD. Believes that secondary pharmaceutical prevention is safer and is more promising. Psychological debriefing of program called Battlemind is done post deployment. Tries to decrease dependency on bonds with comrade and regain bonds with family. Prevention is most successful with a combination of pharmaceuticals and counseling.

Castro et al. [40]	2012	Battlemind study has proven to be effective in large soldier study. Battlemind helps decrease the likelihood of developing a crucial form of PTSD, depression, and increases life satisfaction. Helps ease the transition back home. Is effective.
Suliman et al. [29]	2015	Escilalopram is an SSRI that could possibly prevent the likelihood of developing PTSD if taken immediately after trauma exposure. This study was not supportive because the type of trauma was not controlled for, so very widespread results. More studies on SSRI in secondary prevention should be considered.
Riggs and Sermanian [8]	2012	Should focus on 3 ways to prevent PTSD before deployment. 1) To screen personnel for risk factors 2) educate skills to mitigate the effects of combat trauma. 3) Change how personnel are distributed to a particular unit or position. There is a need to develop an algorithm that takes into account multiple indicators that are proven to be associated with combat related PTSD. These factors should include biological factors, genetic factors, epigenetic factors, neurophysiological factors and physiological factors. Battlemind program is effective. Resilience training needs to be partially focused on how to deal with trauma. Training should highlight attentional focus, physiological control, increased confidence, and imaginable rehearsal of trauma. Debriefing after deployment, needs to have more research, because it could enhance the likelihood of developing PTSD or reduce it. Debriefing can disrupt the natural mechanisms through which the mind processes traumatic events. May strengthen the memory consolidation of traumatic event.
Ostrowski and Delahanty [41]	2014	Article highlights chemoprophylatics of propranolol, hydrocortisone, morphine, and oxytocin. Pharmaceutical drugs approach is to block sympathetic arousal to prevent symptoms of fear, interfere with glucocorticoids that impact emotional memory consolidation or to interfere with sympathetic nervous system and hypothalamic-pituitary-adrenal axis.
Jones et al. [42]	2013	Article discusses traumatic event management and strategies to debrief combat arms personnel. Battlemind is a specific program that has been successful with debriefing effectively. Article followed debriefing of personnel in Afghanistan. Battlemind cover 10-15 individuals at a time for about 3 hours. Intervention includes a visual filmed event with traumatic situations during deployment as a means to address the cumulative effects of stress over the course of

		deployment. Also includes immediate post-deployment debriefings to facilitate transition from combat to home.
Mcfarlen [43]	2015	Needs to be more research for pharmaceutical preventative measures. Propranolol was not proven to be efficacious in this study, but hydrocortisone was more successful in this study. Hydrocortisone is a promising preventative measure.
Farber [44]	2014	Article that highlights DARPA's new emerging technologies that help to understand the human mind and can help treat or prevent mental disorders such as PTSD. One of these programs is REM- restoring active memory program. This involves an implantable device that monitors brain activity.

Discussion of Preventative Measures

Prevention for combat-related PTSD can place a significant impact on military readiness and quality of life. It is a very interesting approach towards decreasing the development of combat-related PTSD; however, this research is still in its early stages and much more research needs to be done. Preventative methods against combat-related PTSD fell into three categories; pharmaceuticals prevention, psychological debriefing, and resilience training. A total of 12 scholarly articles was analyzed for prevention of combat-related PTSD.

Pharmaceutical prevention occurs via prophylactic pharmaceuticals which indicates that these drugs are used to prevent the development of a diseased state. The use of prophylactic pharmaceuticals is approved by the biological weapons convention which is a convention that assesses the use of any biological warfare. Pharmaceutical prevention research focuses on how stress with memory formation is a key point in the development of PTSD. Pharmaceutical prevention research addresses neurological mechanisms within the hypothalamic pituitary adrenal axis, sympathetic nervous system association with epinephrine and norepinephrine, and interaction within the frontal lobe. Prophylactic drugs could be used as a primary or secondary approach against the development of

combat-related PTSD. A primary pharmaceutical approach against combat-related PTSD involves administering the drug before the exposure to combat trauma. Primary drugs that have proven to be somewhat efficacious include the beta blocker propranolol and the alpha blocker prazosin. The effects of these drugs are ambiguous. Secondary pharmaceutical drugs include such as morphine, oxytocin, and ketamine. Other secondary pharmaceutical drugs include hydrocortisone. Some trials also used propranolol for secondary prevention as well. Secondary prevention helps to reduce the consolidation of the traumatic memory. Similarly to primary pharmaceuticals, the efficacy of secondary drugs is ambiguous. However many clinicians feel that secondary pharmaceuticals drugs are a safer route for prevention.

Psychological debriefing is somewhat efficacious, however some studies suggest that psychological debriefing actually enhances the development of PTSD. Therefore, it is possible that psychological debriefing may interfere with one's ability to recover naturally in order to prevent memory consolidation from trauma. However, most clinicians feel that addressing emotional distress from combat at any time is mostly beneficial and therefore the potential benefits outweigh these perceived drawbacks. Battlemind was an effective psychological debriefing program that is available to military personnel after the completion of their deployment. Battlemind helps veterans to open up about traumatic scenarios and helps to ease the transition back home. The Battlemind programs actually starts when military personnel are in combat [45]. Soldiers are assessed on their inner strength, mental toughness, and self-confidence [45]. A follow-up meeting is required after the soldier is finished with their deployment [45]. The post-deployment meeting addresses the psychological state of the soldier after combat and

focuses on distinguishing military personnel relationships from family relationships [45]. This meeting is usually done privately and then soldiers may be placed into a group setting to discuss combat experiences [45]. Battlemind also provides scenario animations about combat experience, transitioning back home, and PTSD [45].

Research relating to resilience training in relation to preventing the development of PTSD is not very well established and much more research needs to be done to see how the military is developing measures to prevent or reduce PTSD. This resilience training is focused on physical and emotional strength, stamina, stress tolerance, attention focus, physiological control, confidence, and traumatic scenarios. This training allows for soldiers to mitigate the effect of trauma. Clinicians suggest that there is a strong likelihood that resilience training has a positive impact on preventing the development of PTSD, however there are just not enough current studies to support this claim.

Research relating to screening for combat-related PTSD is also in its early stages. An algorithm needs to be developed that takes into account multiple indicators for combat-related PTSD. Combat related indicators should include biological factors, such as blood pressure, heart rate, and facial electromyography. Other indicators should include genetic factors, epigenetic factors, and neurophysiological factors. An accurate screening mechanism might help to prevent the development of combat-related PTSD and might accurately place military personnel in better positions.

Research on new and emerging technologies for monitoring chemical activity during a traumatic event is still in the early stages as well; and therefore, it is too soon to draw conclusions about its efficacy. Only general Internet information is given on this topic and only one scholarly article was found on this prevention method [41]. The

Defense Advanced Research Project Agency has announced new technologies of brain machine interface. Resorting Active Memory (RAM) is one technology and REMIND is the other technology which stands for Restorative Encoding Memory Integration Neural Device. The REMIND technology is a chip implantation that monitors a soldier's neuronal and behavioral brain functions. These technologies are proposed to improve human performance and could possibly provide information about how PTSD develops. However, this technology seems more inclined to monitor brain function in order to synthesize this information for artificial intelligence. The Defense Advanced Research Projects Agency has projects that tend to be classified and this is probably why the information is not easily accessible.

Data Analysis: Genetic Implications

Table 5: Genetic Implications for Combat-Related PTSD

Author	Year	Genetic Implication Or Biomarker
Kearns et al. [38]	2012	1/3rd of vulnerability to developing PTSD is genetically heritable. Polymorphisms FKBP5 gene regulates hypothalamic pituitary – adrenal axis reactivity. Also analyze corticotrophin-releasing hormone receptor polymorphisms in relation to central nervous system stress activity. This may mark PTSD-depression phenotype. Risk factor may also been see with polymorphisms on **5HTTLPR** gene.
Wisco et al. [34]	2012	Screening for PTSD should include screening for heart rate, blood pressure, facial electromyography.
Domschk [46]	2012	The pathogenesis of PTSD with heritability is about 30-35%. This statistic is supported by twin studies from Vietnam war veterans. PTSD is presumed to have overlap genetic risk factors with major depressive disorder, alcohol dependence, nicotine dependence, and panic or anxiety disorder. Single risk genes include the **serotonin transporter 5-HTT and promoter region 5-HTTLRR**. Genes related to hypothalamus-pituitary adrenal-axis have been a major focus in PTSD genetics. **FKBP5 gene** a protein influencing glucocorticoid. **ADCYAPIRI gene** with a specific estrogen level is associated with PTSD. Future research is for dopaminergic genes **DRD2 gene with COMT gene**. Epigenetics of methylation and acetylation have demonstrated an association with PTSD. Methylation was seen with **5-HTT gene** with enhanced behavioral stress reactivity following early stress in primates. Methylation in immune system is presumed to have an association with PTSD. Purpose of genetic research will help develop effective drugs for better pharmacotherapies.
Lyons et al. [47]	2013	Factors determining who develops PTSD following trauma is still not understood. PSTD is suggested to be associated with dementia with **apoE gene.** The apoE gene moderates the effects of psychological trauma. Therefore it is suggested to have a relation to the pathogenesis of PTSD.
Lian et al. [48]	2014	Article suggests that a gene-environment interaction involving GR polymorphisms with the number of traumatic or stressful life events and social support result in an increased risk for PTSD. Also suggests that heritability of PTSD is 30-40%. Research for genetics of PTSD focuses on the dopaminergic system, hypothalamic-pituitary adrenal-axis. Prior stressful encounters that could be associated are childhood adversity, financial problems, relationship problems, family issues, or severe illness.

Wang et al. [49]	2011	Serotonin transporter 5-HTT polymorphisms are linked to combat related PTSD. Study analyzed 228 veterans with combat exposure. Promote that genes and environment can explain risk or resilience of stress related conditions like PTSD.
Yehuda et al. [14]	2011	Supports that epigenetics have a linkage to developing PTSD. Genes that regulate cortisol and hypothalamic pituitary adrenal-axis. Genes help explain the etiology and pathogenesis.
Logue et al. [50]	2013	Article supports that **RORA gene** was associated with PTSD in a genome wide study that included 852 military veterans. RORA has been associated with attention-deficit hyperactivity disorder, bipolar disorder and autism. Also suggested that heritability of PTSD is between 30-70%.
Rusiecki et al. [51]	2012	Examined DNA methylation patterns in military personnel from Iraq and Afghanistan. Study supports DNA methylation relation to resilience ad vulnerability factors to combat related PTSD. DNA was extracted from military personnel during the triggering and development of PTSD. Suggest more research is needed on DNA methylation and epigenetic patterns for PTSD.
Lazaro-Munoz and Juengst [9]	2015	Field of genomics for PTSD is receiving attention for research in order to improve treatment and prevent PTSD. The genetic heritability of PTSD is between 30-70%. Genes associated with PTSD include **5HTTLRR, DRD2, and FKBP5.** Million Veterans Program is being proposed by the Department of Defense to gain 1 million genetic sample from veterans.

Discussion for Genetic Implications

The data analysis for genetic implications contains information from 10 scholarly articles within the last five years. These articles provide significant support for the role of genetic predisposition in combat-related PTSD. Genetic research for combat-related PTSD is still in the early stages, but it presumes a promising impact on improving the treatment and prevention for combat-related PTSD. These articles show that the heritability of PTSD is between 30-70%. Many gene associations have been recognized with PTSD which include FKBP5, 5-HTT/5HTTLPR, ADCYAPIRI, DRD2, COMT, apoE, and RORA. These genes are associated with a higher risk for developing PTSD. The study of epigenetics was applied to PTSD and showed that there is also an epigenetic

association with PTSD. Epigenetic is a modification of gene expression cause by environmental and chemical factors. Epigenetics can have an effect on normal gene expression. The genomes of those experiencing PTSD showed methylation on the 5-HTT gene and genes associated with the immune system. Post-traumatic stress disorder was also associated genetically with other disorders such as dementia, schizophrenia, hyperactivity disorder, bipolar disorder, and autism. A majority of these genetic studies used army veterans as participants. The Department of Defense has recognized that genetic research could be advantageous to the military. A Million Veterans Program aims to collect genetic information from one million veterans. The purpose of this information is to comprehend the pathophysiology of combat-related PTSD which may lead to better treatments and preventative measures.

Ethical Concerns

There are immediate ethical concerns for the treatment of combat-related PTSD. It might be considered unethical to knowingly inflict trauma on someone. However, in the case of combat-related PTSD, instilling trauma in a victim has a purpose to heal and not to traumatize on an extremely unethical level. The individual suffering from combat-related PTSD has to give their consent to receive this intense treatment and the direct interaction with trauma may be efficacious for them. The individual experiencing combat-related PTSD can choose to drop out of the treatment if he or she is too uncomfortable. Therefore, I do not think inflicting trauma as treatment is an ethical concern that will cause significant conflict.

The pharmaceutical prevention of combat-related PTSD has revealed some ethical concerns, especially with regard to the use of propranolol as primary prevention [43].

Research on propranolol shows that the drug is safe; however, there are risks that one must consider. There is a risk of the loss of episodic memory which is the memory of actual events and a risk of the loss of emotionally positive memory along with negative memory [43]. Memory and emotion are vital to human functions and it seems that if one does not have absolute control over his or her memory and emotions it may seem unethical to distribute the drug that can induce these extreme effects. One might also say that this is a form of mind control that violates a person's free will. One should always be competent to control one's moral obligations as well. Therefore, primary drugs like propranolol may lead to a risk of emotional confusion and a loss of psychological well-being [58]. Using drugs that modify one's memory may affect what one believes to be true and can alter one's perception of reality [50]. Lastly, some people may feel that it is unethical to interrupt the natural reaction to stress and grief after trauma [51]. Despite these concerns, it is presumed that the effects of propranolol are more advantageous than dangerous for military soldiers.

There are also ethical concerns with regard to the possibility of identifying genetic predispositions. The Department of Defense is organizing a Million Veterans Program that will collect genetic data from one million veterans [9]. The military plans to use this genetic information in order to improve the treatment and prevention of combat-related PTSD [9]. The military could also use this information to possibly construct a form of military artificial intelligence. With this Million Veterans Program in mind, there may eventually be genetic screening for PTSD before deployment. Therefore, there are some concerns for genetic discrimination against soldiers who may be identified to contain specific gene variants that predispose them to developing PTSD. The military already

screens for the genetic conditions of sickle cell and G6PD deficiency to place military personnel in assignments appropriately [9]. Consequently, it is likely that the military will use genetic information related to PTSD in the future. The Genetic Information Nondiscrimination Act of 2008 (GINA) does not apply to military positions [9]. The GINA prevents the use of genetic discrimination in a workplace. The lack of protection under the GINA act may lead to a possible problem of genetic discrimination within PTSD screenings. If genetic screening for PTSD becomes implemented, some people may feel that it is a form of genetic discrimination which violates against the equal protection principles under the Fifth Amendment [9].

Limitations

Overall, this study provides a strong qualitative analysis of treatment options for combat-related PTSD. However, I was limited to the amount of information that was accessible. Barry University's Interlibrary Database provided many scholarly and peer-reviewed full text articles. However, I was not permitted to view some articles because of a required interlibrary loan or because the full-text article was not available for free.

Conclusion

In summary, combat-related PTSD is a controversial and critical disorder that is evident within the branches of the United States military. The military's concern about combat-related PTSD is very strong. The United States military's approach to solving this disorder is moving in the right direction. However, the efficacy of the United States military's approach to combat-related PTSD is still ambiguous due to a very low number of supporting studies.

In retrospect, the research on available combat-related treatment, prevention, and genetic implications is very preliminary because there is still much that is not known and that is the subject of current investigation. However,there are significant findings within this analysis. The most common and most successful treatments with significant data support were trauma-based exposure therapy, cognitive behavioral therapy, SSRI, and eye movement desensitization and reprocessing. Preventative measures currently in use include psychological debriefing programs such as Battlemind and pharmaceutical drugs such as propranolol, prazosin, morphine, oxytocin, and ketamine. The extent to which the United States military uses these preventative measures is not clear. There are also ethical concerns with pharmaceutical prevention with regard to emotional control and moral obligation. The development of genetic screening is underway, and many genes have been identified with potential links to combat-related PTSD such as FKBP5, 5-HTT/5HTTLPR, ADCYAPIRI, DRD2, COMT, apoE, and RORA; however, more research on veterans is needed to verify these finding. The progress of the Million Veterans Program should be very interesting. Therefore, this genetic program should be tracked and the possibility of genetic screening for combat-related PTSD should be critically considered because it may lead to genetic discrimination.

The first hypothesis was not rejected, because both forms of treatments are efficacious in different aspects. However, more information is needed to support the idea of combining psychotherapies and pharmacotherapies. The second hypothesis was also not rejected, because there is significant research on preventative measures of combat-related PTSD. However, there is no significant support to explain how much these preventative measures are used in the United States military. The third hypothesis was

also not rejected, because there is significant research that supports the development of genetic implications. Determination of the genetic role in the development of combat-related PTSD is still in the early stages, it is a concept that has the potential to be very beneficial.

More clinical trials and meta-analyses need to be performed on veterans within the United States military in order to obtain a more accurate assessment on the current military approach to addressing combat-related PTSD. Therefore, a greater amount of data collection and reporting may allow for a clearer and well supported assessment. Future directions should include research on the efficiency of combining psychotherapies and pharmacotherapies for combat-related PTSD. Future research should also be done on the relationship between environmental factors of combat-related PTSD and genetic associations. The potential environmental factors include education, ethnic status, childhood upbringing, and family history. These environmental factors should be analyzed as potential association factors of combat-related PTSD.

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