Prescreening of Active-Duty Military Personnel for Pretrauma Risk Factors for PTSD: Psychopathology, Prior Trauma Exposure, Cognitive Abilities, and Negative Affect Personality Traits

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Abstract

In this paper, pretrauma factors that are associated with an increased risk for the development of PTSD in military personnel upon future trauma were examined. The U.S Department of Veteran Affairs estimates that PTSD afflicts almost 31% of Vietnam veterans and 20% of Iraqi war veterans. Currently there is no pretrauma measure in place to assess which individuals are most at risk for developing PTSD once they are exposed to trauma. Research was analyzed with a discipline in psychology and a variety of studies that are strictly academic and scientific were compiled. In this process, the aim was to propose a prescreening survey by determining the most prominent pretrauma risk factors associated with an increased likelihood of PTSD development in military personnel; so that these high-risk individuals can be identified, assessed, and treated accordingly upon return from deployment. Scholarly studies were explored from an array of perspectives and it was determined that psychopathology (specifically anxiety and depression), prior trauma exposure, cognitive abilities, and negative affect personality traits are pretrauma risk factors that should be assessed before trauma exposure. These risk factors were selected due to the abundance of supporting evidence and ability to assess these factors. Based on efficiency and credibility, it was determined that using the Beck Depression Inventory-II (BDI-II), Hospital Anxiety and Depression Scale- Anxiety (HADS-A), Life Events Checklist for DSM-5 (LEC-5), Armed Forces Qualification Test (AFQT), Visual Reproduction Test (VR), and the Implicit Positive and Negative Affect Test (IPANAT) would be the optimal way to assess the above-mentioned risk factors. If more research is conducted, other risk factors could be added to this prescreening survey. If a more extensive survey could be administered, biological risk factors, for example cortisol levels, could be added.

Keywords: PTSD, Risk Factors, Military Personnel

1. Introduction

According to the American Psychiatric Association, "Posttraumatic Stress Disorder (PTSD) is a psychiatric disorder that can occur in people who have experienced or witnessed a traumatic event such as a natural disaster, a serious accident, a terrorist act, war/combat, rape or other violent personal assault"[1]. The DSM-5 diagnostic criteria for PTSD states that victims of PTSD have at least one intrusive symptom associated with the traumatic event, frequent avoidance of reminders, at least two negative changes in thoughts and mood following the trauma, and at least two changes in arousal following the trauma. In general, an individual is more likely to develop PTSD if they have experienced or witnessed trauma; for example sexual assault, death, or a natural disaster. Women are more likely to develop PTSD than men based on the premise that women are at a higher risk for sexual violence and therefore have a higher exposure to this type of trauma[2]. However, this essay aims to determine why, under the same trauma exposure,

is one individual resilient to developing PTSD and the other individual at risk for developing PTSD. According to the U.S Department of Veteran Affairs, PTSD is estimated to afflict almost 31% of Vietnam veterans and up to 20% of Iraqi war veterans[3]. By studying what makes certain individuals more at risk for developing PTSD after being exposed to trauma, these individuals can be aware that they have a higher likelihood of developing PTSD.

In this essay, active-duty military personnel is defined as any individual who is enlisted in the military full time and is likely to be deployed. This is because individuals in combat have the potential to experience more traumatic events. If a prescreening risk survey is put in place, active-duty military personnel may benefit from being assessed before potential trauma exposure.

According to the Substance Abuse and Mental Health Services Administration, approximately 50% of returning service members who need treatment for mental health conditions seek it[4]. By assessing risk for PTSD before exposure to trauma, individuals that are at a high risk for developing PTSD can be flagged, assessed for PTSD after deployment, and treated if necessary. The goal of this approach is to increase the number of veterans with PTSD that receive a diagnosis and treatment, as 50% of veterans in need of treatment do not receive it[5].

In terms of monetary cost, the Congressional Budget Office states that the average cost for the first year of PTSD treatment for veterans is $8,300[6]. Fortunately, the Department of Veteran Affairs attempts to provide treatment to veterans and receives funding from the Veterans Health Administration in order to do so. In terms of emotional cost, PTSD can lead to social isolation, deterioration of interpersonal relationships, alcoholism, suicidal thoughts and behaviors, and several other life altering effects[7]. Having a prescreening risk survey for veterans would allow high-risk individuals to be notified of their risk and understand the possible financial, mental, and social consequences of PTSD before officially deciding on deployment. If the individual decides to follow through with deployment, they should be first priority for PTSD assessment upon returning from deployment.

Because of the high rates of PTSD in returning active-duty military personnel and the relatively low rates of PTSD-afflicted veterans that seek treatment, a prescreening risk survey assessing psychopathology, trauma exposure, cognitive abilities, and negative affect personality traits should be administered before deployment so that high-risk individuals can be identified and assessed for treatment after returning from deployment.

2. Predisposition for PTSD: Preexisting Depression and Anxiety

Because researchers have conducted experiments that have found that preexisting anxiety and depression put an individual at a higher risk for developing posttraumatic stress disorder, psychopathology should be considered as a pretrauma risk factor[8] [9] [10]. These individuals are already at a vulnerable state mentally, and therefore are more susceptible to PTSD development.

Researchers have assessed psychopathology, specifically depression and anxiety, as a possible pretrauma risk factor for PTSD. In "When the Earth Stops Shaking: Earthquake Sequelae Among Children Diagnosed for Pre-Earthquake Psychopathology," Asarnow et al. researched the effect of having an anxiety disorder prior to a traumatic event – specifically an earthquake –on the likelihood of developing PTSD after experiencing trauma[11]. Asarnow et al. utilized the Diagnostic and Statistical Manual of Mental Disorders-III-Revised (DSM-III-R) to diagnose psychopathology prior to trauma. Asarnow et al. found that "predisaster anxiety disorders constitute a risk factor for postdisaster PTSD symptoms". Asarnow et al. stated that the mean value for PTSD symptoms in individuals with a pre-earthquake anxiety disorder was 13.5, while the mean value in individuals without a pre-earthquake anxiety disorder was 8.38. This data shows a correlation between pretrauma anxiety disorder and a higher PTSD symptom score, and a correlation between no pretrauma anxiety disorder and a lower PTSD symptom score. Asarnow et al. provides evidence that supports that having an anxiety disorder prior to trauma exposure increases the risk of developing PTSD symptoms after trauma exposure. Similarly, in "Predicting Post-trauma Stress Symptoms from Pre-trauma Psychophysiologic Reactivity, Personality Traits and Measures of Psychopathology," Orr et al. found a correlation between pretrauma anxiety and PTSD[12]. Orr et al. assessed three hundred eight firefighter/EMT and police trainees before trauma for psychological, psychophysiological, and personality variables to determine their predictive relationships with post-traumatic stress symptoms (PTSS). Orr et al. found that the difference in anxiety, measured by the State-Trait Anxiety Inventory (STAI), between the high and low PTSD groups was nearly significant. Orr et al. stated that the high PTSD group had a mean STAI-Trait score of 33.7, while the low PTSD group had a mean score of 29.8. Although statistical significance was not observed, there is a clear association between high PTSD scores and high pretrauma STAI-Trait scores. Orr et al. suggested that anxiety might have not reached statistical significance due to the low levels of PTSS severity and relatively restricted ranges of outcome scores. Because of the likelihood of significance for anxiety to be a pretrauma risk factor, anxiety disorders should be assessed prior to deployment as a prescreening measure for PTSD risk.

Asarnow et al. claimed that although associations were found between PTSD and depression, depression was not a significant risk factor for PTSD symptoms[13]. This is inconsistent with the study conducted by Orr et al., who found that pre-trauma depression was in fact a predictor of PTSD[14]. Orr et al. measured depression prior to trauma via the Beck Depression Inventory-II (BDI-II) and found that higher pre-trauma BDI-II scores were an influential predictor for higher post-trauma Impact of Events Scale- Revised (IES-R) scores. Orr et al. claimed that the mean BDI-II score for the high PTSD group was 3.6 and was 1.9 for the low PTSD group. This data shows a correlation between high pretrauma depression and high PTSD rates. The age of the participants could account for the difference in results, as Asarnow et al. had a sample size of children whereas Orr et al. had an adult population of firefighters, EMTs, and police trainees. Because Orr et al.'s sample size is most similar to the high-risk population of military personnel; pretrauma depression should also be considered a risk factor for PTSD. In "Incidence and Risk Factors for Intensive Care Unit-Related Post-Traumatic Stress Disorder in Veterans and Civilians," Patel et al. conducted research that examined preexisting depression as a risk factor for ICU-related PTSD in both civilians and veterans[15]. Patel et al. explained that participants were adult survivors from three Veteran Affairs hospitals and one civilian hospital, who were assessed for ICU-related PTSD at 3 and 12 months after hospitalization. Patel et al. had similar results to Orr et al., as Patel et al. claimed that preexisting depression was independently associated with higher odds of greater PTSD Checklist-Specific (PCL-S) scores in both civilians and veterans (p <0.03). Patel et al. stated that preexisting depression resulted in an odds ratio of 2.0 with a 95% confidence interval when compared to no preexisting depression. Patel et al.'s results support that pretrauma depression increases the likelihood of PTSD after trauma exposure.

Based on the studies presented, pretrauma anxiety and depression appear to be significant risk factors for PTSD. Therefore, active-duty military personnel may benefit from being assessed for anxiety and depression before deployment.

3. Predisposition for PTSD: Prior Trauma Exposure

Because researchers have suggested that being previously exposed to trauma puts an individual at a higher risk for developing PTSD upon future trauma exposure, an assessment that measures lifetime trauma exposure should be administered before deployment[16] [17] [18] [19] [20]. Childhood trauma should be especially considered because of its ability to alter biological stress systems.

Researchers have assessed prior trauma exposure as a risk factor for developing PTSD upon future trauma exposure. Patel et al. utilized the Traumatic Life Events Questionnaire (TLEQ) to measure trauma exposure and the PCL-S to measure severity of preexisting PTSD[21]. Patel et al. claimed that preexisting PTSD from prior trauma was independently associated with higher odds of greater PCL-S scores that assessed PTSD in relation to the successive traumatic event. Patel et al. stated that preexisting PTSD resulted in an odds ratio of 10.7 with a 95% confidence interval when compared to no preexisting PTSD. Patel et al.'s data shows that having PTSD and experiencing trauma before the subsequent traumatic event makes an individual more likely to develop PTSD that is associated with the subsequent trauma. Likewise, in "Previous Exposure to Trauma and PTSD Effects of Subsequent Trauma: Results From the Detroit Area Survey of Trauma," Breslau, Chilcoat, Kessler, and Davis examined lifetime history of traumatic events via the DSM-IV criteria and analyzed its correlation to PTSD from subsequent trauma[22]. Breslau et al. interviewed 2,181 individuals in southeast Michigan to determine their lifetime history of trauma and then assessed these individuals for PTSD. The results of Breslau et al. support the claim of Patel et al., as Breslau et al. found that "history of any previous exposure to traumatic events was associated with a greater risk of PTSD from the index trauma," and added that "multiple previous events had a stronger effect than a single previous event". Breslau et al. stated that compared with no previous trauma exposure, the odds ratio for a single previous traumatic event was 1.03, the odds ratio for two previous traumatic events was 2.12, and the odds ratio for three or more previous traumatic events was 2.41. Based on this data, it would be beneficial to measure all previous trauma exposure before deployment, with an emphasis on multiple previous traumatic events. Bremner, Southwick, Johnson, Yehuda, and Charney found similar results in "Childhood Physical Abuse and Combat-Related Posttraumatic Stress Disorder in Vietnam Veterans"[23]. Bremner et al. assessed Vietnam combat veterans for pre-military total traumatic exposure via the Checklist of Stressful and Traumatic Events and assessed childhood abuse with a clinician-administered interview. Bremner et al. found that individuals with PTSD had significantly higher rates of total traumatic events before joining the military than individuals without PTSD. Bremner et al. stated that individuals with PTSD had a mean of 4.6 previous traumatic events and individuals without PTSD had a mean of 2.8 previous traumatic events. Therefore, Bremner et al.'s results suggest that being exposed to more traumas increases an individual's risk of developing PTSD

that is related to subsequent trauma. Overall, based on the evidence provided, previous trauma exposure should be considered a risk factor for PTSD and should be assessed before deployment.

In "Type D Personality and the Development of PTSD Symptoms: A Prospective Study," Rademaker et al. examined childhood psychological trauma, measured by the Early Trauma Inventory Self Report- short form (ETISR-SF), as a possible risk factor for PTSD[24]. Rademaker et al. found that "self-reported exposure to childhood emotional abuse and baseline PTSD symptoms significantly predicted postdeployment PTSD symptoms in the final model". Rademaker et al. stated that the relationship between childhood emotional abuse and postdeployment PTSD symptoms was trend significant in the final model, with a p value of .07. Rademaker et al.'s claim that childhood abuse specifically is a risk factor for PTSD development is explained by Delahanty and Nugent in "Predicting PTSD Prospectively Based on Prior Trauma History and Immediate Biological Responses," who claimed that being exposed to trauma at early ages can cause alterations in the biological stress system and can contribute to an increased risk for PTSD upon future trauma exposure[25]. Like Rademaker, Bremner et al. studied childhood abuse as a risk factor for PTSD. Bremner et al. claimed that Vietnam combat veterans with combat-related PTSD had higher rates of childhood physical abuse than combat veterans without PTSD (26% versus 7%)[26]. Although Rademaker et al. claimed that childhood *emotional* abuse is a risk factor for PTSD and Bremner et al. claimed that childhood *physical* abuse is a risk factor for PTSD development, both support the overarching claim that childhood abuse should be assessed as a risk factor for future PTSD development relating to future trauma exposure.

Patel et al. and Breslau et al. claimed that lifetime trauma exposure in general is a risk factor for subsequent PTSD, while Rademaker et al., Delahanty and Nugent, and Bremner et al. claimed that childhood abuse is a risk factor for subsequent PTSD. Overall, any form of trauma, whether it be in childhood or adulthood, should be considered a risk factor for PTSD development and should be assessed accordingly.

4. Predisposition for PTSD: Cognitive Abilities - Memory and IQ

Because researchers have suggested that pretrauma cognitive ability is a risk factor for developing PTSD after trauma exposure, cognitive abilities–specifically IQ and memory–should be assessed prior to deployment[27][28][29][30].

Although impaired cognitive abilities are recognized as an outcome of PTSD, they may also serve as a pretrauma risk factor for PTSD. In "The Influence of Pre-Deployment Neurocognitive Functioning on Post-Deployment PTSD Symptom Outcomes Among Iraq-Deployed Army Soldiers," Marx et al. examined pretrauma memory in Iraq War U.S active duty army soldiers and its connection to post trauma exposure PTSD symptoms[31]. Marx et al. assessed initial acquisition of memory, memory retention, sustained attention, inhibition, working memory, and other cognitive processes linked to memory; however, claimed that only immediate visual recall is a pre-deployment indicator that is negatively associated with higher post-deployment PCL scores. Marx et al. stated that the standardized parameter estimate (β) for immediate visual recall was -.07. Marx et al. measured immediate visual recall via the Visual Reproductions (VR) test and stated that impaired visual memory, leading to a weakened encoding of the trauma, can result in a negatively altered retrieval of the trauma that causes PTSD. Negatively altered retrieval of trauma is a common symptom of PTSD, which can be seen through intrusive, involuntary memories or inability to remember important aspects of the traumatic event. Marx et al.'s data suggests that there is a correlation between having low immediate visual recall before a traumatic event and PTSD development after trauma. In "Impaired Specific Autobiographical Memory as a Risk Factor for Posttraumatic Stress After Trauma," Bryant, Sutherland, and Guthrie studied impaired retrieval of autobiographical memories as a pretrauma risk factor for PTSD[32]. Bryant et al. explained that trainee firefighters were assessed before possible trauma exposure by using the Autobiographical Memory Test. Bryant et al. found that impaired retrieval of specific memories in response to positive cues before trauma significantly predicted posttraumatic stress severity after trauma exposure. Bryant et al. stated that pretrauma deficits in retrieving specific memories to positive cues resulted in a standardized parameter estimate (β) of -.51 and accounted for 19% of the variance. Bryant et al. presents evidence that being deficient in specific memory retrieval before trauma exposure is associated with a higher risk for PTSD. Therefore, Bryant et al.'s evidence supports the claim that deficient memory retrieval is a pretrauma risk factor for PTSD. Although Marx et al. examined visual recall as a risk factor and Bryant et al. examined retrieval of autobiographical memories as a risk factor, they both examined the recall of explicit memories and therefore are similar enough to be considered in tandem. Overall, the ability to recall visual memory should be assessed before trauma as a pretrauma risk factor.

Orr et al., who prospectively examined IQ in police and firefighter trainees, measured pretrauma IQ via the Shipley Estimated IQ and stated that the high Impact of Event Scale – Revised (IES-R) group had a mean IQ of 98.4, while the low IES-R group had a mean of 103.5[33]. This data shows a correlation between high PTSD scores and lower IQ

scores, as well as a correlation between low PTSD scores and higher IQ scores. Orr et al. explained that lower IQ scores were associated with higher levels of PTSD symptoms after trauma exposure, and therefore claimed that lower IQ is a risk factor, while higher IQ is a protective factor for PTSD. In "Pretrauma cognitive ability and risk for Posttraumatic stress disorder," Kremen et al. examined pre-war cognitive deficits in Vietnam-era twin veterans in relation to post-deployment PTSD[34]. Kremen et al. obtained cognitive ability measures via the Armed Forces Qualification Test (AFQT) and stated that the AFQT is an index of general cognitive ability that correlates well with traditional IQ measures. Kremen et al. found that lower preexposure cognitive ability measured by the AFQT was significantly associated with increased risk of PTSD. Kremen et al. provided data showing that the group with medium-low AFQT scores had an odds ratio for risk of PTSD of 0.74, the group with medium-high AFQT scores had an odds ratio of 0.56, and the group with high AFQT scores had an odds ratio of 0.42. Therefore, individuals with the lowest pretrauma AFQT scores were shown to have the highest rates of PTSD development and are more likely to develop PTSD. Although different tests were administered to measure intelligence, Orr et al. and Kremen et al. both used conventional intelligence testing prior to trauma exposure and found that lower scores predicted a higher risk for PTSD.

Overall, both visual memory recall and intelligence quotient should be measured before trauma as cognitive ability pretrauma risk factors.

5. Predisposition for PTSD: Negative Affect Personality Traits

Because researchers have suggested that certain negative affect personality traits put individuals at risk for PTSD development, negative affect personality –specifically low self-efficacy and hostility– should be assessed prior to trauma to identify a risk for PTSD development in the future[35][36][37][38].

Researchers have suggested that preexisting negative affect personality traits, specifically negative emotions such as anger, guilt, fear, and poor self-concept, are risk factors for PTSD. In "Predicting posttraumatic stress symptoms from pretraumatic risk factors: A 2-year prospective follow-up study in firefighters," Heinrichs et al. conducted a study with professional firefighters and assessed pretrauma self-efficacy via the Inventory on Competence and Control Beliefs[39]. Heinrichs et al. stated that the PTSD score at the 24-month follow up was negatively correlated with baseline self-efficacy (r=-0.40, df=35, p=0.02). Heinrichs et al. provided data that supports that a low level of self-efficacy before trauma exposure is a risk factor for developing PTSD. This claim is consistent with the claim of Rademaker et al., who studied pretrauma Type D personality and its potential predictive value for postdeployment PTSD[40]. Rademaker et al. stated that Type D personality is a combination of negative affectivity and social inhibition, and measured these traits with the DS14 Type D personality scale. Rademaker et al. determined that Type D personality as a whole was not a significant predictor of PTSD scores, but that negative affectivity was an independent and significant predictor of PTSD symptoms. Rademaker et al. stated that negative affectivity was correlated with postdeployment re-experiencing (r=-.29, p < 0.001), avoidance (r=-.36, p < 0.001), and arousal (r=-.33, p < 0.001) symptoms. Rademaker et al.'s data supports that negative affectivity in its entirety is a risk factor for PTSD. In "Predisaster trait anxiety and negative affect predict Posttraumatic Stress in youths after Hurricane Katrina," Costa, Watts, Taylor, and Cannon examined negative affect in children prior to Hurricane Katrina via the Positive and Negative Affect Schedule-Child version (PANAS-C)[41]. Costa et al. claimed that pre-Katrina PANAS-C scores relating to negative affect were significant in predicting elevated post-Katrina PTSD symptoms (β=0.37, p < 0.01). Costa et al.'s results suggest that pretrauma negative affect significantly predicts posttraumatic stress symptoms. Although Costa et al. had a different population of participants in their study, the results are consistent with those of Rademaker et al. and Heinrichs et al., as all three studies determined that pretrauma negative affectivity was a risk factor for PTSD.

Heinrichs et al. also measured pretrauma levels of hostility, a characteristic of negative affect personality, via the Symptoms Checklist-90-Revised (SCL-90-R)[42]. Heinrichs et al. stated that the PTSD score at the 24-month follow up was positively correlated with baseline hostility (r=0.58, df=35, p < 0.001). This shows that high levels of pretrauma hostility predicted higher PTSD symptom scores after trauma exposure. Similarly, in "A prospective study on personality and the cortisol awakening response to predict posttraumatic stress symptoms in response to military deployment," Zuiden et al. claimed that hostility is associated with PTSD risk[43]. Zuiden et al. conducted a study with Dutch Armed Forces soldiers prior to their deployment in Afghanistan and assessed hostility via the Cook-Medley Hostility scale. Zuiden et al. found that in the final model, hostility was significantly associated with PTSD scores after deployment (β=0.211, p < 0.001). Zuiden et al.'s data provides evidence to support that high hostility is significantly and directly related to PTSD scores after deployment. Zuiden et al. noted that aspects of hostility are also PTSD symptoms (post trauma), and explained that even after removing hostility-related items from the PTSD scores,

pretrauma hostility still remained a significant effect on post deployment PTSD scores. Both Heinrichs et al. and Zuiden et al. claimed that high pretrauma hostility is a predictor for PTSD.

Overall, negative affect personality traits, especially low self-efficacy and hostility, should be measured before deployment as a pretrauma risk factor.

6. Prescreening Tests for PTSD Risk Factors

Anxiety, depression, prior trauma exposure, cognitive abilities, and negative affect personality traits should be measured prior to trauma exposure so that individuals with a determined higher risk for developing PTSD can be identified, assessed, and treated post-trauma. Because of accuracy and efficiency, the following tests should be used to screen individuals for risk factors prior to trauma exposure: Beck Depression Inventory-II (BDI-II), Hospital Anxiety and Depression Scale- Anxiety (HADS-A), Life Events Checklist for DSM-5 (LEC-5), Armed Forces Qualification Test (AFQT), Visual Reproduction Test (VR), and the Implicit Positive and Negative Affect Test (IPANAT).

According to David Bienenfeld, a MD at Boonshoft School of Medicine, The Beck Depression Inventory was created by Aaron Beck in 1961 and is the most widely used self-rating scale for depression[44]. Bienenfeld stated that the BDI consists of 21 depression-related symptoms and takes approximately 5-10 minutes to administer. Scores can then be sorted into mild depression, moderate depression, and severe depression. A study conducted by Steer, Cavalieri, Leonard, and Beck found that the Beck Depression Inventory for Primary Care (BDI-PC) yielded 98% clinical efficiency with 97% sensitivity and 99% specificity rates for diagnosing individuals with or without Major Depressive Disorder[45]. Therefore, the BDI-II should be used on a prescreening risk survey to measure pretrauma depression in active duty military personnel.

In "Measures of Anxiety," Laura Julian stated that the Hospital Anxiety and Depression Scale-Anxiety (HADS-A) is a 7 item, 5-minute scale that assesses generalized anxiety and quantifies the magnitude of anxiety symptoms[46]. Julian explained that scores can be categorized by normal or no anxiety, mild anxiety, moderate anxiety, and severe anxiety. Julian claimed that the HADS-A anxiety subscale was supported as a stand-alone measure, and that the HADS-A yielded a sensitivity of 88% and a specificity of 81%. Julian stated that the HADS-A has a higher reliability and validity than the State-Trait Anxiety Inventory (STAI) and the Beck Anxiety Inventory (BAI). Therefore, the HADS-A should be used on a prescreening risk survey to measure pretrauma anxiety in active duty military personnel.

According to the U.S Department of Veteran Affairs, the Life Events Checklist for DSM-5 (LEC-5) is a self-report measure that screens for trauma in an individual's lifetime by assessing 16 events that commonly result in PTSD or distress[47]. The U.S Department of Veteran Affairs explained that a 6-point scale indicates varying levels of exposure for each of these events. The U.S Department of Veteran Affairs stated that, "the LEC demonstrated adequate psychometric properties as a stand-alone assessment of traumatic exposure, particularly when evaluating consistency of events that actually happened to a respondent". In "Psychometric Properties of the Life Events Checklist," Gray, Litz, Hsu, and Lombardo found that the mean kappa coefficient for all items on the checklist was 0.61, and the retest correlation was r=0.82 (p < 0.001)[48]. Therefore, the LEC should be used on a prescreening risk survey to measure prior trauma exposure in active duty military personnel.

The AFQT consists of four sections of the Armed Services Vocational Aptitude Battery: word knowledge, paragraph comprehension, arithmetic reasoning, and mathematics knowledge[49]. The AFQT tests base intelligence level, and is therefore comparable to other widely used IQ tests. The AFQT scores determine eligibility for military enlistment, and therefore is a requirement. Because military personnel are required to take the AFQT test before enlistment, assessing AFQT scores for this prescreening survey will require little to no additional effort. Therefore, the AFQT should be used on a prescreening risk survey to measure pretrauma IQ in active duty military personnel.

According to Hori, Sanjo, Tomita, and Mizusawa, the VR test is a subtest of the Wechsler Memory Scale-IV (WMS-IV) that measures immediate and delayed visual memory[50]. Hori et al. claimed that the VR-II/I with a cutoff score at 50.6% had a sensitivity of 90%, a specificity of 92.3%, a positive prediction value of 90%, and a negative prediction value of 92.3%. The VR test is relatively short, typical involving three pictures that are to be drawn from memory after being observed. The score for the VR test is out of 15 points. Because of accuracy and efficiency, the VR test should be used on a prescreening risk survey to measure pretrauma visual recall in active duty military personnel.

According to Quirin, Kazen, and Kuhl, the IPANAT subjectively examines an individual's various emotions in response to artificial words and these responses are determined to be either implicit positive or negative affect[51]. Quirin et al. stated that the IPANAT is an adequate measure due to internal consistency, test-retest reliability, stability, and construct validity. In "The Implicit Positive and Negative Affect Test: Validity and Relationship with Cardiovascular

Stress-Responses," Ploeg, Brosschot, Thayer, and Verkuil claimed that the IPANAT was reliable, with Cronbach's α = 0.75 for negative affect[52]. Therefore, the IPANAT should be used on a prescreening risk survey to measure negative affect personality in active duty military personnel.

7. Conclusions and Future Study

PTSD is a prevalent issue in deployed military personnel. Many of these veterans are either not aware of their condition or do not receive treatment for PTSD. For these reasons, a prescreening risk survey should be instituted so that active duty military personnel can be assessed for PTSD risk before deployment and high-risk individuals can be identified for treatment after deployment. Based on the research presented in this essay; anxiety, depression, prior trauma exposure, immediate visual recall, IQ, and negative affect personality traits should be assessed as pretrauma risk factors for PTSD. The following tests should be compiled into a prescreening risk survey to assess these factors respectively: HADS-A, BDI-II, LEC-5, VR, AFQT, and IPANAT. In order to create a more extensive prescreening risk survey, biological risk factors should be researched for validity and assessed prior to deployment.

8. Acknowledgements

9. References

1 American Psychiatric Association, What is posttraumatic stress disorder? (2013). Retrieved from https://www.psychiatry.org/patients-families/ptsd/what-is-ptsd

2 U.S. Department of Veterans Affairs, How common is PTSD in women?. Retrieved from https://www.ptsd.va.gov/understand/common/common_women.asp

3 U.S. Department of Veterans Affairs, How common is PTSD in Veterans?. Retrieved from https://www.ptsd.va.gov/understand/common/common_veterans.asp

4 Veterans and military families. Retrieved from https://www.samhsa.gov/veterans-military-families

5 Veterans and military families. Retrieved from https://www.samhsa.gov/veterans-military-families

6 The Veterans Health administration's treatment of PTSD and traumatic brain injury among recent combat veterans. (2012, February 9). Retrieved from https://www.cbo.gov/publication/42969

7 The management of PTSD in adults and children in primary and secondary care. (2005). *National Collaborating Centre for Mental Health, 26*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK56506/

8 Asarnow et al. (1999). When the earth stops shaking: Earthquake sequelae among children diagnosed for pre-earthquake psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 1016-1023. doi:10.1097/00004583-199908000-00018

9 Orr et al. (2012). Predicting post-trauma stress symptoms from pre-trauma psychophysiologic reactivity, personality traits and measures of psychopathology. *Biology of Mood & Anxiety Disorders,* 1-12. https://doi.org/10.1186/2045-5380-2-8

10 Patel et al. (2015). Incidence and risk factors for intensive care unit-related post-traumatic stress disorder in veterans and civilians. *American Journal of Respiratory and Critical Care Medicine, 193,* 1373-1381. doi:10.1164/rccm.201506-1158OC

11 Asarnow et al. (1999). When the earth stops shaking: Earthquake sequelae among children diagnosed for pre-earthquake psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 1016-1023. doi:10.1097/00004583-199908000-00018

12 Orr et al. (2012). Predicting post-trauma stress symptoms from pre-trauma psychophysiologic reactivity, personality traits and measures of psychopathology. *Biology of Mood & Anxiety Disorders,* 1-12. https://doi.org/10.1186/2045-5380-2-8

13 Asarnow et al. (1999). When the earth stops shaking: Earthquake sequelae among children diagnosed for pre-earthquake psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 1016-1023. doi:10.1097/00004583-199908000-00018

14 Orr et al. (2012). Predicting post-trauma stress symptoms from pre-trauma psychophysiologic reactivity, personality traits and measures of psychopathology. *Biology of Mood & Anxiety Disorders,* 1-12. https://doi.org/10.1186/2045-5380-2-8

15 Patel et al. (2015). Incidence and risk factors for intensive care unit-related post-traumatic stress disorder in veterans and civilians. *American Journal of Respiratory and Critical Care Medicine, 193,* 1373-1381. doi:10.1164/rccm.201506-1158OC

16 Patel et al. (2015). Incidence and risk factors for intensive care unit-related post-traumatic stress disorder in veterans and civilians. *American Journal of Respiratory and Critical Care Medicine, 193,* 1373-1381. doi:10.1164/rccm.201506-1158OC

17 Breslau, N., Chilcoat, S., Kessler, R., & Davis, G. (1999). Previous exposure to trauma and PTSD effects of subsequent trauma: Results from the Detroit area survey of trauma. *American Journal of Psychiatry, 156,* 902-907. doi:10.1176/ajp.156.6.902

18 Bremner, J., Southwick, S., Johnson, D., Yehuda, R., & Charney, D. (1993). Childhood physical abuse and combat-related posttraumatic stress disorder in Vietnam veterans. *American Journal of Psychiatry, 150,* 235-239. doi:10.1176/ajp.150.2.235

19 Rademaker, A. R., Zuiden, M., & Vermetten, E., Geuze, E. (2011). Type D personality and the development of PTSD symptoms: A prospective study. *Journal of Abnormal Psychology, 120,* 299-307. doi:0.1037/a0021806

20 Delahanty, D. L. & Nugent, N. R. (2006). Predicting PTSD prospectively based on prior trauma history and immediate biological responses. *Annals of the New York Academy of Sciences, 1071,* 27-40. doi:10.1196/annals.1364.003

21 Patel et al. (2015). Incidence and risk factors for intensive care unit-related post-traumatic stress disorder in veterans and civilians. *American Journal of Respiratory and Critical Care Medicine, 193,* 1373-1381. doi:10.1164/rccm.201506-1158OC

22 Breslau, N., Chilcoat, S., Kessler, R., & Davis, G. (1999). Previous exposure to trauma and PTSD effects of subsequent trauma: Results from the Detroit area survey of trauma. *American Journal of Psychiatry, 156,* 902-907. doi:10.1176/ajp.156.6.902

23 Bremner, J., Southwick, S., Johnson, D., Yehuda, R., & Charney, D. (1993). Childhood physical abuse and combat-related posttraumatic stress disorder in Vietnam veterans. *American Journal of Psychiatry, 150,* 235-239. doi:10.1176/ajp.150.2.235

24 Rademaker, A. R., Zuiden, M., & Vermetten, E., Geuze, E. (2011). Type D personality and the development of PTSD symptoms: A prospective study. *Journal of Abnormal Psychology, 120,* 299-307. doi:0.1037/a0021806

25 Delahanty, D. L. & Nugent, N. R. (2006). Predicting PTSD prospectively based on prior trauma history and immediate biological responses. *Annals of the New York Academy of Sciences, 1071,* 27-40. doi:10.1196/annals.1364.003

26 Bremner, J., Southwick, S., Johnson, D., Yehuda, R., & Charney, D. (1993). Childhood physical abuse and combat-related posttraumatic stress disorder in Vietnam veterans. *American Journal of Psychiatry, 150,* 235-239. doi:10.1176/ajp.150.2.235

27 Marx, B., Doron-Lamarca, S., Proctor, S., & Vasterling, J. (2009). The influence of pre-deployment neurocognitive functioning on post-deployment PTSD symptom outcomes among Iraq-deployed Army soldiers. *Journal of the International Neuropsychological Society, 15,* 840-852. doi:10.1017/S1355617709990488

28 Bryant, B.A, Sutherland, K., & Guthrie, R.M. (2007). Impaired specific autobiographical memory as a risk factor for posttraumatic stress after trauma. *Journal of Abnormal Psychology, 116,* 837-841. doi:10.1037/0021-843X.116.4.837

29 Orr et al. (2012). Predicting post-trauma stress symptoms from pre-trauma psychophysiologic reactivity, personality traits and measures of psychopathology. *Biology of Mood & Anxiety Disorders,* 1-12. https://doi.org/10.1186/2045-5380-2-8

30 Kremen, W.S., Koenen, K.C., Boake, C., Purcell, S., Eisen, S.A., Franz, C.E., …Lyons, M.J. (2007). Pretrauma cognitive ability and risk for Posttraumatic stress disorder. *Archives of General Psychiatry, 64,* 361-368. doi:10.1001/archpsyc.64.3.361

31 Marx, B., Doron-Lamarca, S., Proctor, S., & Vasterling, J. (2009). The influence of pre-deployment neurocognitive functioning on post-deployment PTSD symptom outcomes among Iraq-deployed Army soldiers. *Journal of the International Neuropsychological Society, 15,* 840-852. doi:10.1017/S1355617709990488

32 Bryant, B.A, Sutherland, K., & Guthrie, R.M. (2007). Impaired specific autobiographical memory as a risk factor for posttraumatic stress after trauma. *Journal of Abnormal Psychology, 116,* 837-841. doi:10.1037/0021-843X.116.4.837

33 Orr et al. (2012). Predicting post-trauma stress symptoms from pre-trauma psychophysiologic reactivity, personality traits and measures of psychopathology. *Biology of Mood & Anxiety Disorders,* 1-12. https://doi.org/10.1186/2045-5380-2-8

34 Kremen, W.S., Koenen, K.C., Boake, C., Purcell, S., Eisen, S.A., Franz, C.E., …Lyons, M.J. (2007). Pretrauma cognitive ability and risk for Posttraumatic stress disorder. *Archives of General Psychiatry, 64,* 361-368. doi:10.1001/archpsyc.64.3.361

35 Heinrichs et al. (2005). Predicting posttraumatic stress symptoms from pretraumatic risk factors: A 2-year prospective follow-up study in firefighters. *The American Journal of Psychiatry,162,* 2276-2286. doi:10.1176/appi.ajp.162.12.2276

36 Rademaker, A. R., Zuiden, M., & Vermetten, E., Geuze, E. (2011). Type D personality and the development of PTSD symptoms: A prospective study. *Journal of Abnormal Psychology, 120,* 299-307. doi:0.1037/a0021806

37 Costa, N., Watts, S., Taylor, L., & Cannon, M. (2007). Predisaster trait anxiety and negative affect predict posttraumatic stress in youths after Hurricane Katrina. *Journal of Consulting and Clinical Psychology, 75,* 154-159. doi:10.1037/0022-006X.75.1.154

38 Zuiden, M., Kavelaars, A., Rademaker, A., Vermetten, E., Heijnen, C., & Geuze, E. (2011). A prospective study on personality and the cortisol awakening response to predict posttraumatic stress symptoms in response to military deployment. *Journal of Psychiatric Research, 45,* 713-719. doi:10.1016/j.jpsychires.2010.11.013

39 Heinrichs et al. (2005). Predicting posttraumatic stress symptoms from pretraumatic risk factors: A 2-year prospective follow-up study in firefighters. *The American Journal of Psychiatry,162,* 2276-2286. doi:10.1176/appi.ajp.162.12.2276

40 Rademaker, A. R., Zuiden, M., & Vermetten, E., Geuze, E. (2011). Type D personality and the development of PTSD symptoms: A prospective study. *Journal of Abnormal Psychology, 120,* 299-307. doi:0.1037/a0021806

41 Costa, N., Watts, S., Taylor, L., & Cannon, M. (2007). Predisaster trait anxiety and negative affect predict posttraumatic stress in youths after Hurricane Katrina. *Journal of Consulting and Clinical Psychology, 75,* 154-159. doi:10.1037/0022-006X.75.1.154

42 Heinrichs et al. (2005). Predicting posttraumatic stress symptoms from pretraumatic risk factors: A 2-year prospective follow-up study in firefighters. *The American Journal of Psychiatry,162,* 2276-2286. doi:10.1176/appi.ajp.162.12.2276

43 Zuiden, M., Kavelaars, A., Rademaker, A., Vermetten, E., Heijnen, C., & Geuze, E. (2011). A prospective study on personality and the cortisol awakening response to predict posttraumatic stress symptoms in response to military deployment. *Journal of Psychiatric Research, 45,* 713-719. doi:10.1016/j.jpsychires.2010.11.013

44 Bienenfeld, D. & Stinson, K. (2016). Screening tests for depression. Retrieved from https://emedicine.medscape.com/article/1859039-overview#a1

45 Steer, R., Cavalieri, T., Leonard, D., & Beck, A. (1999). Use of the Beck depression inventory for primary care to screen for major depression disorders. *General Hospital Psychiatry, 21,* 106-111. doi:10.1016/S0163-8343(98)00070-X

46 Julian, L. (2011). Measures of anxiety. *Arthritis Care & Research, 63,* 1-11. doi:10.1002/acr.20561.

47 Weathers, F.W., Blake, D.D., Schnurr, P.P., Kaloupek, D.G., Marx, B.P., & Keane, T.M. (2013). The life events checklist for DSM-5 (LEC-5). Retrieved from https://www.ptsd.va.gov/professional/assessment/te-measures/life_events_checklist.asp

48 Gray, M., Litz, B., Hsu, J., & Lombardo, T. (2004). Psychometric properties of the life events checklist. *Assessment, 11*, 330-341. doi: 10.1177/1073191104269954

49 What is the AFQT test?. Retrieved from https://afqttest.com/what-is-the-afqt-test/

50 Hori, T., Sanjo, N., Tomita, M., & Mizusawa, H. (2013). Visual reproduction on the Wechsler memory scale-revised as a predictor of Alzheimer's disease in Japanese patients with mild cognitive impairments. *Dementia and Geriatric Cognitive Disorders, 35,* 165-176. https://doi.org/10.1159/000346738

51 Quirin, M., Kazen, M., Kuhl, J. (2009). When nonsense sounds happy or helpless: The implicit positive and negative affect test. *Journal of Personality and Social Psychology, 97,* 500-516. doi: 10.1037/a0016063

52 Ploeg, M., Brosschot, J., Thayer, J., Berkuil, B. (2016). The implicit positive and negative affect test: Validity and relationship with cardiovascular stress-responses. *Frontiers in Psychology, 7,* 1-16. doi:10.3389/fpsyg.2016.00425