

PROTECTING NEWLY DEPLOYED TROOPS FROM PTSD:
THE ROLE OF PREPAREDNESS

by

KATHLEEN GIBLIN RAY

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ABSTRACT OF THE DISSERTATION

PROTECTING NEWLY DEPLOYED TROOPS FROM PTSD: THE ROLE OF PREPAREDNESS

By KATHLEEN GIBLIN RAY

Dissertation Director:
N. Andrew Peterson, Ph.D.

Posttraumatic stress disorder (PTSD) is a serious problem in the military that negatively affects veterans, their families, and military readiness. Previous studies on PTSD have found that veterans who served in Operation Enduring Freedom and Operation Iraqi Freedom have both risk factors and protective factors that contribute to the development of symptoms of PTSD but little is known on how or if these factors interact to prevent the development of symptoms of PTSD. This study used a hierarchical multiple regression to test the curvilinear moderating relationship of combat exposure on the relationship between military preparedness and the development of symptoms of PTSD in a sample of 418 veterans seen for evaluation at the New Jersey War Related Injury and Illness Center. Using Inoculation theory as a conceptual framework, this study examined the main and interaction effects of military preparedness and combat exposure on the development of symptoms of PTSD. This was the first study to test this relationship. Statistical analyses were conducted using SPSS and included descriptive analyses and hierarchical multiple regression.

The results of this study demonstrated that 42% of the veterans in this sample had symptoms of PTSD. Both military preparedness and combat exposure predicted the development of PTSD but in opposite directions and in separate pathways. As military preparedness increased, the development of symptoms of PTSD decreased while an increase of combat exposure increased the development of symptoms of PTSD. There was no interaction between the two main variables examined in this study. It was also found that one deployment was more likely to predict the development of symptoms of PTSD than multiple deployments. Combat exposure, however, was not found to moderate the relationship between military preparedness and the development of symptoms of PTSD.

These results suggest opportunities to create appropriate PTSD prevention strategies prior, during and after deployment to service members. Practical implications include improving military preparedness in PTSD prevention programs, monitoring of impact of combat exposure, and expanding social work interventions to support service members' transition to civilian life.

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This dissertation is dedicated to the men and women in our armed services who selflessly serve our country.

TABLE OF CONTENTS

Number	Page
ABSTRACT OF DISSERTATION	I
ACKNOWLEDGEMENTS	III
CHAPTER 1: INTRODUCTION	
STATEMENT OF REASEARCH PROBLEM	1
RATIONALE FOR PROBLEM CHOICE	5
THEORETICAL FRAMEWORK FOR STUDY	7
HYPOTHESIS	7
PRACTICAL IMPLICATIONS FOR SOCIALWORK	9
PURPOSE OF THE STUDY	11
RESEARCH QUESTIONS	12
CHAPTER 2: LITERATURE REVIEW	
PTSD IN THE OEF/OIF VETERAN POPULATION	14
PTSD	14
IMPLICATIONS OF PTSD FOR SERVICE MEMBERS	16
ISSUES CONFRONTING OEF/OIF VETERANS	17
PTSD AND INCOME AND UNEMPLOYMENT	17
PTSD AND HOMELESSNESS	18
PTSD AND SUBSTANCE ABUSE	18
PTSD AND FAMILY PROBLEMS	19
PTSD AND SUICIDE	20
MECHANISMS OF PTSD	20
PTSD RISK FACTORS	22
COMBAT EXPOSURE AS A RISK FACTOR OF PTSD	25
PROTECTIVE FACTORS OF PTSD	25
PREPAREDNESS	26
VARIABLE RELATED TO PTSD IN A POTENTIALLY NONLINEAR FASHION	27
APPROPRIATENESS OF CURVILINEAR RELATIONSHIP FOR STUDY	31
MCGUIRE’S INOCULATION THEORY	34
SUMMARY	39
CHAPTER 3: RESEARCH DESIGN & METHODS	
DESIGN	40
DATA	40
SAMPLE	41

OVERALL ALL STUDY PLAN	42
AIMS OF THE STUDY	42
MEASURES	42
VARIABLES	42
CRITERION VARIABLES	42
PREDICTOR VARIABLES	43
COVARIATES	46
ANALYTIC STRATEGIES	46
CHAPTER 4: RESULTS	50
GENERAL RESULTS	50
AIM 1 RESULTS	51
AIM 2 RESULTS	52
AIM 3 AND 4 RESULTS	54
CHAPTER 5: DISCUSSION	57
RELATIONSHIP BETWEEN COMBAT EXPOSURE AND PTSD	60
RELATIONSHIP BETWEEN MILITARY PREPAREDNESS AND PTSD	62
RELATIONSHIP OF COVARIATES	66
RELATIONSHIP OF RESULTS WITHIN INOCULATION FRAMEWORK	69
OPPORTUNITY FOR SOCIAL WORK	72
IMPACT ON SOCIAL WORK	75
SOCIAL WORK EDUCATION	75
SOCIAL WORK PRACTICE	77
SOCIAL WORK POLICY	77
STRENGTH OF STUDY	77
LIMITATION OF THE STUDY	78
IMPLICATIONS FOR FUTURE RESEARCH	79
APPENDIX A. DESCRIPTION OF MILITARY PREPAREDNESS QUESTIONS	93
APPENDIX B. DESCRIPTION OF COMBAT EXPOSURE QUESTIONS	94
REFERENCES	95

LIST OF TABLES

Table 1.	Correlations between military preparedness question.....	81
Table 2.	Correlations between combat exposure questions.....	82
Table 3.	Descriptive statistics of sample.....	83
Table 4.	Characteristics of study cohort.....	84
Table 5.	Means, standard deviations and intercorrelations of military preparedness questions and PTSD.....	85
Table 6.	Regression analysis summary of military preparedness variables and PTSD.....	86
Table 7.	Means, standard deviations and intercorrelations of combat exposure questions and PTSD.....	87
Table 8.	Regression analysis summary of combat exposure questions PTSD.....	88
Table 9.	New characteristics of study cohort (with recoded variables).....	89
Table 10.	Descriptive statistics and correlation among military preparedness, combat exposure, deployments and demographic variables.....	90
Table 11.	Summary of regression analysis predicting the development of symptoms of PTSD.....	91

LIST OF FIGURES

Figure 1.	Hypothesized relationship between military preparedness and the development of symptoms of PTSD at low combat levels.....	8
Figure 2.	Hypothesized relationship between military preparedness and the development of symptoms of PTSD at moderate combat levels.....	8
Figure 3.	Hypothesized relationship between military preparedness and the development of symptoms of PTSD at high combat levels.....	9
Figure 4.	Hypothesized moderating relationship of combat exposure on the Relationship between military preparedness and the development of symptoms of PTSD.....	9
Figure 5.	Regression line of military preparedness and the development of symptoms of PTSD.....	52
Figure 6.	Regression line of combat exposure and the development of symptoms of PTSD.....	53

Chapter 1: Introduction

Statement of research problem

The United States invaded Afghanistan on October 7, 2001, and Iraq on March 20, 2003 and has since deployed approximately two million troops (Tanielian & Jaycox, 2008). There have been 1,353,627 soldiers who have separated from active duty and are eligible for health care through the Department of Veterans Affairs (VA) since from 2002 through the third quarter of fiscal year 2011. Currently, there are 711,986 veterans, approximately 53%, who have received health care at the VA (Veterans Health Care Administration, 2011). These veterans often have long and multiple deployments with short dwell time (i.e. rest periods in between deployments). It was estimated that approximately 14% of our veterans from Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) have a diagnosis of posttraumatic stress disorder (PTSD), with some studies reporting the prevalence of PTSD among Iraq veterans may be as high as one in five (Castro, 2009; Hoge et al., 2004) and other studies reporting rates between 9-38 % (Grieger, Kolkow, Spira, & Morse, 2007; Hoge et al., 2004; Hoge et al., 2006; Hoge, Auchterlonie, & Milliken, 2006; Thomas, Wilk, Riviere, McGurk, Castro., & Hoge, 2010; Vasterling, Proctor, Friedman, Hoge, Heere, King, & King, 2010). The psychological toll on our current service members was disproportionately high compared to the physical injuries of combat in these conflicts (Tanielian & Jaycox, 2008). PTSD has been associated with poor health (Hoge, Terhakopian, Castro, Messer, & Engel, 2007; Tanielian & Jaycox, 2008), substance abuse (Tanielian & Jaycox, 2008), suicidal ideation and suicide (Pietrzak, Johnson et al., 2010; Tanielian & Jaycox, 2008), homelessness (Schnurr, Lunney, Bovin, & Marx, 2009), unemployment (Prigerson,

2001), incarceration and other high risk behaviors (Hartl, Rosen, Drescher, Lee, & Gusman, 2005), and increased medical costs (Tanielian & Jaycox, 2008). Disability payments to veterans with PTSD have grown 148.8% from 1999 to 2004 (Tanielian & Jaycox, 2008) and it was estimated that the 2-year PTSD and depression-related costs could range from \$ 4.0 to \$6.2 billion (Tanielian & Jaycox, 2008).

PTSD is a diagnosis that includes the development of symptoms following exposure to an extreme traumatic stress (American Psychological Association, 2000). Symptoms include re-experiencing of the event (images, thoughts, dreams, and flashbacks) and psychological distress and/or physiological reactivity to internal or external cues that symbolize or resemble actual trauma or aspect of the trauma (American Psychological Association, 2000) Symptoms also include avoidance and/or numbing of stimuli associated with trauma. There can also be a physical component of increased arousal. These symptoms must be present for more than one month and cause significant distress or impairment in social, occupational, or other important areas of functioning. PTSD can occur within 30 days of a trauma but can also occur even years after the trauma. Duration of symptoms can vary from three months to a lifetime and is treated with medication, counseling and more recently with alternative and complementary medicine (CAM) such as acupuncture, meditation and yoga (Hankey, 2007).

The research on veterans with PTSD from OEF/OIF is just emerging. The established research focused on treatment models of PTSD and reduction of disability from PTSD post deployment (Hourani, Council, Hubal, & Strange, 2011). Some studies examined the individual risk and protective characteristics of veterans who develop

PTSD (Pietrzak, Goldstein, Malley, Rivers & Johnson., 2010; Pietrzak, Johnson, Goldstein, Malley, Rivers & Morgan, 2010). There was scant research on the interaction of risk and protective factors and the development of PTSD (Renshaw, 2011), and there was almost no research on prevention of PTSD in this population, although many new programs have been funded to explore prevention efforts (Hourani et al., 2011). Prior research on the prevention of PTSD has focused on prevention measures to lessen symptoms of PTSD through psychotherapy, exposure therapy and pharmacotherapy after trauma has occurred (Ballenger, Davidson, & Lecrubier, 2006). Some prevention approaches utilizing early intervention for soldiers and veterans viewed to be at risk have also been examined(Litz, 2008). There has been an effort by U.S. Department of Defense (DoD) (The DoD is the government agency that oversees activity duty military) to fund research programs to investigate the prevention of PTSD on its Army, Navy, Air Force and Marine personnel (Veterans Administration, 2007; Figley & Nash, 2007; Keane, Marshal, & Taft, 2006; Kennedy & Zillmer, 2006). These programs have yet to be evaluated. The development of PTSD has more than one pathway (Feldner, Monson, & Friedman, 2007); therefore, it was necessary to research different pathways to gain knowledge on how to best understand the development of PTSD and to possible prevent PTSD in our veterans.

This study examined the relationship between military preparedness, combat exposure and the development of symptoms of PTSD. This study tested a curvilinear interaction to explain the inconsistent bivariate associations between measures of preparedness and the development of symptoms of PTSD. Combat exposure was used as a moderating variable in this study.

Research in disaster preparedness, defined as if the participant took any precautions from attacks, such as planning escape routes, establishing communication plans or stockpiling food or supplies, demonstrated that preparedness was able to inoculate or buffer citizens from effects of trauma when confronted by a stressful situation, i.e., fires, natural disasters (Boscarino, Adams, Figley, Galea, & Foa, 2006). It has also been found in the disaster preparedness literature that emergency responders do not always develop symptoms of PTSD when presented with a stressful situation (Marmar, McCaslin, Metzler, Best, Weiss & Aniel, 2006). It was not clear why some responders developed symptoms of PTSD and others did not. The military literature has similar results; some veterans developed symptoms of PTSD while others did not (Hoge et al., 2006). It has been found that combat exposure was correlated with the development of PTSD (Hoge, Terhakopian, Castro, Messer & Engel, 2007) and military preparedness was correlated with lower levels of PTSD (Pietrzak, Whealin, Stotzer, Goldstein, & Southwick, 2011). Yet, it was unclear if there was a relationship between the two variables. It was also interesting that some veterans developed PTSD without deploying at all; therefore, not experiencing any combat exposure (Kline, Falca-Donson, Sussner, Ciccone, Chandler & Callahan, 2010). Also, National Guard veterans were more likely to develop PTSD than veterans who served as active duty service members (active duty veterans) despite more combat exposure experienced by active duty veterans (Vasterling, Proctor, Friedman, Hoge, Heeren & King, 2010). It appeared that the relationship between combat exposure and PTSD most likely involved other variables. Examining the variables that may influence the relationship between combat exposure

and PTSD was helpful to create prevention efforts as well as treatment options for the veterans.

This study was framed by William McGuire's inoculation theory (McGuire, 1961), which was developed in the 1960's to examine a hypothesized relationship between combat exposure and military preparedness to predict the development of symptoms of PTSD. Looking at the possible relationship between military preparedness and combat exposure using McGuire's inoculation theory, it was expected that military preparedness would not inoculate or protect veterans from the development of PTSD at both low levels of combat exposure or high levels of combat exposure but only at mid-levels of combat exposure.

This study extended our knowledge of PTSD in the OEF/OIF veteran population in two ways. First, it offered a model of the interaction between combat exposure and military preparedness protective to predict the development of symptoms of PTSD and second, this study applied an alternative theory that may lay the framework for possible prevention models. Guided by inoculation theory by McGuire (1961), this study examined the relationship between military preparedness and combat exposure to predict the development of symptoms of PTSD.

Rationale for problem choice

Prevalence. It was estimated that approximately 250,000 of the servicemen and women from OEF/OIF suffered from PTSD (Tanielian & Jaycox, 2008). The cost of PTSD occurred at the individual, family, and the community level. The veteran suffering from PTSD was more likely to be unemployed, homeless, substance abuse, have multiple medical problems, and was more likely to commit suicide (Tanielian & Jaycox, 2008).

Impact of PTSD on Families of Veterans. The family of the veteran who experienced PTSD suffered as well. Galovski & Lyons (2004) found that there was a disruptive effect of a veteran's PTSD on the veteran's marriage, his/her children rearing practices, and the children's development. The relationship between the veteran and spouse often suffered from the emotional numbing and withdrawal that often was displayed post deployment. Among veterans with PTSD, there was a high rate of divorce (Shea, Vujanovic, Mansfield, Sevin, & Liu, 2010a), a low rate of marital satisfaction (Monson, Taft, & Fredman, 2010), and an increase in intimate partner violence (Finley, Baker, Pugh, & Peterson, 2010; Teten et al., 2010). There can be a secondary trauma to the children of veterans who suffered from PTSD (Rosenheck & Fontana, 1998) including behavior problems (Kulka, Schlenger, Fairbank, Hough, Jordan and Marmar 1998) and symptoms of psychopathology (Jacobsen, Sweeney, & Racusin, 1993). A study found that the children of veterans with PTSD had a decrease in academic performance, fragile peer relations, and problems with affect regulation (Harkness, 1991). Veterans with PTSD had a tendency to over react and over protect their children in their child rearing practices (Galovski & Lyons, 2004).

Economic Cost of PTSD. It was estimated that on a per-cost basis, two-year cost association with PTSD were approximately \$5,904 to \$10,298 (Tanielian & Jaycox, 2008). These costs did not include current and potential costs from substance abuse, domestic violence, homelessness, and family problems. Prior to January 2008, the VA provided OEF/OIF veterans two years of military service-related health care dating from service separation. In January, 2008, Congress extended these benefits to five years post discharge (110th Congress, 2008). In order to receive care from VA healthcare facilities,

veterans needed to enroll for the benefits. It was estimated that 41% of separated OIF and OEF veterans eligible for VA health care have enrolled in the VA since 2002 (Kang, 2008). A more recent report found that this percentage had risen to 53% (Veterans Health Administration, Office of Public Health, September 2011). This was an historic high for the VA as only 10% of Vietnam veterans were enrolled (Kulka, et al., 1998) and this increase in enrollment was increasing making the VA the single largest health care provider for OIF and OEF veterans (Kang, 2008). Currently, targeted mental health services and identification of high-risk subgroups of OEF/OIF veterans were being provided (Hourani et al., 2011). The goal of this study was to test if combat exposure modifies the relationship between military preparedness and the development of symptoms of PTSD.

Theoretical framework for study

This study used William McGuire's Inoculation theory (McGuire, 1961) as the framework of the interactional model examining the relationship between combat exposure and military preparedness to predict the development of PTSD. McGuire's Inoculation theory offered an explanation of how beliefs and attitudes change and how to maintain original beliefs and attitudes consistent in the face of threat or persuasion. The theory followed the logic of vaccination; the body is injected with a small amount of a disease (stress in McGuire's theory), just enough to activate the body's antibody production, thus protecting the body from actually developing the disease. This theory had been used in varied contexts including marketing (Compton & Pfau, 2005), politics (Pfau, 1992) and health campaigns (Pfau & Van Bockern, 1994). The theory suggested a curvilinear relationship (U-shaped) between original thoughts and beliefs and a possible

stress that could change that belief. If there were no stress to the belief system, the belief is weak. If a stress was introduced, the belief was strengthened. Further, if the threat was too strong and without warning, the threat could overwhelm the belief system and the defenses did not have the opportunity to activate. McGuire's Inoculation theory provided a framework for a curvilinear relationship between military preparedness and combat exposure to predict the development of symptoms of PTSD.

Hypothesis

The first hypothesis of this study was that combat exposure would not moderate the relationship between military preparedness and the development of symptoms of PTSD at low combat exposure (see figure 1). The next hypothesis is that combat exposure would moderate the relationship between military preparedness and the development of symptoms of PTSD at moderate combat exposure (see figure 2), whereby decreasing the development of symptoms of PTSD with higher levels of military preparedness. At high levels of combat exposures, combat exposure would not moderate the relationship between military preparedness and the development of symptoms of PTSD (see figure 3). Therefore, the overall hypothesis of this study was that combat exposure would moderate the relationship between military preparedness and the development of symptoms of PTSD in a curvilinear manner (see figure 4).

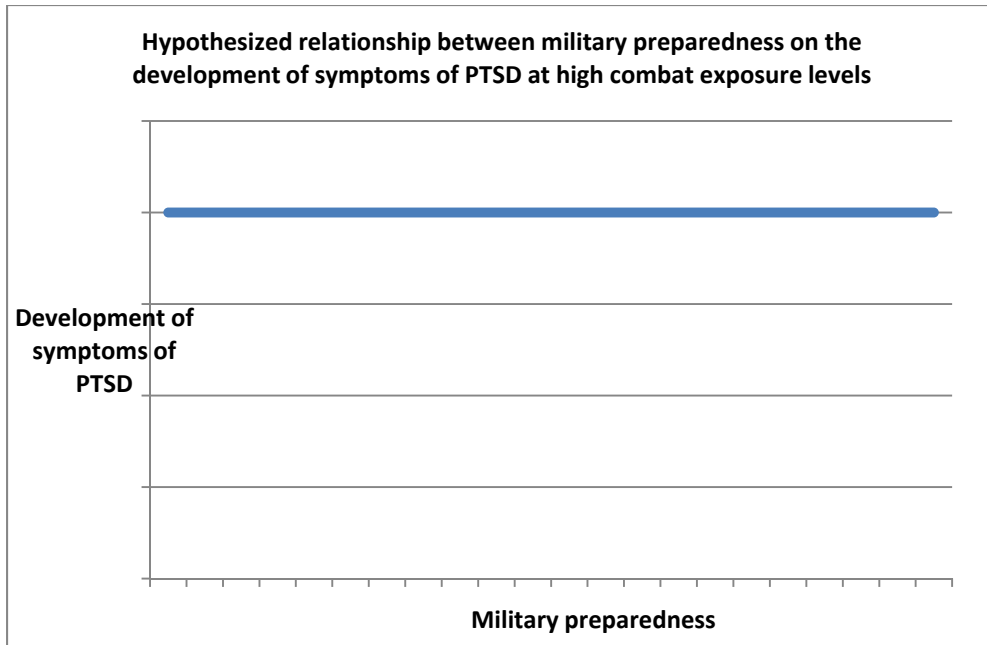


Figure 1. Hypothesized relationship between military preparedness and the development of symptoms of PTSD at low combat exposure levels

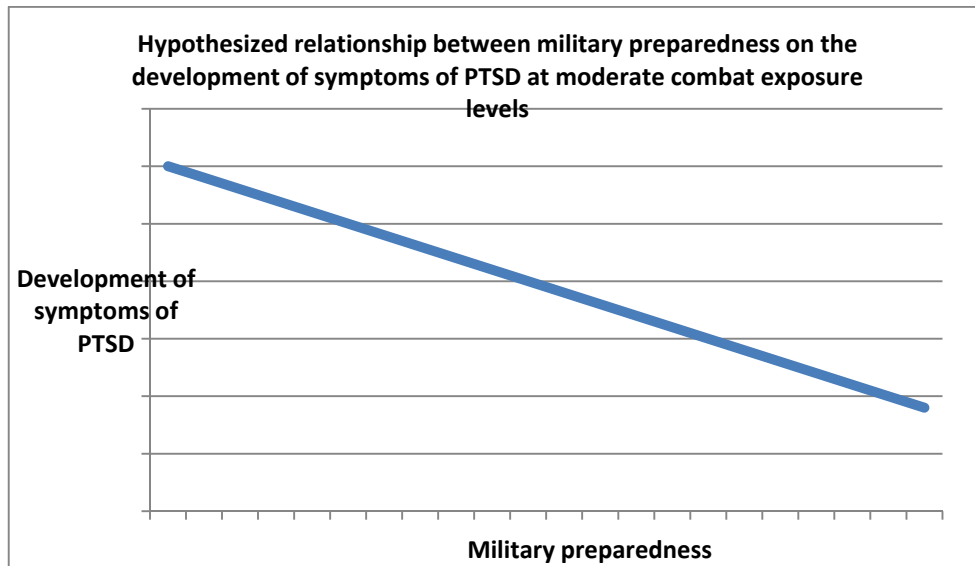


Figure 2. Hypothesized relationship between military preparedness and the development of symptoms of PTSD at moderate combat exposure levels.

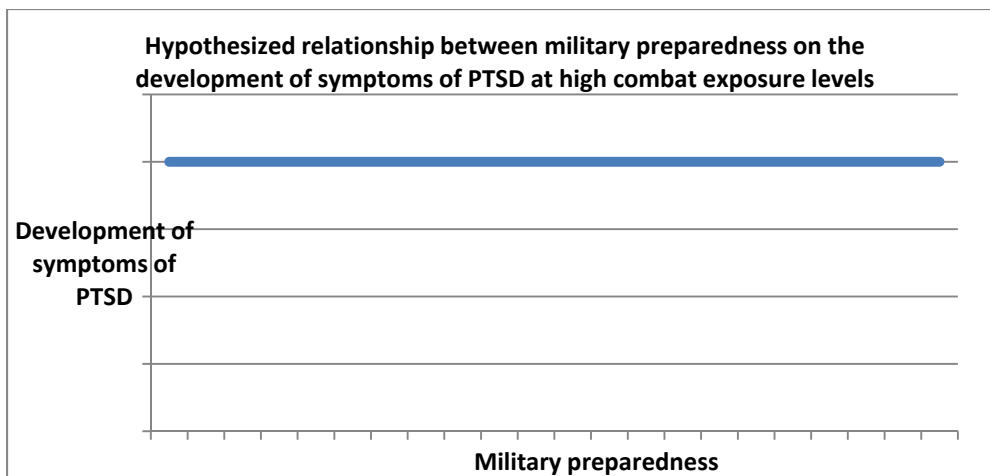


Figure 3. Hypothesized relationship between military preparedness and the development of symptoms of PTSD at high combat exposure levels

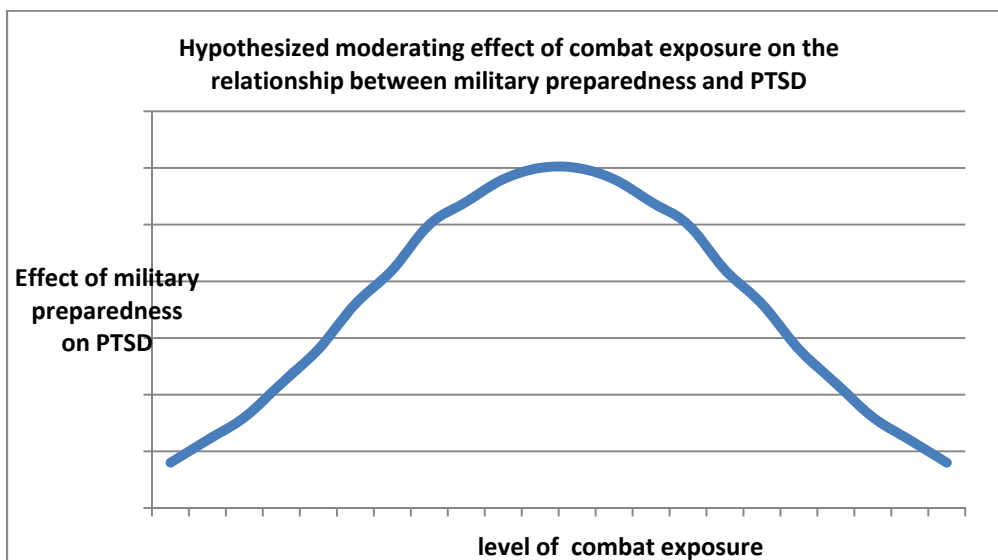


Figure 4. Hypothesized moderating effect of combat exposure on the relationship between combat exposure and PTSD

Practical implications for social work

This study had implications for social work at the practice, policy, education, and research levels. This study provided information about the possible pathways for the development of symptoms of PTSD that could be translated into an intervention strategy prior to deployment, during deployment and post deployment. The results in this study

contributed to a new understanding of impact of military preparedness and the development of symptoms of PTSD. The majority of the research studies in the social work literature looked at PTSD from a treatment access view (Sayers, Farrow, Ross, & Oslin, 2009), ecological factors to predict PTSD (Benda & House, 2003; Ruef, Litz, & Schlenger, 2000), the impact of PTSD on interpersonal problems (Roberts, Penk, Gearing, Robinowitz, Dolan, & Patterson., 1982), and the impact of PTSD on self-esteem (Kashdan, Uswatte, Steger, & Julian, 2006). There was a growing interest in prevention models. For effective prevention models to be created, variables that are associated with development of symptoms of PTSD and identification of the mechanism that contribute to the development of symptoms of PTSD must be identified. Given the high prevalence rates of PTSD in the OEF/OIF population and the effect on the family members of the veteran, social workers, who work with service members and veterans, must understand the development of PTSD and its precipitating factors.

Interestingly, there was no research about the contribution of social work on the understanding of the development of symptoms of PTSD. Information learned in this study may provide an opportunity for social work to play an active role in policy making around the preparation and support of our troops and their families. Most of the discussion surrounding PTSD in social work education is primarily around sexual and childhood abuse (Patten, Gatz, Jones, & Thomas, 1989). There was a beginning effort to expand the education of social workers around PTSD post trauma, especially in the wake of 9/11 (Gelman & Mirabito, 2010). Previously, PTSD from military trauma had been neglected in social work education, as the United States was not actively engaged in war for many years. Most research in social work had been about PTSD regarding trauma

sustained during the Vietnam War and PTSD from intimate partner violence (Coker, Weston, Creson, Justice, & Blakenay, 2005). A more comprehensive understanding of the development of PTSD in our current veteran population was essential for practice, policy and education of social work. Many social workers are at the front line of treatment of veterans and their families and their ability to understand the interaction of risk and protective factors of PTSD will help them provide effective treatment. A goal of this study was to have social work part of the research community that examines the interaction of risk and protective factors in the development of symptoms and how that information is used in prevention models.

Purpose of the Study

The purpose of this study was to examine the relationships between military preparedness and combat exposure and the development of symptoms of PTSD and to test if combat exposure had a moderating effect on the relationship between military preparedness and the development of symptoms of PTSD in returning veterans from Iraq and Afghanistan. This study used a sample of 418 veterans seen at the War Related Injury and Illness Center (WRIISC) at the New Jersey VA Healthcare System-East Orange, NJ in a secondary data analyses. This dataset contained information on both risk and protective factors and afforded the opportunity to examine a new model of interaction of military preparedness and combat exposure to predict the development of symptoms of PTSD. This dataset allowed the application of an alternative theoretical framework to explain the interaction model. To date, there have been no analyses conducted on these data on the interaction between military preparedness and combat

exposure to predict the development of symptoms of PTSD. IRB approval for this study was obtained from both Rutgers University and the Veterans Administration.

Research Questions

1. What was the relationship between military preparedness and the development of symptoms of PTSD in the OEF/OIF veteran population from the NJ WRIISC database?
 - A. What type of military preparedness best immunized the veteran from the development of symptoms of PTSD in this sample?
2. What was the relationship between combat exposure and the development of symptoms of PTSD in this sample?
 - A. What type of combat exposure best predicted the development of symptoms of PTSD in this sample?
3. Was there a moderating effect of combat exposure on the relationship between of military preparedness and the development of symptoms of PTSD in a curvilinear manner in this sample?
4. What was the impact of number of deployments and the development of symptoms of PTSD?

Chapter 2: Literature Review

PTSD In the OEF/OIF Veteran Population

The United States invaded Afghanistan on October 7, 2001, and Iraq on March 20, 2003 and had since deployed over 2 million troops (Tanielian & Jaycox, 2008). These troops often had long and multiple deployments with short dwell time (i.e. rest periods in between deployments). Post 9/11, deployed troops have had their tours extended, and as of June 2008, more than 638,000 troops had been deployed more than once (Tanielian & Jaycox, 2008). The number of deployments was significantly associated with post deployment PTSD (Cohen, Marmar, Ren, Bertenthal, & Seal, 2009; Phillips, LeardMann, Gumbs, & Smith, 2010) but increased number of deployments also increased the chance of combat exposure. PTSD was a significant and multifaceted issue for OEF/OIF service members. Current reports have estimated PTSD rates at 14% for this population (Tanielian & Jaycox, 2008), though other studies reported rates that fell between 9-38 % (Grieger et al., 2007; Hoge et al., 2004; Hoge et al., 2006; Hoge et al., 2006; Thomas, Wilk, Riviere, McGurk., Castro, & Hoge, 2010; Vasterling et al., 2010) and PTSD among Iraq veterans may be as high as one in five (Castro, 2009; Hoge et al., 2004).

PTSD

Historically, soldiers returning from war, who were suffering from psychological distress, had been diagnosed as having soldier's heart, railway spine, shell shock, war neurosis, combat fatigue, and battle shock, depending on the particular time period (Tanielian & Jaycox, 2008). In recent years, soldiers were diagnosed as having PTSD. The first major study looking at the trauma associated with combat, called physioneurosis

was in 1941 by Kardiner, who studied the impact of extreme trauma on psychological functioning from survivors of World War II death and prisoner camps (Tanielian & Jaycox, 2008). In 1968, the concept of combat fatigue trauma was included in the 2nd edition of the Diagnostic and Statistical Manual of Mental Disorders under the category of transient situational disturbances (American Psychological Association, 2000). By the mid-1970s, veterans of the Vietnam War who experienced trauma were being hospitalized and diagnosed with schizophrenia or other psychotic disorders. Simultaneously, civilian clinicians working with non-military sexual assault survivors identified similar psychological patterns that military clinicians were observing in the veterans.

By 1980, PTSD was defined and added to the DSM-III. The current definition of PTSD used by the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-4), is coded as 309.81 Posttraumatic Stress Disorder. A person with this diagnosis has been exposed to a traumatic event in which of the both of the following have been present: (A) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others ;(B) the person's response involved intense fear, helplessness, or horror. The traumatic event is persistently re-experienced in one (or more) of the following ways: (1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions, (2) recurrent distressing dreams of the event, (3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated), (4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event, and (5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.; (C) persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following: (1) efforts to avoid thoughts, feelings, or conversations associated with the trauma, (2) efforts to avoid activities, places, or

people that arouse recollections of the trauma, (3) inability to recall an important aspect of the trauma, (4) markedly diminished interest or participation in significant activities, (5) feeling of detachment or estrangement from others, (6) restricted range of affect (e.g., unable to have loving feelings), and (7) sense of a foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span); (D) persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following: (1) difficulty falling or staying asleep, (2) irritability or outbursts of anger, (3) difficulty concentrating, (4) hypervigilance; and (5) exaggerated startle response. Duration of the disturbance (symptoms in Criteria B, C, and D) is more than one month. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning (American Psychological Association, 2000).

PTSD was represented by clear psychological and physical symptoms. PTSD often co-occurred with substance abuse, depression, and mental health issues including cognition and memory, and problems with physical health. It was also associated with family or social life difficulties including marital problems, occupational instability, parenting difficulties and family discord (Kinchin, 2004).

Implication of PTSD for Service Members

PTSD among the military had implications for both the service members as well as for the nation. For service members, PTSD had long-lasting mental and physiological effects that took considerable resources to treat. In fact, treating PTSD can become quite burdensome for the federal government. A 2005 investigation by the VA Office of the Inspector General found that the number of beneficiaries receiving compensation for PTSD increased significantly during fiscal years 1999–2004, growing by 79.5 percent (120,265 cases in 1999 to 215,871 cases in 2004) with PTSD payments increasing by 148.8 percent from \$1.72 billion to \$4.28 billion dollars (Miller, Wolf, Martin, Kaloupek, & Keane, 2008). Given the number of diagnosed veterans, the complexity of

the illness and the associated costs, identifying pathways leading to the occurrence of PTSD symptoms became crucial to understanding the possible relationship between preparedness and combat exposure in predicting PTSD.

Issues Confronting OEF/OIF Veterans

PTSD has been associated with poor health (Hoge et al., 2007; Tanielian & Jaycox, 2008), substance abuse (Tanielian & Jaycox, 2008), suicidal ideation, and suicide (Pietrzak, Johnson et al., 2010; Tanielian & Jaycox, 2008), as well as homelessness (Schnurr et al., 2009), unemployment (Prigerson, 2001), incarceration and other high risk behaviors (Hartl et al., 2005), and increased medical costs (Tanielian & Jaycox, 2008). The psychological toll on our current service members is disproportionately high compared to the physical injuries of combat in these conflicts (Tanielian & Jaycox, 2008). Further, each of these issues increases the likelihood that the veteran may have a lower quality of life and become part the criminal justice system. These issues may be either the outcomes or be exacerbated by PTSD.

PTSD and Income and Unemployment

In addition to the social issues that veterans are struggling with, they are also struggling with obtaining and maintaining employment. In fact, the United States Bureau of Labor Statistics (November 2005) reported that for the first three quarters of 2005, around 15% of veterans aged between 20 and 24 years were jobless, which reflects a picture 3 times the national average. The Associated Press (2007) reported that of those veterans who searched for employment within 1 to 3 years after discharge, close to 18% were unemployed in 2007. One reason offered was that the employers were anxious about the veteran's mental status. For the veterans who were able to secure employment,

25% of the veterans earned less than \$21,850 each year (Associated Press 2007). Since mental health status was implicated in the hesitancy of some employers to not hire veterans, reduction of the incidence of PTSD may have an overall positive effect on employment rates for this population.

PTSD and Homelessness

As veterans struggled with PTSD; issues such as employment or underemployment and incidences of homelessness may rise (Edens, Kaspro, Tsai, & Rosenheck, 2011; Schnurr et al., 2009). The United States Veteran Affairs had determined the number of homeless veterans to be 155,000, though others estimate that 300,000 veterans are homeless on any given night (National Alliance to End Homelessness, 2007). The discrepancy between these numbers can be attributed to the fact that many homeless veterans are not enrolled in VA databases and therefore do not receive VA services and subsequently are not counted in reports. Veterans are also more likely than those in the general population to become homeless. Of all homeless people, 23% are veterans (U.S Census Bureau, 2006). As veterans account for only 7% of the US population, it seems that veterans are more likely to become homeless than their non-veteran peers (U.S Census Bureau, 2006).

PTSD and Substance Abuse

Substance abuse is a challenge for mental health professionals providing treatment for OEF/OIF veterans (Bernhardt, 2009). Alcohol use and abuse is also high in the OEF/OIF veteran population. Twenty-four percent of returning OEF/OIF veterans responded “yes” when asked if they “used alcohol more than they meant to?” (Hoge et al., 2004). In a study of OEF/OIF veterans in a substance abuse program, it was found

that 30% also screened positively for PTSD (Seal et al., 2008). Despite this high number, many OEF/OIF veterans who are dually diagnosed with substance abuse and PTSD avoid treatment. Hoge (2006) reports that only 38-40% of dually diagnosed OEF/OIF veterans indicate an interest in receiving help and less will actually apply or participate in programs. For the veterans that are dually diagnosed and who do seek care, their prognoses are poorer than a veteran with only one of the diagnoses (Hien, Nunes, Levin, & Fraser, 2000).

PTSD and Family Problems

Service members and veterans often had difficulty readjusting to civilian life (Lester, Peterson, Reeve, Knauss, Glover, Mogil, & Beardslee, 2010) and this can often lead to difficulties in spousal relationships as well as experiencing emotional and academic problems for their children (Rentz, Marshall, Loomis, Casteel, Martin, & Gibbs, 2007). This includes possible violence towards the service member's partners and children (Sayers, et al., 2009). Sayers (2009) found that recently returned OEF/OIF veterans with a diagnosis of either PTSD or depression were five times more likely to have family readjustment problems. Another problem facing our service members, their families, and society at large is violence. A study of on army soldiers who were reassessed post deployment found incidents of soldiers engaged in spousal aggression and anger problems increased from 12 percent to 23 percent after deployment, and those scheduling to divorce their spouse has increased from 10% to 16% after the deployment of combat (Miliken, Auchterlonie, & Hoge, 2007). Divorce rates of deployed service members have increased by 32% from 2001 (Rentz et al., 2007). Shea (2006) found that

80% OEF/OIF service members have committed one act of violence and almost half have committed a serious act of violence. Families of service members are struggling.

PTSD and Suicide

Currently, the combined suicide rate for soldiers in theater and veterans stateside is approximately one per day (Burns, 2012). There are more deaths by suicide than combat deaths for the OEF/OIF population (Burns, 2012). For this particular cohort, risk factors for this alarmingly high suicide “completion” rate as well as attempts include: mental disease (Bullman & Kang, 1994; Henriksson, Aro, Martunen, Isomatsa, & Kuoppassalmi, 1992), chronic physical illness (Ikeda et al., 2001), and exposure to a specific traumatic event (Brewin & Holmes, 2003). Jakupak (2009) found that veterans who screened positive for PTSD were more than 4 times more likely to endorse suicidal ideation. Since there were a large percentage of the OEF/OIF veterans diagnosed with PTSD, the Department of Veterans Affairs suggested that a significant number of OEF/OIF veterans may be at risk for suicide (Brewin & Holmes, 2003).

Mechanisms of PTSD

Currently, theories to explain the development of PTSD have addressed four possible mechanisms of action differentiating PTSD from healthy recovery from trauma: learning, information processing, memory and psycho-biological (Feldner et al., 2007). Learning theorists suggest that associations formed during a traumatic event create a “fear network” (Foa & Rothbaum, 1998). This network creates a pathway back to the traumatic event when invoked in a non-threatening situation. These networks can become pathological when there are excessive response elements that are resistant to change (Ehlers & Clark, 2000; Foa & Kozak, 1986).

While learning theories focus on response, information-processing theories suggest that trauma is incompatible with existing worldview. Individuals exposed to trauma struggle to integrate the new incompatible information into their existing belief or view about one's self, others and their world. Repeated attempts to process this new information result in a preoccupation or inhibited response that reactivates the trauma memory (Ehlers & Clark, 2000).

Researchers who focus on memory suggest that memories of traumatic events are often disjointed and difficult to recall. If there were high levels of arousal during the trauma, vivid memories of the event may occur and these may be difficult to forget and may make one vulnerable to chronic re-experiencing (McCleery & Harvey, 2004). Trauma does not have a solidified place in one's memory.

Individuals with a diagnosis of PTSD often complain of having biological reactions such as arousal, anxiety, and fear. The neurobiological system that responds to stress involves the amygdala, hippocampus, and medial prefrontal cortex. The amygdala processes information associated with the traumatic event exposure, the hippocampus contextualizes the information and the medial prefrontal cortex can inhibit excessive amygdala activation associated with acute and chronic stress reactions (Feldner et al., 2007). This activation mediates an adrenergic response (fight, flight, or freeze) and the production of cortisol from the adrenal cortex. An adaptive response would mobilize the mechanism for appropriate coping and adaptation. A non-adaptive response would include excessive stress reaction or an inadequate stress response, and inability to return to "normal" and/or the inability to match the response.

Despite the myriad theories of development of PTSD, it is unclear if any pathway is dominant, or if pathways work in conjunction with one another. Currently, the gold standard for treating PTSD is cognitive behavior therapy with medication (Cukor, Spitalnick, Difede, Rizzo, & Rothbaum, 2009). It seems logical then to think of PTSD as a cognitive construct. As such, this study used McGuire's (1961) Inoculation theory as a lens as it addresses the four different pathways (discussed above) that prevent recovery from a traumatic event. The development of PTSD due to the creation of fear networks, difficulty in information processing and faulty memory may be weakened by an increase in military preparedness.

PTSD Risk Factors

It has been found that there are relationships between pre-trauma PTSD risk factors of family instability, childhood antisocial behavior, war stressors (combat exposure, perceived threat) and post-trauma resilience-recovery variables (hardiness, locus of control and social support) (Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009). It was found that with Vietnam veterans, all of these variables had a direct relationship with the development and severity of PTSD; war-zone stressors were preeminent in males while resilience-recovery variables were preeminent in women (King, King, Foy, Keane, & Fairbank, 1999). In Gulf War veterans; lifetime trauma, combat exposure and avoidant coping with related to PTSD symptoms and combat exposure moderated the strength and direction of PTSD's relationship with childhood trauma and avoidant coping style (Stein et al., 2005).

Battlefield-related trauma was more likely to result in PTSD than trauma from civilian terrorism, work and traffic accidents (Amir, 1996). Increased number and/or

severity of combat exposure were associated with greater likelihood and severity of PTSD (Sutker, Uddo, Brailey, & Allain, 1993; Wolfe, Erickson, Sharkansky, King, & King, 1999). Vietnam veterans, with the greatest exposure to combat had highest rates of PTSD (Kulka et al., 1990) and among Gulf War veterans, the more severe the combat exposure, the more likely to experience PTSD (Baker, Mendenhall, Simbartl, Magan, & Steinberg, 1997; Wolfe et al., 1999). This suggested that both the amount of combat exposure as well as the quality of combat exposure were significant factors in the development of PTSD.

Meta-analyses suggested that low social support leading up to traumatic events was the strongest predictor of PTSD (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). A national sample of 1,632 Vietnam veterans found that social support and hardiness mediated the relationship between war-zone stressors and risk for PTSD (D. W. King et al., 1999). Social support was also associated with reduced risk of PTSD with non-military people who have been exposed to trauma (Ahern, Galea, Resnick, & Vlahov, 2004; Kaspersen, Matthiesen, & Gøtestam, 2003). Various studies of OEF/OIF veterans have shown that those veterans who have greater post-deployment social support also have lower levels of PTSD, symptoms of depression, suicidal ideation as well as psychosocial difficulties (Pietrzak et al., 2009; Pietrzak et al., 2010; Pietrzak, Johnson et al., 2010). Low levels of social support have been associated with increased avoidance of thoughts as well as behaviors that can increase risks related to PTSD (Benotsch, Brailey, Vasterling, Udd, Constans, & Sutker, 2000; North, 2001; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002; Solomon, Mikulincer, & Benbenishty, 1989). Individuals with high levels of support are the least engaged in avoidance coping,

i.e., social withdrawal, worry and emotional disengagement which can reduce chances of developing PTSD (Charuvastra & Cloitre, 2008; Runtz & Schallow, 1997). The specific avoidant behaviors mediated the relationship between social support and the development of PTSD symptoms (Monson et al., 2010; Pietrzak et al., 2009; Pietrzak & Southwick, 2011). Therefore, veterans with social support who engaged in specific avoidant behavior remain at higher risk for PTSD.

Demographic information such as younger age (Smith, Ryan, Windgard, Slymen, Sallis, & Kritz-Silverstein, 2008; Tanielian & Jaycox, 2008), lower rank (Schnurr, Lunney, & Sengupta, 2004; Schnurr et al., 2009), not being married (Rundell, 2006; Rundell, 2006), less formal education (Pietrzak et al., 2009) and being a minority (Pietrzak et al., 2009; Pietrzak et al., 2010; Shea et al., 2010b) has been linked to increased rates of PTSD.

Schnurr (2004, 2009) found that the risk of peritraumatic dissociation was the single best predictor of PTSD symptoms, where Phillips (2010) found that type of combat exposure was the greatest risk factor for the development of PTSD symptoms. Deployment characteristics such as location (i.e., veterans who deploy to Iraq have higher rates of PTSD (Shen, Arkes, & Pilgrim, 2009), type of job (Castro, 2009); multiple deployments (Tanielian & Jaycox, 2008), and type of combat exposure (Phillips et al., 2010; Schnell & Marshall, 2008; Seal et al., 2007)) and length of deployments, specifically those lasting longer than 180 days (Shen, Arkes, Kwan, Tan, & Williams, 2010) have also contributed to the PTSD literature.

Interestingly, 5-8% of a non-deployed combat brigade team screened positive for PTSD (Castro, 2009). This suggested that either the service members had screened

positive for PTSD prior to their military service or that something in the preparation for combat experience may be responsible for the development of PTSD. The central hypothesis of this study was that combat exposure moderates the relationship between military preparedness and the development of symptoms of PTSD. This framework indicated that military preparedness needed to confront the stress of combat exposure to protect veterans from the development of symptoms of PTSD. Without some combat exposure, military preparedness was not able to be utilized therefore leaving service members vulnerable to the development of symptoms of PTSD. This may be a possible explanation of the above results in the study by Castro (2009).

Combat Exposure as a risk factor for PTSD

Combat exposure was associated with considerable post-deployment mental health problems such as PTSD in Vietnam Veterans (Dohrenwend et al., 2006; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Kulka et al., 1990), Gulf War veterans (Kang, Natelson, Mahan, Lee, & Murphy, 2003) and OEF/OIF veterans (Hoge et al., 2004). Hoge (2004) also found an association between combat exposure and substance abuse. While overall exposure to combat was associated with PTSD, there were studies that examined specific types of combat exposure associated with PTSD. There were mixed results; threat of death, serious injury and witnessing death has been found to be associated with PTSD (Phillips et al., 2010) where perceived threat of personal danger were associated with PTSD in other studies (Grieger et al., 2007; Iversen et al., 2008; Vogt & Tanner, 2007).

PROTECTIVE FACTORS OF PTSD

While there are numerous factors that can put veterans at risk for PTSD, there were also protective factors associated with a decrease in development of symptoms of PTSD, such as the availability of post deployment social support (Booth-Kewley, Larson, Highfill-McRoy, Garland, & Gaskin, 2010; Pietrzak et al., 2010) and early psychological treatment post trauma (Booth-Kewley et al., 2010); personality traits such as hardiness and locus of control (Solomon et al., 1989). Being an older white male with higher rank was associated with lower levels of PTSD (Grieger et al., 2007; Iversen et al., 2008). Interestingly, female veterans do not have higher levels of PTSD as compared to their male peers, whereas, females in the civilian community had higher rates of PTSD compared to males (Lilly, Pole, Best, Metzler, & Marmar, 2009; Olf, Draijer, Langeland, & Gersons, 2007).

Preparedness

There is little attention paid to preparedness, a variable in the development of PTSD in veterans. Among World Trade Center responders during 9/11, workers and volunteers in occupations least likely to have had prior disaster training or experience were at greatest risk of PTSD (Perrin, DiGrande, Wheeler, Thorpe, Farfel, & Brackbill, 2007). Disaster preparedness training and shift rotations to enable shorter duration of service at the site may have reduced PTSD among workers and volunteers. Also, a sense of preparedness in political torture victims was related to less perceived distress during torture and less severe psychological sequelae afterward (Basoglu & Paker, 1995; Basoglu, Mineka, Paker, Livanou & Gok, 1997). Conversely, an individual's perceived sense of unpredictability and lack of control during a traumatic situation increases the risk of PTSD afterward (Basoglu & Paker, 1995; Basoglu, et al., 1997). Renshaw

(2011) found that National Guard troops were at greater mental health risk from combat experience than active duty troops and stated that their shorter time of training may be a risk factor. National Guard soldiers generally participate in only one weekend of drills per month and 15 annual training days per year, resulting in limited training of only 300-350 hours annually (Pryce, Ogilvy-Lee, & Pryce, 2000). Renshaw (2010) also found that preparedness may be indirectly helpful in mitigating the development of PTSD by reducing perceptions of threat. This evidence leaves open areas for exploration regarding the role of preparedness in the occurrence of PTSD symptoms in military personnel. If veterans were prepared both in terms of training and equipment, they may feel less of a loss of control during combat exposure. Previous studies of interpersonal traits to protect against occurrence of PTSD symptoms post combat exposure have not examined the role of training and equipment preparedness.

In a very recent study, military preparedness was correlated with concerns about environmental exposures (Osinubi, McAndrew, DeCandia, Chandler, Santos, Falco, & Teichman, 2012). The researchers reported two possible explanations for their results. One explanation was that veterans who felt well prepared were likely to have healthier coping responses and higher levels of mental health. These researchers also speculated that veterans with higher levels of mental function were less likely to be concerned with deployment-related exposure concerns. Other studies that examined organizational preparedness/support and mental health functioning post disaster posit that preparation enables people to be more resilient to adverse impact of disaster (Bonanno, Galea, Bucciarelli, & Vlahov, 2007; Pietrzak et al., 2009).

Variables that are related to PTSD in a potentially nonlinear fashion

Stress has also been studied as both a risk and protective variable. The dose-response model supported the concept that combat exposure is a risk factor, stating that the more severe the stressor, the greater exhibition of PTSD symptoms regardless of predisposed personality traits (Ben-Ezra, Palgi, Shrira, Sternberg, & Nir Essar, 2010). Stress Inoculation Theory argued that repeated exposure to stress decreased the impact of stress on PTSD symptom development as the veteran became able to handle more stress over time (Meichenbaum, 1993; Meichenbaum, 2007). The diathesis–stress model of PTSD asserted that traumatic events serve as the primary activator of PTSD symptoms, but that pre-trauma individual differences contributed to the development of PTSD (McKeever & Huff, 2003). In these models, there was not an accommodation for when stress levels become too high.

Despite studies that described the risk and protective factors in the occurrence of PTSD symptoms, scant research has been done examining the interaction of these risk and protective factors and the occurrence of PTSD symptoms in OEF/OIF veterans. Pietrzak (2010) found that psychological protective and post deployment social support protected against the occurrence of PTSD and depressive symptoms. There were also some data that suggested that perceptions of threat partially or fully mediated the association of combat severity with PTSD (Iversen et al., 2008; King, Vogt, & King, 2004).

Units with perceived higher levels of leadership reported lower levels of PTSD, while units with perceived lower levels of leadership reported higher levels of PTSD (Castro, 2009). Soldiers with more ethics training, often associated with higher rank, reported lower levels of PTSD and soldiers who feel they were in ethical situations that

they were not prepared for reported higher levels of PTSD (Castro, 2009). High levels of unit cohesion have been reported to be a protective factor in the development of PTSD except for situations of high levels of combat exposure where unit cohesion was associated with higher levels of PTSD (Fontana, Rosenheck, & Horvath, 1997).

Mixed results existed in examining the role of active duty status versus reserve status and the occurrence of PTSD symptoms among combat-deployed military personnel. There seems to be some evidence that reservists, who deploy to combat, had more mental disorders compared to their active duty counterparts (Browne et al., 2007; Miliken et al., 2007) and that reservists had less training and preparation than active duty troops (Browne et al., 2007), while other studies have not found a difference between the groups (*Office of the US army surgeon general. mental health advisory team V report*. February 14, 2008; Hoge et al., 2004).

Research that addressed factors that could lead to the development of interventions for PTSD in the OEF/OIF veteran population is just beginning to emerge. The majority of published studies on the impact of deployment on mental health in the OEF/OIF veteran population have been on estimated rates of PTSD (Bliese, 2006; Hoge et al., 2004; Schnell & Marshall, 2008; Smith et al., 2008) and on predictors of PTSD (Browne et al., 2007; Iversen et al., 2008; Smith et al., 2008). There had been research on protective factors of PTSD (Pietrzak et al., 2009; Pietrzak, Johnson et al., 2010), risk factors for PTSD, (Iversen et al., 2008), the role of PTSD and social functioning, (Shea et al., 2010b) and only one study on the interaction of risk and protective factors on PTSD (Renshaw, 2011). Furthermore, very few studies looked at quality of life for this veteran cohort, but early results seemed to be similar to previous conflicts with a decrease

in all quality of life issues (Schnurr et al., 2004; Schnurr et al., 2009) pointing towards the need for further research to examine how the reactions may be different for the OEF/OIF veteran population. The OEF/OIF veteran population is different than previous veteran populations as it is more diverse demographically, includes more reservists, and they sustain multiple and longer deployments.

The DoD supported varied research programs to evaluate PTSD in each of the different branches such as Battlemind for the Army and Combat and Operation Stress Control (COSC) for the Navy and Marines (Figley & Nash, 2007; Kennedy & Zillmer, 2006). These two programs have not yet been evaluated for efficacy. In a review by Hourani et al (2011), the approaches being studied have elements of Deahl's approach to reducing effect of stress; PTSD psychoeducation, anxiety-reducing techniques, strategies to minimize identification with victims and increase and maintenance of social support (Deahl, 1998).

Two programs have utilized some of the principles of Deahl's approach. The first program, Time-driven Battlemind Psychological Debriefing (PD), used by some platoons in the Army was designed to reduce mental health symptoms for the entire unit by implementing five phases of debriefings at different intervals of deployment. There has not yet been systematic research of efficacy of the program. The Royal Marines in the United Kingdom developed a program called Trauma Risk Management system (TriM). This is a post trauma intervention that provided stress education briefs (Greenberg, Cawkill, March, & Sharpley, 2005). Early review of this program showed that the briefs were perceived as helpful by the Marines (Greenberg, Langsto, Fear, Jones, & Wessely, 2009) but no data has published about efficacy and prevention of PTSD (Hourani et al.,

2011). The Air Force has a program entitled, “Landing Gear” that employed prevention approach pre and post deployment to education service members to identify combat stress symptoms (Shea-Porter, 2009). The “Comprehensive Soldier Fitness Program” was in its early stages of development by the army and was designed to increase service member’s resiliency and strength by developing five dimensions of strength; physical, emotional, social, spiritual and family (Lopez, 2009). Two other interventions currently being studied are special protective training that employed cognitive exercises such as role plays and live demonstrations to mitigate effects of trauma (Jarrett, 2008) and a protocol where service members engaged in audio-visual experience via cell phone to lesson effects of trauma (Riva, Grassi, Villani, & Preziosa, 2007). Both interventions have not been evaluated systematically but are supported by anecdotal evidence that the service members’ responses to the training were positive (Hourani et al., 2011).

Appropriateness of testing curvilinear relationship

Application of a curvilinear relationship between risk and protective factors was a novel approach in this study. Risk and protective factors have been tested separately in a linear relationship. Some studies found a possible curvilinear relationship in the development of PTSD in Vietnam veterans (Schnurr, Friedman, & Rosenberg, 1993), Gulf War veterans (Stein et al., 2005), and OEF/OIF veterans (Brailey, Vasterling, Proctor, Constans, & Friedman, 2007; Fontana, Rosenheck, & Horvath, 1997). This study expanded the field of curvilinear relationships by examining another relationship, whether combat exposure moderated the relationship between military preparedness and the development of symptoms of PTSD.

Stein (2005) found that veterans with low combat exposure but who had experienced more severe childhood trauma reported more severe PTSD while veterans with high combat exposure who experienced high levels of childhood trauma reported less severe PTSD suggesting an inoculation effect of childhood trauma and the development of PTSD when exposed to combat exposure. This study suggested that severe childhood trauma made veterans vulnerable to PTSD when they experienced low combat exposure. The low levels of combat exposure may have activated difficult feelings experienced at an early time period in their life, thereby making early childhood trauma a risk factor. But, with higher levels of combat exposure, early childhood trauma may have enabled the veteran to manage the high levels of combat exposure more successfully. This study also suggested that when levels of combat exposure became too great, veterans become vulnerable once again to PTSD. It could be that repeated combat exposure gave the veteran time and opportunity to use any possible resilience or inoculation qualities learned from early childhood trauma (Stein, 2005). Early trauma may make individuals more resistant to later trauma but only if enough time and opportunity are available to activate coping skills and not if the combat exposure became overwhelming.

Brailey (2007) found a curvilinear relationship between PTSD and unit cohesion, with both low and high levels of unit cohesion associated with more severe PTSD. Low levels of unit cohesion suggested that service members do not feel connected with their unit. They may felt that there was poor leadership and that their mission may not been well defined. These feelings may leave individuals vulnerable to combat exposure; therefore, more susceptible to PTSD. Military units with high levels of cohesion work

effectively as a group and reinforce group norms. If the combat exposure is so great, all the members of the group may experience a group effect as well as an individual effect when trying to protect them from the effect of the combat exposure. Very high levels of unit cohesion may not allow for individual strengths to emerge (Brailey et al., 2007).

Vietnam veterans who experienced moderate levels of combat exposure, as opposed to high and low levels, experienced more benefits to their military experience than veterans who experience either high or low levels of combat exposure (Fontana et al., 1997). Soldiers are taught to experience combat exposure; they expect it and are given the tools to manage the combat exposure from both a military and psychological point of view. Soldiers are taught to constantly be on guard for possible combat and how to manage once they find themselves in that hostile situation. To not experience some combat exposure may be a disappointment to some soldiers because their training teaches them to expect and prepare for combat situations. To be on constant guard is stressful in itself. For combat to not occur, that alone may increase the impact of anticipation. If combat occurs, the soldier is able to activate training and defenses learned to protect from themselves from the actual combat and thereby protect themselves from developing PTSD. To be successful in combat may help the soldier feel as if they did their jobs competently, encouraging a sense of pride in the soldier regarding their military service.

A curvilinear relationship was found between scores on the Minnesota Multiphasic Personality Inventory (MMPI) in Vietnam era veterans attending a private college and combat exposure. Veterans had lower or less pathological scores if they experience peripheral rather than no or direct combat exposure (Schnurr et al., 1993). These results suggested that the veterans who experienced peripheral combat exposures

were able to use their training and that by using their training they were protected them from psychological pathology later on. Ultimately, too much combat exposure could have been too much to handle from their training, and no exposure at all prevented them from using their training at all (Schnurr, 1993).

Finally, Suvak, Vogt, Savarese, King, & King, (2002) found a curvilinear relationship between problem-focused coping and outcomes of achievement and lifetime adaptation of veterans when exposed to moderate levels of combat exposure. As with the examples cited above, too little and too much combat exposure had detrimental effects on quality of life issues. The veterans who had moderate levels of combat exposure may have felt successful or felt mastery in their ability to be a soldier. This sense of achievement may be associated with coping skills and lifetime achievement in this study sample.

McGuire's Inoculation Theory

This study used inoculation theory to accommodate for the theorized moderating effect of combat exposure on the relationship between preparedness and the development of symptoms of PTSD. Inoculation Theory has its roots with Hovland (Hovland, Lumsdaine, & Sheffield, 1949) but was first tested by McGuire in the early 1960s. The theory hypothesizes that specific beliefs and attitudes would be maintained and strengthened when individuals were forewarned of possible impending threat to their belief system and were given the opportunity to practice resisting appeals to the original belief system. McGuire (1961) believed that subjects would be more likely to change their belief system if threats to that belief system were unexpected making the subjects vulnerable and off guard. If the subject were caught off guard, they would not have

counterarguments to use to defend their original belief system. McGuire modeled this theory after the theory of vaccination; vaccines could produce immunity, and therefore, he believed that moderate levels of stress could produce psychological immunity. In medical inoculation, a weakened form of the threat, i.e. the disease, is injected into the body to stimulate the formation of anti-bodies to be able to ward off a future attack of the same disease. In psychological inoculation, the threat can never be exactly the same, so threats are approximated, a weakened version of potential threats provides the subject the opportunity to create counterarguments to maintain and strengthen belief system. The closer the approximation, the stronger the belief system remains (McAlister, Perry, & Kellen, 1980; Sybillo & Heslin, 1973).

The inoculation theory establishes three types of defenses: supportive, refutational, and combination. McGuire (1961) advanced the theory that supportive defense provided strong supporting evidence that the original belief system is correct and sound. The procedure of refutational defense occurred when the subject's belief system was threatened, thereby giving the subject a sense of vulnerability. If the threat is not too great, the subject was able to resist the threat and strengthen their existing beliefs. The refutational defenses can be refutational same (exact message is refuted) and refutational different (approximate message). A refutational same message was an inoculation treatment that refuted specific potential counterarguments that will appear in the subsequent persuasion message, while refutational different treatments were refutations that were not the same as those present in the impending persuasive message (Pfau & Van Bockern, 1994). Effective refutations protected the subject from future

vulnerabilities. The combination of supportive and refutational defenses was the most effective of belief immunization (McGuire, 1961a).

Strategies in McGuire's (1961) inoculation theory to refute persuasive arguments and resist belief changes have four approaches: (1) direct refutation of argument's main points, (2) severing association between persuader and message, (3) derogation of the source, and (4) concept or belief boosting. Direct refutation has been further divided into four areas: (1) refute argument by negating content validity, (2) refute argument by showing irrelevancy to current belief system, (3) refute argument by pointing out its covert strategy (potential risk may be shared) and (4) refute argument by pointing out long-term effects (Cialdini & Mirel, 1976; Tannenbaum, 1968). In summary, the inoculation constructed states that an original belief system and attitude developed by a presentation will be protected or inoculated from a larger threat when a smaller threat is received. This smaller threat triggers the receiver to strengthen arguments supporting original beliefs and attitudes through refutation; therefore, developing resistance to future threats or challenges. Research has shown that inoculation will not only protect from specific arguments to original beliefs and attitudes but will protect against potential threats that may be more general (McGuire, 1961b; McGuire, 1999; Pfau & Burgoon, 1988; Pfau, Kenski, Nitz, & Sorenson, 1990). McGuire does point out that some subjects may have a natural immunity to persuasion but does suggest that concepts such as self-esteem, self-efficacy and locus of control may have an impact of persuasion.

McGuire's Inoculation theory has been applied to health behavior, politics and marketing strategies. Inoculation is a strategy to promote resistance to attitude and belief change not to change existing attitudes. In a study on smoking prevention in teenagers by

Grube and colleagues (1990), junior high school students who were at the most vulnerable age to start smoking were targeted. Surveys were administered to measure their attitudes towards smoking. Students were then given a prevention course through lectures; peer-led, adult-led, video etc. Half of the students received a threat in a video form suggesting that the students may change their attitudes or succumb to peer-pressure. A message was introduced stating that smoking is “cool” or glamorous and not dangerous to one’s health. A survey was conducted 6 months later to see if students had an attitude change towards smoking. Results of these programs found that students receiving the “threat” to smoking belief system were less likely to change their attitudes towards smoking than the students who did not receive the threat (Evans, Rozelle, Maxwell, Raines, Dill, & Guthrie, 1981; Hersey, Niederdeppe, Evans, & Nonnemaker, 2005; Pfau & Van Bockern, 1992; Shaffer, Beck, & Boothroyd, 1983). This model was particularly effective for students with low self-esteem measured prior to the program (Pfau & Van Bockern, 1992). Longitudinal studies have shown that the inoculation against adolescent smoking can last for as long as two years (Pfau & Van Bockern, 1994).

Inoculation theory has also been studied in measuring effectiveness of inoculation of voters from political attacks (An & Pfau, 2004; An & Pfau, 2004; Burgoon, Pfau, & Birk, 1995; Pfau & Burgoon, 1988; Pfau, 1992). Inoculation theory has been studied in different modalities including televised political debates where it was found that inoculation was effective in conferring resistance to influence of counter attitudinal attacks from opposing candidate televised debates of US Senate candidates in students from a Midwest university (An & Pfau, 2004). In this study, students first completed surveys about their attitudes and beliefs towards candidates along with demographic

information. The subjects were randomized into two groups: a control group who did not receive any messages and an experimental group who were asked to read a message on behalf of the candidate they supported. Finally, the subjects were asked to view a televised debate and answer a questionnaire about their attitudes and beliefs about the televised political debaters. The study was able to control for prior exposure to political messages of the candidates. The study found that the students who received the “inoculation” treatment were able to strengthen their original beliefs and attitudes toward their preferred candidate and experienced the negative attacks used during the debate as unwarranted (An & Pfau, 2004). Similar results have been found that inoculation theory is an effective strategy for instilling resistance to political attacks. In a field experiment of the 1986 US senatorial election, it was found that inoculation undermines the effectiveness of political attacks in different ways: “undermining the potential influence of the source of political attacks, deflecting the specific content of political attacks, and reducing the likelihood that such attacks will influence receiver voter intention” (Pfau & Burgoon, 1988, pp. 105-106). Comparable results were found when political attack ads were distributed via direct mail; students with inoculation training were more likely to strengthen their original beliefs and attitudes to their preferred candidate (Pfau et al., 1990).

Application of McGuire’s (1961) inoculation theory has not been applied to the development of symptoms of PTSD in veterans. Previous studies have looked at the application of stress inoculation training (SIT) by Meichenbaum originally developed in 1973. This training model is also based on vaccination theory, but does not account for a curvilinear relationship. The model posited a linear relationship where learning to

manage small levels of stress will inoculate an individual from gradually higher levels of stress (Lazarus & Folkman, 1984; Meichenbaum, 1975; Meichenbaum, 1993; Meichenbaum, 2007). SIT does not account for the impact of large amounts of stress. Application of McGuire's inoculation theory to frame the relationship between military preparedness and combat exposure to predict the development of symptoms of PTSD presents a unique and potentially useful understanding of how to understand the development of PTSD as well as possible opportunities for intervention. Both military preparedness and combat exposure are potentially modifiable situations that can be altered to limit the risk of combat exposure and to increase the inoculation effect of military preparedness. Modification of either variable could potentially lead to the decrease in the development of symptoms of PTSD.

Summary

PTSD is a significant problem among the OEF/OIF veterans, it is costly both in terms of the health and well-being of our services members and their families and it is a tremendous financial burden to the United States. Any insight into possible pathway in the development of symptoms of PTSD will help researchers and clinicians design and implement treatment/prevention programs to lower the risk of PTSD. This study examines whether combat exposure moderates the relationship between military preparedness and the development of symptoms of PTSD in a curvilinear manner.

Chapter 3: Research design & Methods

This chapter presents the methods of the current study. The dataset, sample, measures, and analytic strategies are discussed in this chapter.

Design

This cross-sectional study examined the relationship between military preparedness and combat exposure factors, and the development of symptoms PTSD in a sample of OEF/OIF veterans drawn from the VA New Jersey Healthcare System, East Orange WRIISC program. This study used hierarchical multiple regression models to examine the interaction of military preparedness (continuous variable) and combat exposure (continuous variable) to estimate the development of symptoms of PTSD (continuous variable). This study used a hierarchical multiple regression model as this approach is consistent in the literature when examining combat exposure as a moderating variable in the development of PTSD (Suvak et. al, 2002). The model will adjust for covariates such as gender, age, branch of service, employment and marital status. The current study is a secondary data analysis of the New Jersey, War Related Injury and Illness Study Center (WRIISC) data set.

Data

The WRIISC is one of three national VA programs devoted to veterans to evaluate post deployment health concerns. WRIISC develops and provides expertise for veterans and their health care providers through clinical evaluation, research, education, and risk communication (<http://www.warrelatedillness.va.gov/>). Veterans deployed to hostile areas and with deployment related health concerns and/or symptoms are eligible for free individualized assessment. Currently, the WRIISC offers evaluations to veterans

with difficult to diagnose health problems and Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) veterans with medical concerns.

In this study, the following inclusion and exclusion criterion were used.

Inclusion: All veterans, 18- 70 years of age with previous deployment to OEF/OIF, who were evaluated for either of the two evaluations at the New Jersey Healthcare System VA WRIISC, in East Orange, NJ from January 2007 through November 2010, and have completed the Initial Health Questionnaire that is completed by all WRIISC participants in all three national VA programs.

Exclusion: Theoretically, Veterans seen at the WRIISC, who did not complete the questions in the Initial Health Questionnaire. Veterans not be part of the NJ WRIISC database would include veterans who were unaware of the services provided by NJ WRIISC, decided not to be evaluated, who could not travel to this facility for evaluation, who were not referred by their primary care physician, and veterans without a physical address.

Sample

The sample of veterans for the current study included 493 veterans, who were evaluated at the WRIISC from November 2007 through November 2010. Veterans with previous deployment to OEF/OIF with completed Initial Health Questionnaire were also included in the sample. The Initial Health Questionnaire in completed by all veterans prior to clinical evaluation. This health questionnaire is a self-report questionnaire containing questions on quality of life, military experience and demographics. Participants with missing information (conflict, combat exposure and military

preparedness) were excluded list-wise from the sample, thus, resulting in a final sample size of 418 veterans for this study.

Overall study plan

The overall plan for this study was to examine the relationship between demographics, military preparedness, combat exposure, and the development of symptoms of PTSD separately and within a hierarchical regression to test for moderating effect of combat exposure on the relationships between military preparedness and the development of symptoms of PTSD in a curvilinear manner.

Aims of the study

Aim 1. Examined the relationship of combat exposure and the development of symptoms of PTSD symptoms in the OEF/OIF veterans

Aim 2. Examined the relationship of military preparedness and the development of symptoms of PTSD symptoms in the OEF/OIF veterans

Aim 3. Examined the moderating effect of combat exposure on the relationship between military preparedness and the development of symptoms of PTSD in the OEF/OIF veterans

Aim 4. Examined the effect of the number of deployments on the relationship between combat exposure and development of symptoms of PTSD in the OEF/OIF veterans

Measures

Variables

Criterion Variable

The criterion variable of this study was the occurrence of PTSD symptoms as measured by the Posttraumatic Check List-Civilian Version (PCL-C) (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). The PCL-C is a 17-item screening instrument using a 5-point Likert scale with a possible range from 17-85 and is based on diagnostic criteria for PTSD. This is the most widely used measure of PTSD symptoms in studies of military personnel. Results of previous research provided support for psychometric properties of the PCL, including internal consistency, test-retest reliability, convergent validity, and discriminant validity (Ruggiero, Del Ben, Scotti, & Rabalais, 2003).

Predictor Variables

Military preparedness

Military preparedness was measured by a five training and support questions from the WRIISC Initial Health Questionnaire and was operationalized in this study as the sum of these questions. These questions measured perceived level of preparedness and support and to what extent the veteran received adequate training and information and support prior, during and after deployment. The questions included perceived appropriate training prior and during deployment, receipt of physical and material support and emotional, psychological and transition to civilian life support. The military preparedness questions were scored as (0) no, not at all; (1) yes, a little; (2) yes, a lot; and (3) no answer. (See Appendix 1)

The sum of the military preparedness questions from the Initial Health Questionnaire from the WRIISC have not been validated but have been used in a recent study examining the relationship between deployment-related preparedness and support and exposure concerns (Osinubi et al., 2012). These questions were almost identical to

the military preparedness questions asked on the Deployment Risk and Resilience Inventory (DRRI (King, King, Vogt, Knight, & Samper, 2006) which had demonstrated strong reliability with OIF, with a Cronbach's alpha coefficient ($\alpha=.88$) (King, et al., 2006). This current study used the five questions provided by the Initial Health Questionnaire. The questions were almost identical to questions used in DRRI component on preparedness. The preparedness component of the DRRI had 14 questions. Using only five questions in this study was possible as the components as well as the individual questions of the DRRI are considered as a stand-alone instrument. That is, any one or more of the DRRI measures may be used individually, apart from the full inventory, depending on the needs of the researcher (King et al., 2006). King and colleagues (2006) stated that questions in the DRRI can be analyzed separately to get a better understanding of the special training and preparedness needs of personnel facing the challenges presented by modern military operations. Therefore, since the questions used in the NJ WRIISC Initial Health Questionnaire are almost identical to the questions in the DRRI, analyses were done individually and summed to answer the research questions. In the context of this study, the correlations between the military preparedness variables were significantly correlated with an internal consistency reliability of $\alpha=.83$ as measured by Cronbach's alpha coefficient, which is indicative of good reliability and Cronbach's alpha ranging from $.9 > \alpha > .8$, indicates good internal consistency (DeVellis, 1991). The predictor variable of military preparedness was the aggregate of the five scale questions listed in Table 1.

Combat Exposure

Combat exposure was measured by four questions regarding veterans' perceived exposure and participation in combat/dangerous duties, being in imminent danger of being injured or killed, and experiencing injuries or loss of unit members. The questions used in the Initial Health Questionnaire were selected from the Combat Exposure Scale (CES) (Keane et al., 1989). The CES has two forms: a 14 or seven-item, self-report questionnaire that assesses combat exposure events and severity on a five point Likert scale. The CES has shown moderately high internal consistency (report psychometrics as you did above) and excellent test-retest reliability over a one-week interval in a veteran sample (Keane et al., 1989). The test-retest reliability of the CES was .97 with a Cronbach's $\alpha=.85$ (Keane et al., 1989). The CES was used in its entirety or modified scale of seven questions (Keane et al., 1989) and these specific questions using the NJ WRIISC data have been used in a recent study exploring deployment related exposure concerns (Osinubi et al., 2012). Using the CES allowed this study to examine the quality of combat exposure and not just the intensity of combat exposure usually measured in other studies references. (See Appendix 2)

In the context of this study, the correlations between the combat exposure questions were significantly correlated with an internal consistency reliability as measured by Cronbach's alpha coefficient ($\alpha=$) .79 which is indicative of acceptable to good reliability. As reported by (DeVellis, 1991), acceptable internal consistency would have a Cronbach's α between .7 and .8, good internal consistency ranges between .8 and .9. The predictor variable of combat exposure is the aggregate of these questions and weighted as per CES scoring guidelines (see Table 4).

Number of Deployments

Previous studies have found that an increased number of military deployments have resulted in increased prevalence of PTSD (Pietrzak et al., 2009). Number of deployments were included in this study to examine if multiple deployments would have an impact on the moderating effect of military preparedness on the relationship between combat exposure and the development of PTSD as increased number of deployments would theoretically increase both military preparedness and combat exposure. In this study, there was a range 1-3 tours with an average of 1.38.

Covariates

Results from previous studies indicate that a variety of sociodemographic factors were associated with the development of symptoms of PTSD (Brewin et al., 2000; Ozer & Weiss, 2004; Riddle et al., 2007). The factors controlled for in this study included gender, age, race, branch of service, marital status, and employment status (see Table 3).

Analytic Strategies

Analyses for Aim 1 and Aim 2:

Descriptive statistics and zero-order correlations among the development of symptoms of PTSD, military preparedness and combat exposure variables were examined. Next, two simultaneous multiple regressions were performed to investigate the relationship between the development of symptoms of PTSD and the individual questions that comprise each of these two conceptual predictor variables, i.e., military preparedness and combat exposure.

Rationale for examining individual questions in a scale for Aims 1/2

Combat Exposure

In previous studies, the CES has been analyzed as a full scale or part of a scale (Keane et al., 1989). Recent studies have analyzed individual questions to suggest that certain combat experiences may be independently related to the development of mental health issues, including PTSD (Maguen, Suvak, & Litz, 2006; Maguen, Luxton, Skopp, & Madden, 2012; Phillips et al., 2010; Rona et al., 2009). Data were analyzed separately to examine if a particular exposure is more predictive of the development of symptoms of PTSD. The conflicts in Iraq and Afghanistan are unique as there are not a defined “front line” that has historically incurred most of the combat exposure; therefore, some of the historical measures for combat exposure may not describe the potential impact on this new population of veterans. The conflicts in Iraq and Afghanistan have been characterized by unconventional features (e.g., use of improvised explosive devices by an indistinctive enemy, counterinsurgency, and urban warfare) that may produce ambiguous combat situations for which the warrior may feel especially unprepared (e.g. killing a non-combatant) and may significantly contribute to PTSD risk (Litz, 2007). For example, transport workers have not traditionally been exposed to combat exposure in previous conflicts, but they have been targeted during the recent conflicts and often feel under imminent danger.

Military preparedness

The military preparedness variable was created from the sum of the five preparedness/support questions from the Initial Health Questionnaire. This variable measured the perceived level of preparedness and support received from the military before, during and after deployment. This created variable has been used in a recent study examining deployment related exposure concerns (Osinubi et al., 2012). The goal

of analyzing the military preparedness questions separately was to examine what measure of perceived military preparedness best inoculates (protects them) veterans from the development of symptoms of PTSD. This information may inform future inquiry.

Analyses for Aim 3 and 4:

Descriptive statistics and zero-order correlations among all variables implicated in these two aims were computed. Then, a hierarchical multiple regression was conducted to examine the relationship between aggregated measures of military preparedness and combat exposure to predict symptoms of PTSD. The aggregate variables representing the main effects of combat exposure and military preparedness were centered prior to the calculation of the product terms as recommended by (J. Cohen, Cohen, West, & Aiken, 2003). At the first step of the regression analysis, the following demographic variables were entered into the model: gender, age, employment status, marital status, race, and military branch. Number of deployments, a predictor variable was entered at this step. At the second step, the predictor variables, military preparedness, and combat exposure, were added. At the third step, the interaction or cross product term between combat exposure and military preparedness was entered to evaluate the role of combat exposure as a moderator of the relationship between military preparedness and development of symptoms of PTSD. Finally, to test the viability of the hypothesized curvilinear moderator effects, the square of the combat exposure variable (combat exposure²) and the product of this term with the military preparedness term (military preparedness X combat exposure²) were entered into the regression equation. As described by Baron and Kenny (1986), a significant contribution of the predictor by moderator product term (combat exposure X military preparedness or military preparedness X combat exposure²)

indicates the presence of moderation, suggesting that the relationship between military preparedness and development of symptoms of PTSD vary across different levels of the moderator (combat exposure or combat exposure²), hence a curvilinear relationship.

Chapter 4: Results

General results

This sample was comprised of 418 veterans from OIF or OEF who were seen at the WRIISC for evaluation for health concerns and completed the Initial Health Assessment... The sample was 88% (n= 367) male and 12% (n= 51) female. The average age was 32 years with a range from 20-61. The racial makeup of the sample was 55% White, 32% African American, 3% Asian, 1% American Indian/Alaskan, 1% Hawaiian/Pacific Islander, 13% other ,and 1% unknown. Sixty-seven percent of the sample represented the Army, 6% Navy, 6% Air Force, 20% Marine and > 1% Coast Guard. Fifty-two percent of the sample was employed while 46% was not employed. Thirty-nine percent of the sample is married, 39% divorced, 10% never married, >1% widowed, 5% separated and 2% describes themselves as living as married. The range in deployments averaged from 1-3 with an average of 1.38 deployments. The average PCL score was 45.01 with a range from 16-81. The numbers of participants with a PCL score over 50, average cutoff for PTSD diagnosis, was 42% (see Table 4).

Aim 1 results

As displayed in Table 5. , the mean PTSD score was 45.01 and indicated that the average level of the development of symptoms of PTSD would be considered “clinical” and worthy of intervention. Previous cutoff value of 50 has been traditionally used but recent studies show that cutoff values as low as 34 have been used for screening purposes (Polusny et al., 2009). The score of 34 had 71% sensitivity and 91% specificity for PTSD based on the Mini International Neuropsychiatric Interview (Bliese, 2006). The mean values of the military preparedness questions varied from “a little” to “a lot” in “training

prior to deployment”, “training during deployment” and “available physical and material support” and “not at all” to “a little” in “emotional and psychological support” and “transition to civilian life support”. As also seen in Table 5, the various military preparedness questions were all significantly, positively, and at least moderately strongly related to each other. As hypothesized, most of these military preparedness questions were significantly and inversely related to the development of symptoms of PTSD, although they range in magnitude or strength from weakly negative to moderately strongly negative (Cohen, 1988).

Simultaneous multiple regression analyses were conducted to investigate the relationship between the set of five military preparedness predictors and the development of symptoms of PTSD. As seen in Table 6, the set of five military preparedness predictors, taken together, was significantly related to PTSD ($R^2 = .26$, $F(5, 402) = 28.17$, $p < .001$) and a change in $R^2 = .25$ (see figure 5). With respect to the individual predictors, “transition to civilian life support” was strongest of the military preparedness predictors ($\beta = -.38$, $p < .001$). Two other military preparedness predictors, “emotional and psychological support” ($\beta = -.17$, $p < .001$) and “training prior to deployment” ($\beta = -.11$, $p < .05$) were also statistically significant predictors, but the magnitudes of these effects were noticeably weaker. The remaining military preparedness predictors; “training during deployment” and “available physical and material support” were not statistically significant predictors of the development of symptoms of PTSD.

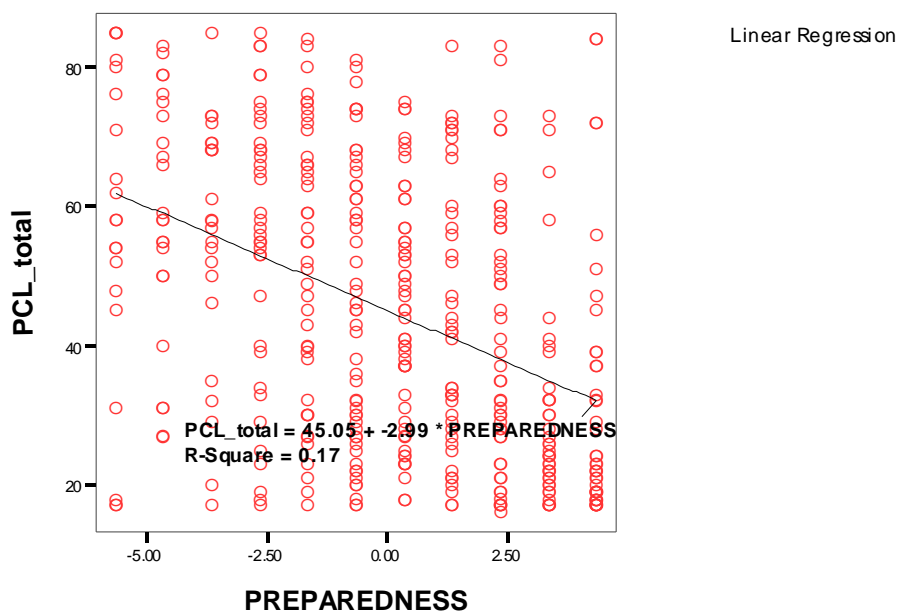


Figure 5. Regression line of military preparedness and the development of symptoms of PTSD (PCL total score)

Aim 2 results

As displayed in Table 7, the mean PTSD score was 45.01 and indicated that the average level of the development of symptoms of PTSD would be considered “clinical” as recent studies show that most efficient cutoff values were between 30 and 34 for screening purposes. The means of the combat exposure measures varied from 1 to 5; “Did you ever go out on combat patrols or have other very dangerous duties?” ranged from no to 51+ times. “Were you ever under enemy fire?” ranged from never to 4 weeks or more. “What percentage of the people in your unit was killed, wounded or missing in action?” ranged from none to 76% or more and finally, “How often were you in imminent danger of being injured or killed?” ranged from never to 51+ times. These questions were aggregated as the subject was asked to answer these questions for each separate

deployment. As also seen in Table 7, the various combat exposure measure were all significantly, positively, and at least moderately strongly related to each other. As hypothesized, most of these combat exposure measures were significantly and positively related to PTSD although the effect was small (Cohen, 1988).

Simultaneous multiple regression analysis was conducted to investigate the relationship between the set of four combat exposure predictors and PTSD. As seen in Table 8, the set of four combat exposure predictors, taken together, was significantly related to PTSD ($R^2 = .09$, $F(4,413) = 11.38$, $p < .001$ and a change in $R^2 = .10$ (see Figure 6). With respect to the individual predictors, only being under imminent danger was a significant predictor of PTSD ($\beta = .30$, $p < .001$). The remaining combat exposure predictors; “going out on combat patrols or having very dangerous duties”, “being under enemy fire”, and “percentage of people in unit killed, wounded or missing in action” were not statistically significant predictors of PTSD.

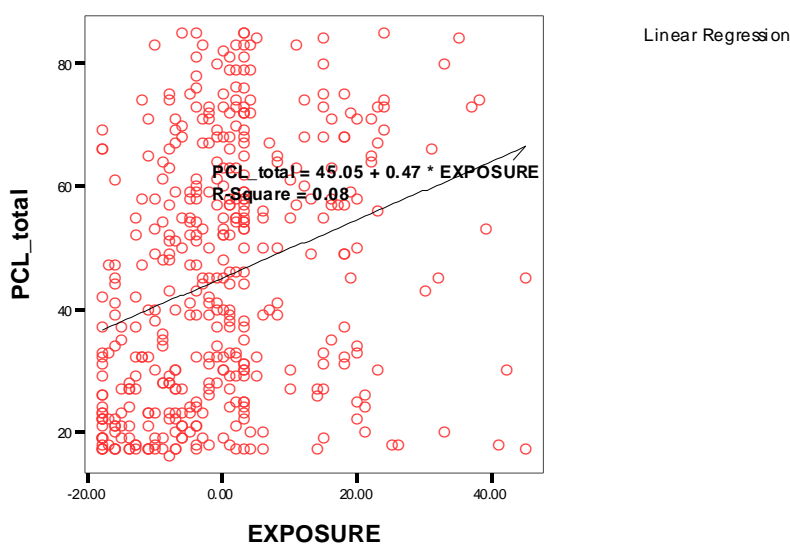


Figure 6. Regression line of combat exposure and the development of symptoms of PTSD (PCL total score)

Aim 3 and Aim 4 results

Covariates were re-coded for analyses in AIM 3. Military preparedness was summed and centered. Combat exposure was summed, weighted as per the CES scoring procedures and centered. Branch was re-coded as 1=Army, 2=other. Race was re-coded as 1=White and 2=other and marital status was re-coded as 1=married/living as married, 2=not married, divorced or widowed (See Table 9).

A correlation matrix was computed with all variables in analyses 3 and 4 (see Appendix 10) to examine the relationships between the variables. The correlation coefficients ranged from .00 to .25 which shows no to little correlation between the variables, except for the correlation between military preparedness and PTSD at .42**, the correlation between combat exposure and number of deployments at .53**, and for combat exposure and the interaction term of military preparedness and combat exposure²; .069**.

A hierarchical, multiple regression modeling approach was used in conducting the analyses for AIM 3. In the first step of the model-building process, the demographic and background variables were entered into the regression model. As shown in Table 8, these demographic and background variables, taken as a set of predictors were marginally significantly related to, predictive of, the development of symptoms of PTSD reported ($R^2 = .03$ (7,376), $p = .09$). Consistent with this finding, only one of the seven “members” of this set of variables was a statistically significant predictor of PTSD, i.e., marital status ($\beta = .15$, $p < .05$). In substantive terms, this finding indicates those veterans who were married or cohabiting reported somewhat greater levels of the development of symptoms of PTSD.

In the second step of building the regression model, the predictor variables, combat exposure and military preparedness, were added to the model containing the demographic and background variables. The incremental change in the development of symptoms of PTSD variance explained by the main effects of these two predictors is quite substantial and highly significant ($R^2 = .23$ (2,374), $p < .001$). Consistent with this finding, both combat exposure ($\beta = .32$, $p < .001$) and military preparedness ($\beta = -.36$, $p < .05$) exhibit approximately equally strong but, as predicted, oppositely signed relationships to the development of symptoms of PTSD. In addition, as of this step in the model-building process, marital status was no longer statistically significant ($\beta = .08$, $p > .05$) but the number of deployments became statistically significant ($\beta = -.13$, $p < .05$). In substantive terms, veterans with greater combat exposure, veterans with lower levels of military preparedness and veterans with fewer deployments reported higher levels of the development of symptoms of PTSD.

The third step in the model building process added the linear interaction between combat exposure and military preparedness to the regression model. As shown in Table 8, the incremental contribution of this term to the “variance explained” in the criterion variable; the development of symptoms of PTSD, was not statistically significant ($R^2 = .003$ (1,373), $p = .25$). This finding indicated the relationship between military preparedness and the development of symptoms of PTSD does not depend on, i.e., does not differ according to, the “level” of a combat exposure. The claim made in Aim 3 was not that the anticipated moderation will take a linear interactive form but rather that it would be a curvilinear interaction. In order to test this claim, the moderator; combat exposure were not only entered separately but is also entered as an interaction with

military preparedness. The fourth step of the model building process incorporated these additional terms.

As seen in Appendix 11, neither of these terms, both of which constitute a test of curvilinear moderation, were statistically significant (both, $p > .05$). The data cannot be said to support the claim of curvilinear moderation by combat exposure of the relationship between military preparedness and PTSD. Instead, both combat exposure and military preparedness appeared to have only main effects on development of symptoms of PTSD.

Chapter 5: Discussion

The purpose of the study was to examine the relationships between military preparedness and combat exposure in the development of symptoms of PTSD in returning veterans from Iraq and Afghanistan and to test a moderating effect of combat exposure on the relationship of military preparedness and the development of PTSD symptoms. Previous studies have examined characteristics of combat exposure and measures of military preparedness that may be associated with the development of symptoms PTSD in the OIF/ OEF veteran population separately (Iversen et al., 2008; Pietrzak, Johnson et al., 2010; Polusny et al., 2009), Only one study to date has examined the relationships between combat exposure and military preparedness (Renshaw, 2011) where it was found that military preparedness did mitigate perceived threat of low combat exposure but did not moderate risk factors with PTSD. To my knowledge, this is the first study to date to examine the moderating effect of combat exposure on the relationship between military preparedness and the development of symptoms of PTSD.

This study was framed using an inoculation theory developed by McGuire (1961b). Previous articles examining the prevention of PTSD (Deahl et al., 2000) and the treatment of PTSD (Meichenbaum, 1993; Meichenbaum, 2007) using an inoculation framework have employed Stress Inoculation Theory (SIT) (Deahl, 1998). Briefly, SIT states that there is a linear relationship between stress and ability to manage this stress. While the military has begun to fund prevention programs using SIT, rigorous intervention studies and program evaluations have yet to be published (Hourani et al., 2011). McGuire's (1961) inoculation theory as a framework for prevention was unique as it employed a cognitive process of refutation to reinforce existing attitudes, beliefs and

behaviors (McGuire, 1961b; McGuire, 1964b; McGuire, 1999) that could possibly protect soldiers from the development of symptoms of PTSD due to a cognitive pathway that is unlike SIT which employs a biological pathway. Inoculation theory also assumes a curvilinear relationship between maintenance of existing beliefs and attitudes when faced with a stress contrary to those beliefs. Beliefs are generally not strong or permanent when not challenged or stressed, become stronger when stressed, finally beliefs can be changed when the stress is too great. Using a unique framework adds to the literature to illustrate pathways of the development of PTSD in the OEF/OIF population as well as prevention models of PTSD research remains in its infancy.

Several aims were used to guide the purpose of this study. This study examined the relationships between measures of combat exposure and military preparedness to predict the development of symptoms of PTSD in OEF/OIF veterans. Hierarchical multiple regression analysis were performed to examine the moderating effect of military preparedness on the relationship between combat exposure and the development of symptoms of PTSD. Using the military preparedness and combat exposure scale provided in the WRIISC Initial Health Questionnaire, analyses found that both military preparedness and combat exposure equally predict the development of symptoms of PTSD, but in opposite directions. It was also found that there was no interaction between these variables as each variable predicts the development of symptoms of PTSD in separate pathways. The individual military preparedness items from the aggregate measure of military preparedness from the Initial Health Questionnaire of pre-deployment training, emotional and psychological support and transition to civilian life support were significant predictors of the development of symptoms of PTSD and

transition to civilian life was the strongest predictor. Being under imminent danger was the only combat exposure item that predicted the development of symptoms of PTSD. Among the demographic variables used in the model for this study, only number of deployments was significant in predicting the development of symptoms of PTSD. This study found that one deployment was more predictive of the development of symptoms of PTSD than two or three deployments. The literature has not reached consensus on the impact of multiple deployments and post deployment PTSD in the OEF/OIF veteran population. Some studies found that the increase in number of deployments in significantly associated with post deployment PTSD (Cohen et al., 2009; Phillips et al., 2010) while other studies have also found that multiple deployments were not significant in the diagnosis of PTSD (Goldmann, Calabrese, Prescott, Tamburrino, Liberzon, Slembariski, & Galea, 2012; Kline et al., 2010; Pietrzak & Southwick, 2011), but were found significant in the increase in utilization of services and mental health needs (Kline et al., 2010; Seal et al., 2007; Seal et al., 2009). These mixed results call for more research to clarify the impact of deployments and PTSD.

This sample was unique in that it had a higher prevalence of the development of symptoms of PTSD as compared to studies found in the literature. Forty-two percent of the sample had a PCL score of over 50 (i.e. indicating the presence of PTSD). Previous studies have reported a prevalence rate of PTSD in veterans from Iraq and Afghanistan ranging from 9-38% (Grieger et al., 2007; Hoge et al., 2004; Hoge et al., 2006; Thomas et al., 2010; Vasterling et al., 2010). This larger than expected rate in this study could be explained by the fact that this sample is seeking treatment for unexplained medical symptoms and prior research has shown that injured soldiers are at higher risk for PTSD

(Hoge et al., 2006; Hoge et al., 2007; Seal et al., 2007; Seal et al., 2009) and veterans who are married or living as married, 41% of this study, seek medical treatment more often than non-married veterans (Erbes, Westermeyer, Engdahl, & Johnsen, 2007). Veterans seen at the WRIISC, where this study data originates, are automatically assessed for PTSD during the evaluation even if they have not described symptoms usually identified as being at risk for PTSD. Therefore, the process of the medical evaluation will mostly likely produces results of higher levels of PTSD because everyone in the sample is being evaluated. Typically, in the VA, PTSD evaluation is only done when a patient screens positive for possible PTSD symptoms.

The development of symptoms of PTSD in OEF/OIF veterans is not clearly defined. Studies have examined risk and resilience variables (Pietrzak et al., 2009; Pietrzak, Johnson et al., 2010; Pietrzak & Southwick, 2011; Polusny et al., 2009; Renshaw, Rodrigues, & Jones, 2009) but little is known on the relationships between these variables. This study extended the literature by using enlisted as well National Guard and Reserve veterans and examined pre (training prior to deployment), peri (received the emotional and psychological support needed to do job properly), and post-deployment (support needed to transition to civilian life) measure of military preparedness.

Relationship between combat exposure and PTSD

The results from this study show that the perception of “being under imminent danger”, a question in the Health Inventory Questionnaire, was the strongest predictor of the development of symptoms of PTSD suggesting that the service members’ assessment of their surroundings, ability to be safe and to perform their job was more important than

potential danger of their current situation. This study confirmed previous studies that stated that an increase of combat exposure predicts mental health disorders in the OEF/OIF veteran population (Hoge et al., 2004; Kang et al., 2003; Kang & Hyams, 2005). For example, Rona and colleagues (2009) previously analyzed individual combat exposure experiences and found that service members from the UK who were under small arms fire, and who discharged a weapon in combat, and those who were in close proximity with the enemy and seeing personnel wounded or killed were strongly associated with development of PTSD. Phillips et al. (2010) found that US Marine OEF/OIF veterans that felt they were in great danger of death, were shot or seriously injured and who saw someone wounded or killed were independently associated with PTSD. Both of these studies support the concept that being in “imminent danger” is associated with PTSD as found in this study.

Also, an early study on Vietnam veterans found that combat-related guilt is associated with PTSD severity and experiencing different types of combat exposure may elicit these feelings of guilt that could contribute to the development of symptoms of PTSD (Frueh, 1997). The results of this present study support that the development of symptoms of PTSD can follow a cognitive pathway and that interventions such as mental and emotional support during deployment as well as transition to civilian support could lessen the combat-related guilt associated with PTSD. Other studies have demonstrated that specific combat experiences are differentially associated with severity and probable diagnosis of PTSD in OEF/OIF veterans (Maguen et al., 2006; Phillips et al., 2010). The results of this study may suggest that there are opportunities to intervene at different phases of deployment with targeted services, i.e., emotional and psychological support

during deployment, to lessen the risk of PTSD as relationships between types of support at specific time frames were found to be significant. Assessment of service members' well-being throughout the deployment experience may be able to inform the military of when and where intervention can be most effective.

Relationship between military preparedness and PTSD

The second aim of this study was to examine the impact of military preparedness and the development of symptoms of PTSD. This study found an inverse relationship between military preparedness and the development of symptoms of PTSD suggesting that high military preparedness immunizes service members from the development of symptoms of PTSD. These results support a previous study that found that high levels of pre-deployment preparedness in National Guard veterans was associated with lower levels of PTSD (Renshaw, 2011). Another study of Ohio National Guard veterans also found that preparedness, defined by knowing what to expect, having adequate supplies and training, was also associated with lower odds of developing deployment-related PTSD (Goldmann et al., 2012). Interestingly, a study by Polusny et al. (2009) found no differences in perceptions of preparedness and prevalence of PTSD in previously deployed OEF/OIF National Guard service members suggesting that the research is inconclusive regarding the perceptions of military preparedness is protective against the prevalence in PTSD in the OEF/OIF population. These results may be accounted for as this particular sample had lower measures of unit cohesion, such as “my unit is like family to me”, “I am impressed by the quality of the leadership in my unit”, which is also related to the development of PTSD (Brailey et al., 2007).

In this study, the following qualities of examine military preparedness; training prior to deployment, emotional and psychological support during deployment, and transition to civilian life were predictive of lower levels of development of symptoms of PTSD; therefore, potentially protective of the veteran's mental health. The finding of increase of training prior to deployment agrees with the work of protective factors in developing PTSD in the OEF/OIF veteran population (Hoge et al., 2004; Osinubi et al., 2012; Renshaw et al., 2009) and in the first responder literature as well (Perrin et al., 2007). What this study lacked is what makes a service member feel he/she received the appropriate training prior to deployment. This question has not been answered in the research and is an area for exploration.

Emotional and psychological support during deployment was found to have a protective effect against the development of symptoms of PTSD. To date, there are no published research studies on the relationship between emotional and psychological support during deployment. However, there is an interest in the military to pilot a project to provide emotional and psychological support during deployment. In other studies, (Adler, Castro, & McGurk, 2006; Adler et al., 2008), it was found that the results from a four month follow-up with 1,060 participants showed those with high levels of combat exposure who received Battlemind debriefings, Small Group Battlemind,, and Large Group Battlemind Training reported fewer post-traumatic symptoms than those in the standard stress education. Concerns in this report noted that leaders in the unit be adequately prepared to provide support and that the mental health professionals assigned to help the service members be credible in the military culture, i.e., actual service members and be part of the unit or mobile so that service members in remote locations

could still receive services. Leaders who took part in the project felt chaplains were in the unique position to be available and knowledgeable of both the military environment and of mental health services (Adler et al., 2008). There have been no published research studies to look at the effectiveness of emotional and psychological support during deployment. This is an area that will need research to target appropriate interventions.

Further research in the area of transition to civilian support is necessary to understand the individual nuances of needs of our veterans. Transition to civilian life support was the most significant item that protected a soldier from PTSD. This finding is consistent with a previously mentioned study by Goldman, (2009). That study found that rescue and recovery workers who had disaster preparedness training after the event were at lower risk for PTSD (Dyregrov et al., 1996). Similarly, more recently in the World Trade 9/11 disaster literature, it was found that workers, including fire fighters, police, and mental health workers were less likely to develop PTSD if they had disaster preparedness training (Bills et al., 2008; Fullerton et al., 2006; Perrin et al., 2007). YET, the research demonstrates that debriefing does not reduce rates of PTSD post trauma (Deahl, 2000), so understanding the type of support is helpful to reduction or prevention of the development of PTSD symptoms is crucial. Transition to civilian life, support that is more often called "post deployment support" in the literature, has been found to be associated with higher rates of resilience and lower rates of vulnerability to PTSD (Benotsch et al., 2000; Polusny et al., 2009). A study by Browne et al. (2007) suggests that post-deployment support and intervention can enhance a veteran's resources and alleviate stressors to enhance recovery and resiliency. Other studies have found that social support partially mediated the relationship between PTSD and depressive

symptoms in veterans (Iversen et al., 2008; Pietrzak et al., 2009; Vogt & Tanner, 2007; Zatzick et al., 2004). There have also been studies suggesting that veterans who use post deployment support services tend to be more resilient (Sharkansky, King, King, Wolfe, Erickson, & Stokes, 2000). What is not clear from this study or from the literature is what type of post-deployment support best helps the veteran avoid the development of symptoms of PTSD. There have been steps already taken in the area. In New Hampshire, the National Guard created a program named the “Full cycle Deployment Support” to provide support to All New Hampshire Reserve and National Guard service members and their families pre, peri, and post deployment (Shea-Porter, 2009). Each family was assigned a skilled care coordinator in a case management capacity to address any issues around of planning for deployment, and problems in the areas of finance, employment, counseling, child care, and access to mental health services. There has been no research published to date on the effectiveness of this program and if it can diminish the prevalence of PTSD.

The final aim of this study was to test the moderating effect of combat exposure on the relationship between military preparedness. Using the lens of inoculation theory developed by McGuire (1961), it was expected that there would be a moderating effect of combat exposure on the relationship between military preparedness and the development of PTSD. This was not supported. It was found that both combat exposure and military preparedness were almost equally predictive of the development of symptoms of PTSD, but there was neither a linear nor a curvilinear interactive relationship. This study confirmed a recently published study by Renshaw (2011) that also found that pre-deployment preparedness did not moderate combat experiences, post-battle experiences,

and perceptions of stress to the development of post-deployment PTSD symptoms. This implies that there is no relationship between military preparedness and combat exposure to predict the development of symptoms of PTSD. Further studies are needed to understand if there is any relationship between these two variables in the veteran population.

The mechanism(s) for the development of symptoms of PTSD in OEF/OIF veterans is not clearly defined in the literature. Studies have examined risk and resilience variables (Pietrzak et al., 2009; Pietrzak, Johnson et al., 2010; Pietrzak & Southwick, 2011; Polusny et al., 2009; Renshaw et al., 2009) but little is known about the relationships between these variables. The study extended the literature by using enlisted as well National Guard and Reserve veterans and examined pre (training prior to deployment), peri (received the emotional and psychological support needed to do job properly) and post-deployment (support needed to transition to civilian life) measure of military preparedness. This study highlights specific aspects of military preparedness at specific times of deployment that could be further studied to develop interventions.

Relationship of covariates

This study found that none of the covariates, branch, age, employment status, or gender had a significant relationship with the development of symptoms of PTSD in this study except for marital status and number of deployments. Further, this study found that branch of military was not significant in predicting the development of symptoms of PTSD. Previous studies have shown mixed results in examining the interaction of service branch and PTSD. Baker (2009) and Baker et al. (2009) found that Army and Marine veterans were almost twice as likely to screen positive for PTSD symptoms as

Navy veterans, however, other studies found that there were no differences in rates of PTSD among the different branches (Seal, 2007; Seal et al., 2007).

This study found that age was not related to the development of symptoms of PTSD. This contradicts prior studies that have found that younger age was a risk factor for PTSD (Brewin et al., 2000; King et al., 2004). Interestingly, another study found that veterans who served as active duty service members under the age of 25 were at higher risk for developing mental health concerns, including PTSD, than were veterans who served as active duty service members over 40, (Hall et al., 2012; Vogt et al., 2008; Samper et al., 2008) while others (Vasterling et al., 2010; Vogt et al., 2008) found that National Guard and reserve veterans over 40 in that study were at higher risk than their under 25 counterparts. There were similar conflicting results found in other studies. For instance, Schnurr (2009) found older veterans at risk while West (2006) found younger veterans at risk. It has been suggested that older veterans who are National Guard and reserve veterans in OEF/OIF have had their lives uprooted with multiple deployments cite source. They often have to take lower pay while being deployed and are away from their families for very long periods of time. Upon transitioning to civilian life, their jobs may not be secure, family dynamics have changed and support for the veteran may not be readily available. The younger veterans, who are also at risk for PTSD, often struggle with trying to find a job and creating a social network. By becoming a veteran, they have decided to separate from active duty where they had affiliation with a group, work and colleagues. To become a veteran at a young age may not be an easy transition (Hall et al., 2012). Skills learned in the military are not always translatable to civilian work. Young veterans peer groups may have no understanding of the veteran's experience.

Young veterans also may still be living at home and going through normal developmental separation stages that are compounded with their service experience. These factors may have an effect on why they are vulnerable to PTSD (Vogt et al., 2008).

Employment status was not significant in the development of symptoms of PTSD. The literature is consistent that veterans with mental health concerns, including PTSD are more likely to be unemployed (Burnett-Zeigler, Valenstein, Ilgen, Blow, Gorman, & Zivin, 2011; King et al., 2004; Schnurr et al., 2009). Due to data collection recording methods, the current study was not able to discern full-time employment from part-employment. If that distinction was made, it is likely that veterans with full-time employment might have had lower levels of the development of symptoms of PTSD (Smith, Schnurr, & Rosenheck, 2005).

Women comprise approximately 14% of military personnel deployed in support of OEF/OIF (Hall et al., 2012), and this study had a similar percentage of women at 12%. In this study, women were not more likely to develop symptoms of PTSD than men. The literature is mixed in supporting this finding. Hoge (2004) reported that female service members present with more mental health concerns, including PTSD, than men, but it has been also found that female service members have higher baseline rates of PTSD and other mental health concerns prior to deployment than male service members (Litz, 2007). In a study by Luxton, Skopp, & Maguen (2010) it was found that female service members who report higher levels of combat exposure are at greater risk for depression and, not PTSD, than their male counterparts. Maguen (2012) also found no difference in PTSD symptoms between men and women but found women had high rates of PTSD

when injured. These contradictory results support the need for continued research to understand the mechanisms and nuances of the development of symptoms of PTSD.

An interesting finding in this study was that having just one deployment was significant with development of symptoms of PTSD while having two and three deployments were not. There are mixed results in the literature regarding the impact of multiple deployments and association with PTSD. Phillips et al. (2010) found that service members with two deployments were at greater risk for a positive screen for PTSD but not for other mental health screening results including depression and anxiety. Other studies found that service members had a significant increase in utilization of services and mental health needs with multiple deployments (Kline et al., 2010; Seal et al., 2007; Seal et al., 2009). On the other hand, some studies have found that multiple deployments were not significant in the rate of PTSD diagnosis (Goldmann et al., 2012; Kline et al., 2010; Pietrzak & Southwick, 2011). Finally, a study of UK armed forces found no association between the numbers of deployments for any mental health outcome measurements including PTSD (Fear et al., 2010). This study may not support the literature since the impact of number of deployments was only calculated up to three deployments and were examined within a framework that employed a possible curvilinear relationship.

Relationship of results within inoculation theory framework

Applying McGuire's Inoculation theory to the results of this study offers some direction in practice, policy, and programming implications. As previously stated, inoculation theory posits that a stress is necessary to maintain and strengthen existing attitudes, beliefs and opinions (McGuire, 1961a; McGuire, 1964a; McGuire, 1999). The

stress to the existing belief system must be strong enough to make the receiver defensive but not weak enough to change the existing belief framework. The theory argues that the more active the receiver is in activating his/her defenses, the stronger the original attitude, beliefs, and opinions will be (McGuire, 1964b). If the stress is too strong and without warning, the stress could overwhelm the belief system and the defenses do not have the opportunity to activate.

This study found that just one deployment was more predictive of the development of symptoms of PTSD than two or three deployments. This finding can be explained using McGuire's (year) inoculation theory framework. Inoculation theory as a framework suggests that veterans with one deployment may have received a stress to their beliefs and attitudes by conditions of deployment and the opportunity to protect one's attitudes of beliefs, the first key of successful inoculation (Pfau et al., 1997), but the stress may have not been strong enough to activate defenses against it or they did not have the opportunity to refute the stress which provides motivation to protect their initial belief system. Veterans with two and three tours may have been able to have the opportunity of refutational preemption, the second component of successful inoculation, the cognitive process to activate one's own argument for future defense and strengthen their existing attitudes through counter arguing (Compton & Pfau, 2005; McGuire, 1961a; Pfau et al., 1997). Currently, there is a newer program, Time-driven Battlemind Psychological Debriefing (PD), used by some platoons in the Army, and it is designed to reduce mental health symptoms for the entire unit by implementing five phases of debriefings at different intervals of deployment. The components of the debriefings include steel your Battlemind, trust your training, listen to your leaders, and be a buddy

(Adler et al., 2006). This program is a good example of refutational preemption. At each stage of debriefings, the service member is given the opportunity to focus and re-learn and activate their own argument for purpose of the mission, faith, and trust in self and other service members. This could be accomplished with additional training and access to emotional and psychological support or participating in a unit with strong cohesion. Studies have found that strong unit cohesion may protect against PTSD (Brailey et al., 2007; Pietrzak et al., 2010; Pietrzak, Johnson et al., 2010); multiple deployments do offer the opportunity for stronger unit cohesion, which suggests the ability to reinforce attitudes and beliefs regarding the soldier's role and ability to complete their mission.

Examining at all the results from this study within an inoculation framework may provide opportunities for intervention. There was not a curvilinear relationship but a linear relationship between military preparedness and the development of symptoms of PTSD. Military preparedness was found to be protective at immunizing the veteran from the development of symptoms of PTSD at three different stages of military service in this study: training prior to deployment, emotional and psychological support during deployment, and transition to civilian life post deployment. Military preparedness could also be targeted by prevention within the inoculation framework as inoculation theory would suggest that the perception of "feeling under imminent danger" could be either reduced or increased based on strong belief and attitude of the soldier based on their level of preparation and belief in the mission and with opportunities to reinforce existing beliefs through stress. Interventions can be offered at each of these stages to reinforce attitudes and beliefs of the servicemen and women to protect them from the development of symptoms of PTSD in the future.

Opportunities for Social Work

Military social workers are in a key position to participate and develop prevention programs interventions at various stages of deployment. This study has shown that military preparedness can have an impact at three stages: training prior to deployment, emotional and psychological support during deployment, and transition to civilian life post deployment. Social workers can intervene through direct practice and program development at the pre, peri, and post deployment times frames. Interventions can be tailored within the inoculation theory framework to assist the service members to identify, strengthen and maintain their beliefs and attitudes surrounding their identity and role as service members. This is the potentially the domain of social work. The development of programs and interventions themselves is the prevue of social work. Access to different types of care: psychological, support groups, religious, employment, academic and peer support can be implemented and evaluated to see what types of programs and what types of interventions have an effect of these modifiable characteristics of deployment and the eventual effect of the development of symptoms of PTSD. These programs and interventions can also be implemented and evaluated at different types during deployment.

A service member has the opportunity to develop and reinforce a belief system regarding his/her role in the military, his/her job requirement and the importance of his/her contribution to support the mission prior to deployment (during training), during deployment (through psychological and emotional support) and post-deployment (through social support). A social worker can intervene at each one of these described points and assist the service member in assessing perceived level of military preparedness

and target interventions to support and reinforce service member's belief in their ability to perform his/her duty. Characteristics such as self-efficacy and locus of control, previously found to be protective factors in the development of PTSD can be developed and strengthened through the military preparedness variables examined in this study. Both concepts have been previously studied and found to be protective in developing symptoms of PTSD (Karlin et al., 2010; Pietrzak et al., 2009; Pietrzak & Southwick, 2011). This study did not examine these concepts specifically, but it did find the opportunities of training prior to deployment, psychological and emotional support during deployment, and social support post-deployment where these areas of support could be improved and studied bolstered. This is the first step in immunizing service members from potential stress, such as combat exposure that may challenge a service member's well-being thereby leaving him/her vulnerable to the development of symptoms of PTSD. This could be achieved with the addition of social work services to include psychoeducation on what to possibly expect and how to prepare for the stress of combat exposure, thereby strengthening the training message of preparedness and thereby "inoculating" the service member from the impact of military service, therefore, effectively reducing the development of symptoms of PTSD. This intervention could function within the inoculation framework as the "warning" component to activate defenses against possible stress to the belief system. Social workers could offer both individual and group models to service members in preparation for deployment.

This study found that emotional and psychological support to do one's job properly immunized service members from the development of symptoms of PTSD. Access to services that provide emotional and psychological support gives the service

member the setting to discuss their beliefs and attitudes about the task at hand and the opportunity to refute the stress that they may have encountered. Receiving emotional and psychological support may provide the service members with the chance to activate cognitive defenses to protect against perceived deployment stressors that could both be refutational same or refutational different. Interventions to provide emotional and psychological support can be provided in diverse ways. Traditional psychotherapy, groups, peer support, and religious support can all be used to provide this type of support. Ongoing intervention during deployment may have an impact on the development of symptoms of PTSD.

Post deployment is a crucial time to offer support to veterans to strengthen their original belief system about their role in the military and to provide ongoing support to help activate any necessary defenses to protect them from the development of symptoms of PTSD. Transition to civilian life support can give the veteran the opportunity to use refutational preemption to possibly counteract messages from the community, media or own self-doubt about the military mission and his/her role in the conflict by strengthening his/her pre-existing beliefs and attitudes. Be sure your paragraphs are at least three sentences long.

This study found that military preparedness is a modifiable characteristic of deployment that may immunize service members from the development of symptoms of PTSD. For each identified area of military preparedness, training prior to deployment, emotional and psychological support, and transition to civilian life support, programs and interventions can be put in place. In the pre-deployment phase of preparedness, programs could be used to strengthen the attitudes and belief system of the soldier to cognitively

prepare for the experiences of combat. Emotional and psychological support could be provided in-theater to maintain and strengthen attitudes and belief systems to protect from the development of PTSD. And finally, upon discharge, veterans should be provided an array of services to assist them in their transition to civilian life.

Impact on Social Work

The VA is the largest employer of social workers in the United States, employing approximately 4,000 master's level social workers and training approximately 900 social work students per year (Social Work Policy Institute, 2005). The opportunity for social workers to have an impact in the areas of prevention and treatment of PTSD is enormous. Social workers possess unique assessment and intervention training that is nonjudgmental and inclusive of all kinds of people (Bisman, 2004). This is a beneficial contrast to the ridged homogeny of the military culture that has little consideration for individuality. Social workers are trained from an eco-systems and strengths' perspective that allows them to see the veterans and his/her family within their unique setting, enlist their strengths and connect with resources that could help with both prevention and treatment options (Bisman, 2004).

Social Work Education

With so many social workers working within the VA and in agencies that serve the veteran population, it is imperative for social workers to be prepared for the numerous opportunities to work with veterans and their families. Social work students need to be prepared to work within an interdisciplinary framework. Due to comorbid problems veterans face with a diagnosis of PTSD (Jakupcak, Cook, Imel, Fontana, Rosenheck, & McFall, 2009), the veteran will often work with other professionals and social workers

often have the task of coordinating services. Social workers have the unique experience of working with clients, including veterans and their families from multiple perspectives. For example, Wood and Tully (2006) provide the four quadrant model to develop interventions: to work with the client, groups of clients, work with non-clients on behalf of clients, and work with non-clients on behalf of a category of person's at risk. A solid educational foundation in this model will provide the future social worker with the skills necessary to work clinically with a service member prior to, during and when transitioning to civilian life. The social worker should be trained to advocate for the veteran upon separation from service providing group work or working within the community to match service availability to veteran need for transition to civilian life. Advocating at the local, state, and national level is the domain of social work and understanding the unique needs and challenges, as well as the strength of service members will provide future social workers with the information necessary to make an impact.

Future social work curricula will need to address the military culture, available veteran services and the strategic areas of intervention highlighted in this study. Social work schools need to provide a course on cultural competence, particularly with respect to military culture. Optimally, schools of social work should consider specialization in military social work. A few social work schools, Fordham University, University of Southern California and University of North Carolina-Fayetteville, have developed military social work concentrations in their social work master's programs to prepare their social work students to work within the framework of the military or work in agencies that will service the veteran community

Social Work Practice

Social workers perform the following services at the VA: assessment, crisis intervention, high-risk screening, discharge planning, case management, advocacy, education, and psychotherapy (VA Administration, 2011). These services are performed after the service members have separated from active duty. These are services provided to help with transition to civilian life. This study reminds social workers that these services can be connected; they all can contribute to a positive transition to civilian life. This may help protect the veteran from the development of PTSD. The assessment skill set that social workers are trained to use will be imperative in discovering the unique needs of the individual veteran that will support them in their transition to civilian

Social Work Policy

Social workers can play an important role in the areas of policy and programming in the area of PTSD prevention. This study identified three areas of military preparedness where social work can intervene: training prior to deployment, mental health support during deployment, and transition to civilian life. Social workers can advocate to part of the training program pre deployment. Social workers can assess the soldiers' individual challenges that could make them vulnerable to the development of symptoms of PTSD as well as their strengths to protect them. During deployment, social workers could be part of the military team to provide ongoing counseling services to help veterans maintain their mental health. Social workers can support, create, and fight for legislation that continues to fund research for the causes, prevention, and treatment of PTSD. Local, state, and federal programs can be supported and created to address the needs of veterans and their families, especially around transition to civilian life. Social

workers can also work with existing agencies and connect duplicate services to address the needs and challenges of veterans.

Strength of the study

The results of this study add to the literature in several ways. It looks at the development of symptoms of PTSD from the lens of the inoculation theory and focuses future research in the direction of primary prevention and not just secondary prevention and treatment. The strategy of primary prevention has been supported with recent efforts by the United States Department of Defense (DoD; Hourani et al., 2011). Although, primary prevention of PTDS efforts in the military has been limited and has results have not been published. There have been some efforts to minimize high-risk recruits (Deahl et al., 2000; Hourani et al., 2011).

The WRIISC has been operating as a program for over 10 years, so data collected on the veterans in this study were collected in a consistent manner. The data include both medical and psychosocial variables that support the required analyses. The data also included veterans for all branches of the military. The data were drawn from a time that active conflicts were occurring, therefore, exposure to combat was highly likely and recall of experiences was recent for veterans in their reporting.

Limitations of study

There are several imitations of this study. First, the sample was unique in that it had a higher prevalence of symptoms of PTSD as compared to studies found in the literature. Forty-two percent of the sample had a PCL score of over 50 (i.e. indicating the presence of PTSD). Previous studies have reported a prevalence rate of PTSD in veterans from Iraq and Afghanistan ranging from 9-38% (Grieger et al., 2007; Hoge et

al., 2004; Hoge et al., 2006; Thomas et al., 2010; Vasterling et al., 2010). This larger than expected rate in this study could be explained by the fact that this sample is seeking treatment for unexplained medical symptoms and prior research has shown that injured service members are at higher risk for PTSD (Hoge et al., 2006; Hoge et al., 2007; Seal et al., 2007; Seal et al., 2009). Also, veterans who are married or living as married, 41% of this study, seek medical treatment more often than non-married veterans (Erbes et al., 2007). Furthermore, veterans seen at the WRIISC, where this study data originated, are automatically assessed for PTSD during the evaluation even if they have not described symptoms usually identified as being at risk for PTSD. Therefore, the process of the medical evaluation could produce results of higher levels of PTSD because this cohort is being evaluated for PTSD; typically, in the VA, a PTSD evaluation is only done when a patient screens positive for possible PTSD symptoms. These unique features need to be considered in the interpretation of results.

Second, the results of this study are not generalizable and are specific to this sample group as the sample was drawn from veterans who presented to the WRIISC for a health evaluation. Third, the military preparedness scale has not been validated. The scale is almost identical to the DRRI and was treated as such statistically. When the WRIISC started evaluations in 2003, the DRRI was not yet published or used extensively. As a result of this study, the WRIISC is considering using the DRRI as it is now the standard scale used in the literature. Finally, the measures used were obtained by self-report which can have recall bias and the questions may be open to interpretation on how the subject can answer.

Implications for future research

This study has many suggestions for future research. The development of symptoms of PTSD is a complex process with many possible contributing variables. PTSD is a significant problem in the military and there has been increased attention and resources dedicated to understanding this process and the most effective methods of prevention and secondary prevention. Military preparedness is a modifiable variable and a significant predictor of the development of symptoms of PTSD and should continue to be studied. Military preparedness is multifaceted; it can be described as training, emotional and psychological support, social support as well as belief systems. Evaluation of the type of military preparedness, the time of deployment (i.e., pre, peri, and post deployment) the military preparedness took place and the possible effect on the development of symptoms of PTSD would be invaluable knowledge to the military in caring for its troops. While there are new prevention programs, the effectiveness of the programs have not been published. Social workers can be part of existing research projects and to create new project to assess the complicated needs and needed services of veterans' pre, peri, and post deployment. This study also suggests more research on the effect of number of deployments and the relationship to PTSD. The literature remains unclear and this study found different results than previously found.

Table 1

Correlations Between Military Preparedness Measures

Measure	Training Prior	Training During	Support Physical	Support Mental	Support Civilian
Training Prior		.67**	.50**	.43**	.35**
Training During			.62**	.50**	.37**
Support Physical				.57**	.37**
Support Mental					.53**
Support Civilian					

Cronbach's Alpha ($\alpha=.83$)*Note.* * $p<.01$, ** $p<.001$

Table 2

Correlations Between Cumulative Combat Exposure Measures

Measure	Dangerous Patrols	Enemy fire	Unit Killed	Imminent Danger
Dangerous Patrols		.67**	.58**	.73**
Enemy fire			.57**	.71**
Unit Killed				.49**
Imminent Danger				

Cronbach's alpha ($\alpha=.79$)*Note.* * $p<.01$, ** $p<.001$

Table 3

Original Demographic Variables

Variables	Coded
Gender	0=female 1=male
Age	years
Race	1=American Indian/Alaskan 2=Asian 3= Black/African Heritage 4= Hawaiian/Pacific Islander 5= White 6= Unknown 7=Other
Branch of Military	1= Navy 2= Air force 3= Marine 4= Army 5= Coast Guard
Marital Status	1=Married 2=Divorced 3=Never Married 4= Widowed 5=Separated 6= Living as Married
Employment	0= Not employed 1= Employed

Table 4

Characteristics of Study Cohort (N=418)

Predisposing Factors	Weighted Means (SD)
Gender (%)	
Male	88.00
Female	12.00
Age	32.00 (9.67)
Race (%)	
American Indian/Alaskan	1.40
Asian	3.30
Black/African Heritage	32.00
Hawaiian/Pacific Islander	1.00
White	55.00
Unknown	1.00
Other	13.40
Branch (%)	
Navy	6.00
Air force	6.00
Marine	20.00
Army	67.00
Coast Guard	.20
Marital Status (%)	
Married	39.00
Divorced	39.00
Never Married	10.00
Widowed	.50
Separated	5.00
Living as Married	2.00
Employment (%)	
Employed	52.00
Not employed	46.00
Deployments	1.38 (.63)
PCL score	45.05 (20.47) 16.00-
18.00	
% of participants with PCL scores \geq 50	42.00%

Table 5

Means, standard Deviations, and Intercorrelations for PTSD and Predictors Variables (N=408)

Variable	Mean	Min	Max	SD	1	2	3	4	5
PTSD	45.01	16	85	20.51	-.27*	-.23	-.24	-.38**	-.48**
Predictor Variables									
1 Training Prior	1.29	0	2	.73	--	.67**	.50**	.43**	.35**
2 Training During	1.37	0	2	.71		--	.62**	.49**	.37**
3 Support Physical	1.23	0	2	.75			--	.57**	.37**
4 Support Mental	.96	0	2	.79				--	.53**
5 Support Civilian	.81	0	2	.78					--

*p<.05, **p<.001

Table 6

Regression Analysis Summary for Training Prior, Training During, Support Physical, Support Mental, and Support Civilian Predicting PTSD (N=408)

Variable	B	SE B	β
Training Prior	-3.19	1.66	-.11*
Training During	1.57	1.90	.05
Support Physical	.65	1.63	.02
Support Mental	-4.45	1.51	-.17**
Support Civilian	-10.00	1.35	.38**
Constant	58.50	2.04	

Note $R^2 = .26$; $F(5, 402) = 28.17$ $p < .001$

Adjusted $R^2 = .25$

* $p < .05$, ** $p < .001$

Table 7

Means, standard Deviations, and Intercorrelations for PTSD and Predictors Variables (N=418)

Variable	M	Min	Max	SD	Dangerous Patrols	Imminent Danger	Enemy Fire	Unit Killed
PTSD	45.10	16.00	85.00	20.47	.24**	.31**	.23**	.14*
Dangerous Patrols	7.00	0.00	24.00	5.53		.73**	.67**	.58**
Imminent Danger	6.82	0.00	24.00	5.06			.71**	.48**
Enemy Fire	3.22	0.00	12.00	2.68				.57**
Unit Killed	.88	0.00	5.00	.88				

* $p < .05$, ** $p < .001$

Table 8

Regression Analysis Summary for Dangerous Patrols, Imminent Danger, Under Enemy Fire, Unit Killed Predicting PTSD (N=408)

Variable	B	SE B	β
Dangerous Patrols	.11	.28	.03
Imminent Danger	1.22	.31	.30*
Under Enemy Fire	.06	.56	.01
Unit Killed	-.65	1.39	-.03
Constant	36.36	1.68	

Note $R^2 = .10$; $F(4, 413) = 11.388$ $p < .000$

Adjusted $R^2 = .09$

* $p < .001$

Table 9

New Characteristics of Study Cohort (N=418)

Predisposing Factors Mean (S.D.)	Characteristics Weighted
Gender (%)	
Male (N=367)	88.00
Female(N=48)	12.00
Age (Range 20-61)	32 .00(9.67)
Race (%)	
White (N=230)	55.00
Other (N=179)	45.00
Branch (%)	
Army (N=279)	67.00
Other (N=138)	33.00
Marital Status (%)	
Married (N=172)	41.10
Not Married (N=226)	54.10
Employment (%)	
Employed (N=220)	52.00
Not employed (N=192)	46.00
Deployments (Range 1-3)	1.38 (.63)

Table 10

Descriptive statistics and correlation among military preparedness, combat exposure, deployments and demographic variables (N=408)

Variable	P	CE	Dep	Age	Gen	Bra	Mar Stat	Race	PCL	CE X Prep	CE ²	Prep X CE ²
Prepar		.71**	0.07	0.00	0.04	-0.09	**-.14	0.07	**-.42	-0.04	**-.21	**-.22
CE			** .53	-0.04	-0.21	-0.02	0.05	**-.12	** .29	** .14	-0.01	** .69
Depl				0.06	-0.1	**-.25	-0.01	-0.05	0.12	0.02	-0.03	** .37
Age					-0.07	** .27	** .25	0.08	0.05	0.02	0.06	-.00
Gender						* .11	**-.17	** .13	-0.03	.00	-0.06	** .12
Branch							0.03	0.06	-.00	-.00	0.00	-0.03
Marital Status								-0.04	** .14	0.01	** .12	0.01
Race									-0.06	-0.04	-0.06	-0.07
PCL										-0.10	0.02	** .25
CE X												
Prep											-0.13	** .14
CE ²												-.00
Prep X CE ²												

*

*p<.05, **p<.001

Table 11
Summary of Hierarchical Regression Analysis for Variables predicting PTSD symptoms (N=408)

Variable	B	S EB	β
Step 1			
Gender	.85	3.37	.01
Number Deployments	1.33	1.75	.04
Age	.01	.12	.01
Employment	-1.51	2.14	-.04
Branch	3.58	2.43	.08
Marital Status	6.28	2.22	.15*
Race	-2.06	2.15	-.05
R ² change = .03, (7,376), p = .09			
Step 2			
Gender	4.17	3.01	-.07
Number Deployments	-4.19	1.84	-.13*
Age	.17	.11	.08
Employment	-3.27	1.89	-.08
Branch	-.53	2.18	-.01
Marital Status	3.39	1.97	.08
Race	-.03	1.89	-.01
Combat Exposure	.53	.09	.32**
Military Preparedness	-2.61	.34	-.36**
R ² change=.23 (2, 374) p=.000			
Step 3			
Gender	3.98	-3.02	-.06
Number Deployments	-3.93	1.85	-.12*
Age	.15	.11	.07
Employment	-3.23	1.89	-.08
Branch	-.36	2.18	-.01
Marital Status	3.43	1.97	.08
Race	-.19	1.90	.01
Combat Exposure	.51	.09	.31**
Military Preparedness	-2.62	.34	.36**
Combat Exposure X Military Preparedness	.032	.027	.052
R ² =.003 (1, 373) p=.247			

Step 4

Gender	3.72	3.02	.06
Number Deployments	-3.89	1.85	-.12*
Age	.16	.11	.08
Employment	-3.28	1.88	-.08
Branch	-.38	2.18	-.01
Marital Status	3.58	1.97	.09
Race	-.29	1.88	-.01
Combat Exposure	.49	.12	.29**
Military Preparedness	-2.72	.35	-.37**
Combat Exposure X Military Preparedness	.03	.03	.04
Combat Exposure ²	-.19	.11	-.08
Military Preparedness X Combat Exposure ²	.00	.01	.02

R²=-.006 (2, 371) p=.219

Appendix 1

Individual items contained in military preparedness variable abstracted from Initial Health Questionnaire

Training

A. Did you receive the appropriate training and information prior to being deployed, to do your job properly and stay protected during your deployment?

B. Did you receive the appropriate training and information while you were deployed, to do your job properly and stay protected during your deployment?

Physical and Material Support

A. Do you feel you received the support you needed to do your job properly as regards physical support and materials?

Emotional and Psychological Support

A. Do you feel you received the support you needed to do your job properly as regards emotional and psychological support?

B. Do you feel you received the support you needed to adjust to civilian life?

Appendix 2

Individual items in combat exposure variable abstracted from Initial Health Questionnaire

- A. Did you ever go out on Combat patrols or have other very dangerous duties?
- B. Were you ever under enemy fire (including Scuds and other rockets)?
- C. What percentage of the people in your unit was killed, wounded or missing in action?
- D. How often were you in imminent danger of being injured or killed?

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