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Predictors of Veteran PTSD Symptom Reduction by Use of Accelerated Resolution Therapy

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Walden University
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Abstract

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Ann Witt

MS, Walden University, 2012

BA, Fairleigh Dickinson University, 1985

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Psychology

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Abstract

Despite 30 years of research advancements, PTSD treatment remains a trial-and-error process as 22 veterans per day commit suicide to relieve their symptoms. Foa and Kozak's emotional processing theory informed this correlational study which included secondary data consisting of participants' self-rated scale scores to examine whether the independent variables number of deployments, guilt, depression, and anxiety predicted the dependent variable PTSD symptom reduction in a veteran sample with combat deployments and associated PTSD symptoms who completed accelerated resolution therapy (ART). An analysis of whether mean PTSD symptom reduction amounts differed by symptom severity levels was also completed. The study aimed to identify the first predictive treatment-matching model for PTSD symptom reduction by use of ART. A multiple regression analysis to determine whether the predictor variables predicted PTSD symptom reduction by use of ART resulted in nonsignificant findings *(p* = .517). A Welch ANOVA test to determine if mean PTSD symptom reduction differed among the low, moderate, and high PTSD symptom severity groups showed significant results (*p* = .002). Games-Howell post hoc analysis showed that mean differences in PTSD symptom reduction from the low to high PTSD symptom severity group was significant (*p* = .001) with a 26.1 point mean reduction for the high symptom severity group and a greater than 10-point mean PTSD symptom reduction for the low and moderate symptom severity groups. The findings confirmed a need for treatment-matching algorithm studies to predict which PTSD interventions most benefit veterans suffering with PTSD to reduce trial-and-error treatment approaches, associated comorbidities, and high rates of suicides.

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Dedication

I dedicate this dissertation to my husband, Steve Witt. Year after year, through challenging times and winning times, Steve believed in me, cheered me on, and contributed in countless ways to ensure I remained focused on my goal of accomplishing this distinguished academic achievement. I remain forever grateful and humbled by his expressions of unconditional love, kindness, and selfless generosity. I dedicate this dissertation to my dearest love, Steve Witt.

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First and foremost I acknowledge God and His grace in walking each day before me on the path to accomplishing my academic goals, clearing any and all obstacles to ensure I reached my finish line. I am so humbled by His mercy and dedicate myself in service to others in His name.

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Chapter 1: Introduction to the Study

Introduction

Combat-related posttraumatic stress disorder (PTSD) is a phenomenon known over the years by different names including shell shock, battle fatigue, and gross stress reaction (Harris, Mayer, & Becker, 1995; Levinson, 2015; Swank & Marchand, 1946; Wilson, Friedman, & Lindy, 2001). PTSD onset results from the damaging effects survivors experience after severe, distressing, life-altering traumatic events (Selfridge, 2014). Many theorists have debated about the most appropriate assessment, diagnosis, and treatment approaches (Bardhoshi et al., 2015; Selfridge, 2014). These debates have led to PTSD research and treatment advances over the decades (Bardhoshi et al., 2015; Selfridge, 2014). However, the etiology of PTSD is still inconclusive (Bardhoshi et al., 2015; Selfridge, 2014). This is due to the complex nature of the disorder and the varied and unique ways patients recover from their PTSD symptoms (Friedman, 2016; Hoge et al., 2014; Ritchie, 2015).

Empirically supported research informed the Veterans Administration (VA) and the Department of Defense (DoD) implementation of clear PTSD treatment guidelines (Castro, 2014; Friedman, 2016). The VA approved the use of cognitive processing therapy (CPT), prolonged exposure (PE), eye movement desensitization and reprocessing (EMDR), traditional talk therapy, and pharmacotherapy for the treatment of PTSD (Castro, 2014; Friedman, 2016; Selfridge, 2014). These VA-approved approaches, however, came with barriers to effective resolution of PTSD symptoms (Bardhoshi et al., 2015; Selfridge, 2014). The length and duration of these available treatments often did

not align well with veterans' mobility needs and quick deployment turnarounds (Castro & Kintzle, 2014; Hoge et al., 2014; Huan & Kashubeck-West, 2015). The need for between-session homework and the reexperiencing of the trauma memory created high rates of treatment dropout, non-response, and non-completion for those who did seek PTSD treatment (Hoge et al., 2014; Kip et al., 2016; Ritchie, 2015). Hoge et al. (2014) and Ritchie (2015) found that many patients did not resolve their PTSD symptoms. This was significant considering that Hoge et al. (2014) and Huang and Kashubeck-West (2015) estimated that one in six veterans returning from the most recent conflicts met the criteria for PTSD. Additionally, an estimated 70% of the combat veterans treated within the VA healthcare system had symptoms consistent with PTSD (Hoge et al., 2014; Huang & Kashubeck-West, 2015; Kip et al., 2016; Moran, Burker, & Schmidt, 2013). This percentage only included veterans who sought PTSD treatment. Unresolved PTSD is associated with comorbidities that include anxiety, depression, and chronic illness (Hoge et al., 2014; Kip et al., 2016; Moran et al., 2013).

Unresolved PTSD was also associated with the perceived guilt combat veterans experienced when they killed someone or saw another service member get killed (Dettmer, Kappes, & Santiago, 2015). These unresolved PTSD symptoms contributed to an increased rate of combat veteran suicides that have exceeded civilian suicide rates since 2008. Nelson (2015) reported that in 2012 the United States Department of Veterans Affairs estimated that 8,000 veterans committed suicide each year—an average of 22 suicides per day (Nelson, 2015). The main reason these suicides were on the rise was because soldiers chose to end the suffering permanently when they could not

separate themselves from their war memories, images, sensations, and feelings (Nelson, 2015). Hoge et al. (2014), Mott, Hundt, Sansgiry, Mignogna, and Cully (2014), and Ritchie (2015) concluded that there was a need for more research to investigate other factors that contributed to PTSD onset and to hasten the approval and use of emerging interventions.

Hernandez, Waits, Calvio, and Byrne (2016), Hoge (2015), and Kip et al. (2013, 2016) found that accelerated resolution therapy (ART), an empirically supported, trauma-focused intervention not yet approved by the VA, was an effective psychotherapy treatment for trauma and other anxiety and stressor-related disorders. Therapists participating in the above studies delivered the ART protocol in one to five 60-minute session(s) without the patient completing any between-session homework or repeatedly listening to recorded trauma accounts between session. Researchers have, therefore, found that the ART protocol offers an expedient alternative to existing VA-approved PTSD treatment options (Hoge, 2015; Kip et al., 2016; Waits, Kip, & Hernandez, 2015). Hernandez et al., Hoge, and Kip et al. also found that ART included the same core in-session components (narrative, in vivo or imaginal exposure, cognitive restructuring, and relaxation/stress modulation) as other proven, exposure-based PTSD interventions with the added differentiator that ART was equally effective whether or not the patient verbally shared the trauma narrative with the therapist during the session (see also Ritchie, 2015; Waits et al., 2015). In a review of the literature, I found that ART appeared effective for PTSD symptom reduction in veteran populations (Hoge, 2015; Kip et al., 2013, 2014a, 2014b, 2016; Ritchie, 2015; Waits et al., 2015). However, none of

the available ART research studies I reviewed included analysis of variables to predict which veterans most benefitted from use of ART for PTSD symptom reduction (Hoge, 2015; Kip et al., 2013, 2014a; Ritchie, 2015; Waits et al., 2015).

Therefore, I used secondary data in this correlational study to analyze whether the selected variables of interest predicted PTSD symptom reduction by use of ART in a veteran sample (see Field, 2013). I also used secondary analysis of existing data to measure whether the variation in PTSD symptom reduction by use of ART differed among the three identified PTSD symptom severity groups by measuring mean PTSD symptom reduction (see Field, 2013; Kip et al., 2016). Foa and Kozak's (1986) emotional processing theory served as the theoretical basis of this study and aligned well with the underlying theory of the ART protocol. The ART protocol focuses on sufficiently reactivating the trauma memory and images to then extinguish those negative images, cognitions, emotions, and sensations before introducing corrective information during a reconsolidation phase (Kip et al., 2016).

In this study, I aimed to build the first predictive treatment-matching model for the use of ART, the trauma-based treatment chosen for analysis in this study. A predictive model offers broad social implications. Behavioral health practitioners would be able to use it to assess baseline thresholds for ART intervention effectiveness in veteran populations (Kip et al., 2016). This level of specificity may contribute toward PTSD symptom reduction or extinguishment without the need for multiple PTSD interventions (Hoge, 2015; Kip et al., 2016; Ritchie, 2015). The expedient reduction of PTSD symptoms may also reduce the incidence of associated comorbid disorders such as

depression, anxiety, suicidality, medication overuse, alcohol abuse, and other life-threatening diseases (Kip et al., 2016; Xue et al., 2015). I also aimed to contribute to existing ART research in support of future consideration by the VA/DoD for inclusion of ART as an approved veteran PTSD intervention (Kip et al., 2016). Other social change implications include raising awareness for alternate PTSD treatment interventions that more expediently meet the psychological needs of veterans suffering with PTSD symptoms and encouraging other researchers to contribute to this important field of study (see Kip et al., 2016; Ritchie, 2015; Waits et al., 2015).

This chapter continues with a discussion of the background, the problem statement, and a discussion of the study's purpose. Included as well are the research questions and hypotheses, and an expanded summary of the theoretical framework. There is also detailed clarification of the study's key terms, assumptions, limitations, and significance.

Background

The phenomenon of combat-related PTSD known by many different names before it was formally categorized as a psychological disorder in 1951 has existed for as long as soldiers have been in wars (Levinson, 2015). This psychological condition results from experiencing or witnessing a terrifying event (American Psychological Association [APA], 1980, 1987, 1994, 2000, 2013; Levinson, 2015). The effects of PTSD on combat veterans were noticeable as early as World War I (Levinson, 2015). The disorder has previously been known as shell shock, battle fatigue, and gross stress reaction (Harris et al., 1995; Levinson, 2015; Swank & Marchand, 1946; Wilson et al., 2001). The APA

eventually included the diagnosis of PTSD in its 1980 *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed.; *DSM-3*) after the Vietnam war (APA, 1980). The symptoms that support a PTSD diagnosis include the presence of intrusive thoughts, maladaptive avoidance behaviors, negative ruminations, and hyperarousal; all at severity levels that signal the need for treatment (APA, 1980, 2000, 2013; Hinton & Good, 2016; Huang & Kashubeck-West, 2015; Selfridge, 2014). Selfridge (2014) explained that the symptoms of PTSD were elusive and manifested months or years after the traumatic event. Ritchie (2015) found that veterans with unresolved trauma were at higher risk for developing comorbid disorders, such as depression, anxiety, chronic illness, suicidality, and other mental health disorders. Adler and Castro (2014) and Phillips et al. (2016) also found that veterans with PTSD and comorbid disorders reported a higher incidence of health problems, used more healthcare services, incurred greater healthcare costs, had higher rates of work absenteeism, and developed maladaptive coping skills to address their depression and anxiety.

Advancements in PTSD research have led to the creation of specialized psychotherapy treatments such as CPT, PE, and EMDR to name a few of the existing empirically supported PTSD treatments (Karlin, 2012; Ritchie, 2015). Randomized controlled trials have shown that CPT, PE, and EMDR interventions significantly reduce PTSD symptoms (Karlin, 2012; Rauch, Eftekhari, & Ruzek, 2012). However, the above existing therapies are lengthy, time-consuming, and include between-session homework and exposure exercises that risk retraumatization (Feeny & Foa, 2005). Treatment dropout, non-response, and non-compliance rates are also quite high across all VA-

approved PTSD treatment modalities, compromising treatment outcomes (Feeny & Foa, 2005; Hembree & Foa, 2010; Kip et al., 2013). Clear PTSD treatment guidelines were established by the DoD and the Veterans Health Administration (VHA); however, many patients remained treatment-resistant and continued to suffer with PTSD symptoms that worsened their disorder and led to other physiological and psychological sequelae (Bernardy & Friedman, 2012). Treatment studies showed only moderate to modest results, signaling a need for more research to explore the factors that influence PTSD treatment response and inform relapse prevention efforts (Feeny & Foa, 2005).

The varied spectrum of PTSD symptoms combined with the urgent need for alternative PTSD treatment options has challenged the VA and DoD to keep pace with demands for effective treatments (see Karlin, 2012; Ritchie, 2015; Waits et al., 2015). Although many empirically supported treatment options such as CPT, PE, and EMDR are made available to veteran populations through the DoD and VA healthcare system, utilization of these services remains low, and it is unclear which treatment protocols best serve the needs of veterans diagnosed with PTSD (Castro, 2014; Haagen, Smid, Knipscheer, & Kleber, 2015; Ritchie, 2015). Therefore, Ritchie (2015) and Waits et al. (2015) advocated for continued research to understand the factors that better align treatment choice with veterans' presenting PTSD concerns to effect timely and expedient PTSD symptom reduction.

Castro (2014) found that cognitive therapies and psychopharmacology present the best outcomes for PTSD symptom reduction. However, Castro also found that pharmacotherapy offers inconsistent relief of symptoms and ongoing clinical trials are

focused on the most therapeutic constructs for the use of pharmacotherapy alone or in combination with other empirically supported PTSD treatment modalities. Castro, Hoge (2015), Ritchie (2015), and Ritchie and Nelson (2015) concluded that continued research is needed to explore PTSD treatment options that are expedient and do not rely on the adjunct of psychotropics to enhance efficacy rates.

Kip et al. (2016), Hernandez et al. (2016), and Waits et al. (2015) found that ART is an effective, brief trauma-focused therapy that appears effective for the treatment of PTSD in veteran populations. Kip et al., Hernandez et al., and Waits et al. further clarified that ART differs from other therapies because the treatment focus is on the patient's trauma images rather than cognitions. Use of imagery, metaphors, and Gestalt techniques helps conceptualize the trauma and associated guilt, depression, anxiety, and other deep emotions to dismantle the trauma and create separation between the patient's sense of self and the traumatic stimuli (Kip et al., 2016; Waits et al., 2015). This results in a new awareness and understanding that helps normalize the trauma by rescripting the metaphorical components until the patient achieves resolution of the presenting trauma (Kip et al., 2016; Waits et al., 2015). The process also helps resolve associated comorbid sequalae that surface organically through the lens of the restructuring process (Hoge, 2015; Kip et al., 2016; Waits et al., 2015). Finnegan et al. (2016) found that ART offered brief trauma-based treatment for sustained resolution of PTSD symptoms. Finnegan et al. concluded that ART should be considered a first-line treatment protocol for treatment-resistant or comorbid PTSD. Kip et al. (2014a) found that the theoretical base for ART comprises three proven trauma-focused therapy components that include imaginal

exposure (IE), imagery rescripting (IR), and smooth-pursuit eye movements (EM). Kip et al. found that the above components support effective reduction of PTSD-related symptoms such as intrusive thoughts, sensations, emotions, and images. The theoretical base for ART is consistent with Foa and Kozak's (1986) emotional processing theoretical framework, which informed this study (Kip et al., 2014a, 2016).

Randomized controlled trials conducted by Kip et al. (2012, 2013, 2014a) examined the use of ART among combat veterans. Aggregate outcomes showed that ART offers meaningful results for the effective treatment of PTSD (Kip et al., 2012, 2013, 2014a). However, none of the published ART studies included analysis of variables to predict which veterans most benefit from ART for PTSD symptom reduction, and none of the studies included analysis to determine mean PTSD symptom reduction amounts by symptom severity group (Field, 2013).

Therefore, this quantitative study informed by Foa and Kozak's emotional processing theory fills the gap in the literature by analyzing selected variables to predict which veterans most benefit by use of ART for PTSD symptom reduction and whether mean PTSD symptom reduction differs by symptom severity group (Field, 2013). In the study, I aimed to produce a predictive model that could be applied to any PTSD intervention to create a scientific treatment-matching model or algorithm that predicts PTSD symptom reduction.

Problem Statement

PTSD is the result of direct or indirect traumatic experiences that may include injury, sexual or physical violence, the risk of death, or witnessing actual death

(Bardhoshi et al., 2016). Symptoms of PTSD include reliving components of the traumatic event, experiencing intrusive thoughts and flashbacks, displaying avoidant behaviors, self-medicating, numbing of emotional experiences, and heightened arousal (Bardhoshi et al., 2016). PTSD increases the risk of suicides due to a higher prevalence of comorbidities between PTSD and depression, anxiety, phobias, isolation, aggression, homelessness, and maladaptive family systems, all culminating in overall poorer health outcomes (Bardhoshi et al., 2016; Huang & Kashubeck-West, 2015). Combat veterans, the focus of this study, are at higher risk for PTSD, with one in six veterans of the most recent conflicts (Operation Enduring Freedom [OEF] and Operation Iraqi Freedom [OIF]) meeting the diagnostic criteria for PTSD after returning from combat (Bardhoshi et al., 2016; Huang & Kashubeck-West, 2015; Moran et al., 2013). As a result, the estimated prevalence for PTSD in veteran populations is 20% (Bardhoshi et al., 2016).

Advancements in PTSD research have led to the creation of specialized psychotherapy treatments such as CPT and PE (Karlin, 2012). Randomized controlled trials have shown that CPT and PE interventions significantly reduce PTSD symptoms (Karlin, 2012; Rauch et al., 2012). The above cognitive behavioral therapies and other therapies such as EMDR are also interventions that have resulted in statistically significant PTSD symptom reduction (Rauch et al, 2012). However, these existing empirically-supported therapies are lengthy, time-consuming, and include between-session homework and exposure exercises where the patient must record their trauma narrative in session and listen to the recording repeatedly between sessions, increasing the risk of retraumatization (Feeny & Foa, 2005). Treatment dropout, non-response, and

non-compliance rates are high across these treatment modalities, compromising treatment outcomes (Feeny & Foa, 2005; Hembree & Foa, 2010; Kip et al., 2013). For example, CPT requires 12 sessions including homework assignments. The dropout rate is as much as 30% in some programs, and the non-response rate is as much as 48%. Verbal and/or written trauma accounts are required protocol components. Researchers have found there is a 5% to 10% risk that symptoms will worsen and the protocol does not address replacement of negative trauma images (Chard et al., 2012; Hernandez et al., 2017; Kip et al., 2013).

The PE protocol requires eight to 12 sessions including homework assignments, and the patient must provide verbal and written accounts of the trauma. The studies I reviewed revealed a dropout rate of up to 50%; a non-response rate of up to 67%; and a 13% to 25% risk that symptoms might worsen. The protocol does not replace negative trauma images (see Hembree & Foa, 2010: Hernandez et al., 2017; Kip et al., 2013; Thomas et al., 2015).

The EMDR protocol consists of eight to 12 sessions including limited homework assignments and patients must complete verbal and written trauma accounts. The studies I reviewed revealed a dropout rate of up to 36%; a non-response rate of up to 90%; and a 20% risk of symptoms worsening. The protocol does not replace negative images (see EMDR Institute, Inc., 2017; Hernandez et al., 2017; Kip et al., 2013; Shapiro 2001, 2012). Richie (2015) found that veterans suffering with chronic PTSD symptoms were also more treatment-resistant, and treatment studies showed only moderate to modest results from existing trauma-based exposure therapies such as CPT, PE, and EMDR.

In contrast, the ART protocol consists of one to five sessions without the need for homework or written patient trauma accounts, and the patient can choose whether to verbalize the trauma memory during the session (Kip et al., 2016). Researchers have found that the ART dropout rate is 6%, and the non-response rate is 30% (Hernandez et al., 2017; Kip et al., 2013). Researchers also found that there is a less than 2% risk of symptoms worsening, and the protocol does include replacement of negative images (Hernandez et al., 2017; Kip et al., 2013).

Despite treatment advancements over the last 30 years, veterans continue to struggle with a sense of hopelessness and a loss of meaning in life due to their treatment-resistant PTSD symptoms (Feeny & Foa, 2005; Ritchie, 2015). Such struggles signal a critical need for more research to explore the factors that influence PTSD treatment response and inform relapse prevention efforts (Feeny & Foa, 2005; Ritchie, 2015).

This study design, therefore, includes secondary data from a prospective study of ART, an emerging trauma-focused intervention delivered in as little as one to five 60-minute sessions without any between-session homework, the need to repeatedly listen to recorded trauma accounts between sessions, or the retelling of the trauma experience during the session if the patient is unwilling or unable to verbally share the trauma experience (Hernandez et al., 2016; Kip et al., 2013, 2016). The ART intervention protocol is built on the core in-session components of other proven, empirically-supported PTSD interventions to include narrative, in-vivo and/or imaginal exposure, cognitive restructuring, and relaxation/stress modulation (Hernandez et al., 2016; Hoge, 2015; Kip et al., 2016). The United States Substance Abuse and Mental Health Services

Administration (SAMHSA) and the National Registry of Evidence-Based Programs and Practices (NRE-PP) classified ART as an empirically-supported therapy effective for the treatment of trauma and other anxiety and stressor-related disorders, as well as depression (Hernandez et al., 2016; Kip et al., 2016). In a review of the literature, I found that ART is an effective intervention for the treatment of PTSD symptoms in veteran populations (Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). More ART research may strengthen the merits of using ART as an exposure-based, cognitive intervention not currently offered within the VA/DoD behavioral health system for PTSD symptom reduction in veteran populations (Hoge, 2011, 2015; Hoge et al., 2014; Kip et al., 2013, 2016). Therefore, this study filled the gap in the literature by examining the variables that might predict which veterans benefit most by use of ART for PTSD symptom reduction.

Purpose of the Study

In this quantitative study informed by Foa and Kozak's (1986) emotional processing theory, I conducted a secondary analysis of existing data from a prospective cohort treatment study of ART (Kip et al., 2016) registered at www.clinicaltrials.gov (NCT02030522). My intent was to analyze whether number of deployments, guilt, depression, and anxiety predicted PTSD symptom reduction by use of ART for veterans who completed a course of ART (Field, 2013; Kip et al., 2016). In addition, I assessed the variation in PTSD symptom reduction by PTSD symptom severity group to calculate mean PTSD symptom reduction differences among the low, moderate, and high PTSD symptom severity groups (Field, 2013).

Research Questions and Hypotheses

RQ1: What is the effect of number of deployments, guilt, depression, and anxiety in predicting PTSD symptom reduction for veterans who complete ART?

H_o1: Number of deployments, guilt, depression, and anxiety do not predict PTSD symptom reduction for veterans who complete ART.

H_a1: At least one predictor, number of deployments, guilt, depression, and anxiety will predict PTSD symptom reduction for veterans who complete ART.

RQ2: What is the variation in PTSD symptom reduction among low, moderate, and high PTSD symptom severity groups?

H_o2: There is no variation in PTSD symptom reduction among low, moderate and high PTSD symptom severity groups.

H_a2: There is variation in PTSD symptom reduction for at least one of the three (low, moderate, high) PTSD symptom severity groups.

Theoretical Framework for the Study

Foa and Kozak's (1986) emotional processing theory holds that activation of fear structures trigger stimulus and response memory structures (Rauch & Foa, 2006). The excessive response to these activated fear structures differentiate pathological fear structures from normal fear structures (Rauch & Foa, 2006). These excessive responses cause a form of generalized fear that attribute meaning elements and trigger excessive stimulus and response fear structures to otherwise non-threatening structures (Rauch & Foa, 2006). Symptoms persist because avoidant behaviors prevent the processing of traumatic experiences (Rauch & Foa, 2006; Rosen & Frueh, 2010).

The other constructs that the authors attributed to PTSD maintenance were that the world is a dangerous place and that the self is perceived incompetent and incapable (Rauch & Foa, 2006; Rosen & Frueh, 2010). Foa and Kozak (1986) further proposed that extinguishment of PTSD-related fear structures need activation of the fear structure and introduction of corrective information to replace pathological constructs with realistic ones (Rauch & Foa, 2006; Rosen & Frueh, 2010).

Imaginal exposure and in-vivo exposure activate the traumatic memories, sensations, emotional cognitions, and images associated with the trauma to rescript trauma-based images and sensations during a reconsolidation process (Hernandez et al., 2015; Kip, 2012, 2013, 2014a, 2014b, 2016; Rauch & Foa, 2006). Therapeutic interventions must ensure that patients sufficiently engage in the process to activate the fear structures, such that modification can occur (Rauch & Foa, 2006). This theoretical framework was useful in understanding the processes that constitute effective exposure-based treatment. The theoretical framework was aligned with ART's theoretical framework (Kip et al., 2016). The ART protocol relies on sufficiently activating the fear structures to extinguish associated fear-based images, negative cognitions, feelings, and sensations and then rescripts the trauma-based images, associated feelings, and sensations during a reconsolidation process (Hernandez et al., 2015; Kip, 2012, 2013, 2014a, 2014b, 2016; Rauch & Foa, 2006). The extinguishment of the symptoms associated with negative images, thoughts, feelings, and sensations during the reconsolidation process is what forms the basis for PTSD symptom reduction by use of ART (Hoge, 2015; Hernandez et al. 2016; Kip et al., 2016; Waits et al., 2016).

Nature of the Study

A quantitative strategy of inquiry using secondary data and informed by Foa and Kozak's (1986) emotional processing theory was consistent with the study's purpose and research questions. I conducted a multiple regression analysis to examine whether number of deployments, guilt, depression, and anxiety predicted which veterans benefitted most from ART for PTSD symptom reduction (Field, 2013; Kip et al., 2016). An ANOVA test was computed to examine mean PTSD symptom reduction among three PTSD symptom severity groups at low, moderate, and high PTSD symptom severity levels (Field, 2013; Kip et al., 2016). Post-hoc tests showed whether significant differences occurred among the low, moderate, and high PTSD symptom severity groups (Field, 2013). The secondary analysis of existing data from a prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522) included a sample of 108 adult male and female veterans with a history of combat deployments who were experiencing PTSD symptoms (Kip et al., 2016). All participants in the sample completed ART intervention during the prospective cohort treatment study of ART (Kip et al., 2016). In this study, I aimed to fill the gap in the literature by creating a predictive treatment-matching model to predict which veterans most benefit from ART for PTSD symptom reduction (Field, 2013; Kip et al., 2016).

A qualitative strategy of inquiry would neither have achieved this study's purpose nor answered the research questions because inferences and generalizability would not have been possible (Field, 2013). I therefore used deductive inquiry to answer the research questions and to analyze secondary data from reliable, valid, and measurable

Likert scales to examine which independent variables might predict PTSD symptom reduction in veteran populations and whether mean PTSD symptom reduction amounts differed when study participants were stratified by symptom severity levels (see Field, 2013).

Definitions

Veterans: Veterans in this study were identified as adult active-duty, reservist, or discharged United States armed forces veterans or service members with a history of combat deployments who were experiencing PTSD symptoms (Kip et al., 2016).

Number of deployments: The definition of the continuous, independent variable, number of deployments, as measured by data from the original study's demographics form (DF), was identified as the movement of military soldiers to assigned conflict areas (Hoge, 2011, 2015).

Guilt: The definition of the continuous independent variable guilt, as measured by the original study's Trauma-Related Guilt Inventory (TRGI) pretreatment scores was identified as an unpleasant or negative feeling with an associated belief that more could have been done to change the outcome of what occurred (Kubany et al., 1996).

Depression: The definition of the continuous independent variable depression, as measured by the original study's Center for Epidemiologic Studies-Depression (CES-D) scale pretreatment scores, was identified as a persistent sadness that affected thoughts, feelings, and behaviors (Van Voorhees, Gollan, & Fogel, 2012).

Anxiety: The definition of the continuous independent variable anxiety, as measured by the original study's State-Trait Inventory for Cognitive and Somatic

Anxiety (STICSA) scale pretreatment scores, was identified as a feeling of tension, negative cognitions, and physiological reactions, such as elevated blood pressure (Ree, French, MacLeod, & Locke, n.d.).

PTSD symptom reduction: For this study, the definition of the dependent variable PTSD symptom reduction, as measured by the original study's PTSD Checklist-Military (PCL-M) scale scores, was identified as the difference between study participants' pretreatment and posttreatment scores, before and after ART.

PTSD symptom severity group: The definition of PTSD symptom severity group, as measured by the original study's PCL-M scale pretreatment scores, was identified as the study participants grouped into three independent groups according to a range of PCL-M scale pretreatment scores (Field, 2013; Kip et al.., 2016). Group 1 consisted of study participants with PCL-M scale pretreatment scores at or lower than 50. Group 2 consisted of study participants with PCL-M scale pretreatment scores ranging from 51 to 60. Group 3 consisted of study participants with PCL-M scale pretreatment scores at or greater than 61.

Demographics form: The DF was identified as the intake form used in the prospective cohort treatment study of ART to capture military demographic information about each study participant. The respective number of deployments study participants recorded on their DF to include 1, 2, 3, or 4 or more deployments was the construct of interest for this study.

Assumptions

I assumed that this study and its findings will be beneficial for veterans diagnosed with PTSD (Hoge, 2015; Kip et al., 2016; Waits et al., 2015). The study's constructs will better inform behavioral health practitioners and researchers about the needs of veterans diagnosed with PTSD. I also assumed that the secondary data self-rating scales I used for this study and have detailed in the instrumentation section of Chapter 3 are reliable and valid measurements for the constructs of guilt, depression, and anxiety, which could not be measured directly. The pretreatment scores on each respective self-rating scale were utilized to measure the level of perceived guilt, the level of symptom severity for depression, and the level of symptom severity for anxiety. Finally, I assumed that participants in the original study responded honestly when completing their self-rating scales.

Scope of Delimitations

The scope of this study includes analysis of whether the identified predictors of number of deployments, guilt, depression, and anxiety predicts PTSD symptom reduction for veterans who completed ART and whether PTSD symptom reduction differs by PTSD symptom severity groups classified at low, moderate, or high PTSD symptom severity levels to compare mean PTSD symptom reduction differences among the three groups. The difference in PCL-M scale scores before and after treatment with ART will account for the mean PTSD symptom reduction. I selected the ART protocol for analysis because the ART treatment components aligned with and supported Foa and Kozak's (1986) emotional processing theory in which imaginal exposure and in vivo exposure

support activation of the traumatic memories, sensations, emotional cognitions, images, and perceptions associated with the trauma to rescript trauma-based images and sensations during a reconsolidation process, thus leading to PTSD symptom reduction or extinguishment (Hernandez et al., 2016; Kip, 2013, 2016; Rauch & Foa, 2006). After reviewing the literature on the effectiveness of ART in veteran populations and the need for more effective and expedient PTSD treatment alternatives, I determined that it was important to fill the identified gap in understanding by attempting to create a PTSD treatment-matching model that might predict which veterans benefit most from use of ART for PTSD symptom reduction. This scientific treatment-matching model or algorithm might inform other PTSD treatment outcomes, thereby improving PTSD treatment efficacy outcomes in veteran populations (see Hoge, 2015; Kip et al., 2016; Waits et al., 2015; Ritchie, 2015). An analysis of the variables that predict which veterans most benefit from ART intervention for PTSD symptom reduction and which of the three PTSD symptom severity groups experience the greatest difference in mean PTSD symptom reduction might better inform behavioral health practitioners regarding which veterans benefit most from ART for PTSD symptom reduction (Field, 2013). An important boundary of this study is the inclusion of adult combat veterans with a history of PTSD who completed ART. Therefore, the results of this study are only generalizable to adult combat veterans suffering with PTSD. Exclusions in the secondary data I used include adult veterans with suicidality, comorbid psychiatric disorders that could interfere with treatment, and traumatic brain injury severe enough to impede cognitive functioning (Kip et al., 2015).

Limitations

Limitations of this study include self-assessments that, by their subjective nature, may result in responder bias, as well as the inability to assess the impact of participants' engagement levels on the study's statistical outcomes. Additionally, future ART researchers are encouraged to consider the inclusion of study participants with suicidal ideation and those who are in the recovery phase of their alcohol or drug treatment. These inclusions might result in better assessment of the effects of ART intervention on PTSD symptom reduction in veteran populations with comorbid disorders such as alcohol and drug abuse, as well as those whose PTSD symptoms have triggered suicidal thoughts (see Kip et al., 2016; Ritchie, 2015). Despite the above limitations, a correlational research design is appropriate because it allows for statistical inferences and serves to contribute to existing research on available trauma-based treatment for PTSD symptom reduction in veteran populations (Castro, 2014; Hoge, 2015; Kip et al., 2016).

Significance

In this study, I sought to produce a treatment-matching model used to predict PTSD symptom reduction amounts by use of ART, a brief trauma-based intervention for veterans seeking PTSD symptom reduction (Huang & Kashubeck-West, 2015). The same treatment-matching model could be applied to other constructs and other trauma-based interventions to determine PTSD symptom reduction amounts. Use of a treatment-matching model may help identify baseline thresholds that could better inform behavioral health practitioners treating veterans with PTSD. The study's findings will contribute to existing literature on PTSD in veterans population and may support inclusion of

treatment-matching algorithm analyses in current and ongoing PTSD research studies. The study findings may also be of interest to VA and DoD researchers, as they consider empirically validated brief trauma-based interventions such as ART (Kip et al., 2016; Waits et al., 2015). The knowledge derived from this study may inform PTSD treatment choices and relapse prevention efforts in veteran populations. The creation of a predictive treatment-matching model that can be applied across other PTSD treatment options may lead to a reduction in the PTSD-related comorbidities and suicide rates associated with unresolved PTSD (Hoge, 2011; Kip et al., 2016; Ritchie, 2015).

Summary

Documented evidence of posttraumatic stress in its many iterations existed long before it was formally classified as a disorder in 1951 (Levinson, 2015). There have been many names for the disorder, and many theorists have debated about assessment, diagnosis, and treatment approaches (see Hoge, 2015; Kip et al., 2016; Levinson, 2015; Ritchie, 2015; Waits et al., 2015; Xue et al., 2015). Research and treatment advances have occurred over the decades (Xue et al., 2015). However, the etiology of PTSD remains unclear, and the symptoms and degree of recovery are unique to each individual (Hoge et al., 2014; Ritchie, 2015).

Barriers to effective resolution of PTSD symptoms persist, despite empirically supported research on the effectiveness of available PTSD interventions such as CPT, PE, EMDR, traditional talk therapy, and pharmacotherapy, due to the complex nature of combat-related PTSD symptoms (Waits et al., 2015). The DoD and the VHA have created clear treatment guidelines, yet veterans have continued suffering with treatment-

resistant PTSD symptoms (Bernardy & Friedman, 2012; Hoge, 2015; Ritchie, 2015). These unresolved PTSD symptoms have led to other physiological and psychological sequelae (Bernardy & Friedman, 2012). In the literature review, I found that researchers have advocated for continued PTSD research to examine additional factors that influence PTSD symptom reduction and resolution of PTSD-related comorbidities such as depression, anxiety, and suicidality (see Dettmer et al., 2015; Leardmann et al., 2013; Ritchie, 2015; Waits, Marumoto, & Weaver, 2017). These comorbidities have become a critical research focus because veteran suicides exceeded civilian rates in 2008, and the current rate of suicide in veteran populations is 22 suicides per day (Dettmer et al., 2015; Leardmann et al., 2013; Ritchie, 2015).

Although many empirically supported PTSD treatment options are available to veteran populations through the DoD and VA healthcare system, use of existing health services remains low, and it is still unclear which treatment protocols best serve the needs of veterans diagnosed with PTSD (Castro, 2014; Haagen et al, 2015; Ritchie, 2015). Hoge et al. (2014) and Waits et al. (2015) found that the low utilization and high dropout, non-response, and non-compliance rates are due to lengthy and time-consuming therapies, the inclusion of required between-session homework, and the exposure exercises that patients are required to complete on their own between sessions, potentially retraumatizing them when they are required to repeatedly recall their trauma memories, images, sensations, and feelings without the support of their therapist (see Feeny & Foa, 2005; Hembree & Foa, 2010; Hernandez et al., 2016; Hoge et al., 2014; Kip et al., 2013; Ritchie, 2015). Veterans suffering with symptoms of chronic PTSD are also more

treatment-resistant resulting in moderate to modest results (Friedman, 2016; Hernandez et al., 2016; Ritchie, 2015).

A review of study findings from experts in the field of PTSD research confirmed the need for continued research to analyze which factors contribute to PTSD onset to hasten the approval of alternative and emerging PTSD treatments that address these factors (Hawley, Armstrong, Czarnota, & Field, 2013; Kip et al., 2016; Mott et al., 2014; NIMH, 2016; Ritchie, 2015).

My review of the available literature also revealed that ART is an evidence-based trauma intervention not offered within the VA/DoD behavioral health system (see Hoge, 2015; Kip et al., 2013, 2014; Ritchie, 2015; Waits et al., 2015). Therefore, this correlational study using secondary data and informed by Foa and Kozak's emotional processing theory fills the gap in the literature by analyzing whether number of deployments, guilt, depression, and anxiety predict which veterans most benefit from ART intervention for PTSD symptom reduction and weather mean PTSD symptom reduction differ by symptom severity groups at low, moderate, and high PTSD symptom severity levels (Kip et al., 2012, 2013, 2014a, 2014b, 2016). The outcomes of this study will inform practitioners regarding the potential benefits of utilizing a treatment-matching algorithm to predict the amount of improvement possible by use of ART for PTSD symptom reduction (Field, 2013; Kip et al., 2016).

In Chapter 2, I present an overview of the available literature on PTSD, the literature search strategy, the theoretical foundation that informs this study, the literature

review specific to the constructs under investigation, and the methodology I used in this study.

Chapter 2: Literature Review

Introduction

PTSD onset results from direct or indirect traumatic experiences that may include injury, sexual or physical violence, the risk of death or witnessing the death of another (APA, 2013; Bardhoshi et al., 2016). Symptoms of PTSD include reliving components of the traumatic event, experiencing intrusive thoughts and flashbacks, displaying avoidant behaviors, self-medicating, numbing of emotional experiences, and heightened arousal (APA, 2013; Bardhoshi et al., 2016). A diagnosis of PTSD increases the risk of suicide due to a higher prevalence of comorbidities between PTSD and depression, anxiety, phobias, isolation, aggression, homelessness, and maladaptive family systems (Bardhoshi et al., 2016; Huang & Kashubeck-West, 2015). These associated comorbidities culminate in overall poorer health and quality of life outcomes (Bardhoshi et al., 2016; Huang & Kashubeck-West, 2015).

Combat veterans, the focus of this study, are at higher risk for PTSD (Hoge, 2011). Prevalence rates for combat-related PTSD have ranged from 2% to 17% in the veteran population since the Vietnam War. One in six veterans of the most recent conflicts (Operation Enduring Freedom and Operation Iraqi Freedom) met the criteria for PTSD after returning from military combat deployment (Bardhoshi et al., 2016; Fischer, 2014; Huang & Kashubeck-West, 2015; Moran et al., 2013). The overall prevalence rate for veteran PTSD is up to 20% (Bardhoshi et al., 2016). Statistics on prevalence rates range widely because the DoD has not systematically gathered statistical data specific to each war conflict, and veterans suffering with PTSD may not seek behavioral health care

(Bardhoshi et al., 2016). However, the effects of combat-related PTSD pose a critical medical, psychological, physiological, and social crisis for veterans, their families, and the communities in which they live (Castro, 2014). Advancements in PTSD research have led to the creation of specialized psychotherapeutic treatments such as CPT, PE, and EMDR (Karlin, 2012). Randomized controlled trials have shown that CPT, PE, and EMDR interventions reduce PTSD symptoms (Karlin, 2012; Rauch, Eftekhari, & Ruzek, 2012).

However, Hoge et al. (2014), Waits et al. (2015), and Kip et al. (2016) found that these existing empirically-supported therapies were lengthy and time-consuming, as I detailed in Chapter 1. These therapies include between-session homework and require patients to repeatedly listen to their recorded trauma accounts between sessions, increasing the risk of retraumatization (Hoge et al., 2014; Waits et al., 2015). Researchers found that treatment dropout, non-response, and non-compliance rates remained high across all treatment modalities, potentially compromising treatment outcomes (Feeny & Foa, 2005; Hembree & Foa, 2010; Hernandez et al., 2016; Hoge et al., 2014; Kip et al., 2013). Veterans suffering with symptoms of chronic PTSD were also more treatment-resistant, resulting in moderate to modest results (Friedman, 2016; Hernandez et al., 2016; Ritchie, 2015).

Veterans have continued to struggle with treatment-resistant PTSD symptoms despite treatment advancements over the last 30 years (Friedman, 2016; Morina, Wicherts, Lobbrecht, & Priebe, 2014). Ritchie (2015) and Waits et al. (2015) advocated for continued research to find other factors that influence PTSD treatment response and

inform relapse prevention efforts. The varied spectrum of PTSD symptoms combined with the urgent need for alternative therapy options has challenged the VA and DoD to keep pace with demands for effective treatments (Karlin, 2012; Ritchie, 2015; Waits et al., 2015).

Hernandez et al. (2016) and Kip et al. (2013, 2016) found that ART was an emerging, empirically supported, trauma-focused, intervention delivered in as little as one to five, 60-minute session(s) without any between-session homework, exposure exercises that the patient is required to complete outside of the therapy setting, or requirements to retell the trauma experience. Hernandez et al., Hoge (2015), Kip et al., and Waits et al. (2015) confirmed that the ART intervention protocol includes core components consistent with other proven and empirically-supported PTSD interventions. The ART intervention includes narrative, in vivo or imaginal exposure, cognitive restructuring, and relaxation/stress modulation (see Hernandez et al., 2015; Hoge, 2015; Kip et al., 2013, 2016; Waits et al., 2015). However, ART does not require any between-session homework or the need for the patient to record the trauma account and listen to it repeatedly between sessions (see Hernandez et al., 2015; Hoge, 2015; Kip et al., 2013, 2016; Waits et al., 2015).

The SAMHSA and the NRE-PP classified ART as an empirically-supported therapy considered effective in treating trauma and other anxiety and stressor-related disorders, including depression (Hernandez et al., 2016; Kip et al., 2016). My review of the available literature revealed that ART was an effective PTSD intervention not yet offered within the VA/DoD behavioral health system (see Hoge, 2015; Kip et al., 2013,

2014a; Ritchie, 2015; Waits et al., 2015; Waits et al., 2017). Therefore, I conducted this study to fill the gap in the literature by defining the variables that predict which veterans most benefit by use of ART for PTSD symptom reduction and whether the differences in mean PTSD symptom reduction differed among the three PTSD symptom severity groups classified by symptom severity levels.

I analyzed secondary data from a prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522), to conduct this quantitative study. The correlational study design included an analysis of the selected continuous independent variables, as informed by the literature on PTSD in veteran populations. The aim of the study was to determine whether number of deployments, guilt, depression, and anxiety predicted which veterans most benefitted from ART for PTSD symptom reduction, and whether mean PTSD symptom reduction differed among the low, moderate, or high symptom severity groups identified in the study (Field, 2013). Foa and Kozak's (1986) emotional processing theory served as the theoretical framework of this study, which I explain in detail later in this chapter.

In Chapter 2, I offer a comprehensive literature review of the historical origins of PTSD in veteran populations. The chapter also contains a review of the associated etiology, prevalence, symptoms, diagnostic criteria, and comorbidities associated with PTSD. A review of the theoretical frameworks that informed empirically supported PTSD treatments is also included. My aim in the literature review was to identify gaps in understanding that indicated the need for further research of emerging, empirically-supported PTSD treatment options such as ART, the variables that predicted PTSD

symptom reduction, and the influence of PTSD symptom severity levels on PTSD symptom reduction.

Literature Search Strategy

The literature search consisted of a digital database review of PsycARTICLES, PsychiatryOnline, PsycBOOKS, ProQuest - EbooksCentral, Academic Search Complete, SAGE Journals, Mental Measurement Yearbook with Tests in Print, EBSCO eBooks, Google Books, ProQuest Health and Medical Collection, ProQuest Science Journals, Psychology Databases Simultaneous Search, SAGE Research Methods Online, and Thoreau Multiple Database Search. I also reviewed the reference lists of journal articles and books for additional sources. Keywords used to search the databases included *posttraumatic stress disorder, history, origins, diagnosis, symptoms, prevalence, etiology, comorbidities, empirically supported psychotherapy treatments, combat posttraumatic stress disorders, predictors, veteran demographic characteristics, VA and DoD PTSD treatments, deployments, guilt, depression, anxiety, veterans, PTSD pharmacotherapy, refractory PTSD, moral injury, assessment,* and *emerging posttraumatic stress treatments*. The literature review included seminal works for PTSD self-rating scales, theoretical frameworks, combat-related PTSD historical origins, and empirically-supported research studies. The literature I reviewed spanned the years 1955 through 2018, with emphasis on the last 5 years to include current PTSD studies as well as the research specifically relating to ART. The literature review offered me (a) a deeper understanding of the nature of the topic under investigation and the importance of continued research to isolate the variables that predict which veterans most benefit from

ART for PTSD symptom reduction, and (b) whether PTSD symptom reduction varies by PTSD symptom severity group. The use of a predictive treatment-matching model to determine which veterans benefit most from PTSD treatment for PTSD symptom reduction would add a level of treatment-matching specificity that does not currently exist. As the literature review showed, additional research is needed to minimize the need to use different intervention approaches, in a trial-and error manner, to treat unresolved PTSD (Hoge et al., 2014; Kip et al., 2016; Ritchie, 2015).

Theoretical Foundation

Rosen and Frueh (2010) found that the brain stores and recalls traumatic memories in a manner that results in fragmentation. That is, stored traumatic memories become fragmented in ways that are not accessible (e.g., trauma amnesia) or manifest as flashbacks that trigger strong sensations (Rosen & Frueh, 2010). Eraly et al. (2014) theorized that traumatic memories or images are the source of PTSD symptoms that include intrusive thoughts, flashbacks, poor sleep, and physiological sensations. These theories served to inform the development of PTSD interventions to achieve integration of fragmented memories or images and other nonverbal triggers associated with traumatic memory (Eraly et al., 2014). Berntsen, Willert, and Ruben (2003) offered another perspective, arguing that the brain stores traumatic memories in the same manner as normal memories. Berntsen et al. theorized that PTSD onset results from the distinct impact the traumatic memories make on the individual and the way the individual internalizes reality. Berntsen et al. concluded that the dysfunctional memories of the

event, rather than exposure to the trauma event itself, explained the nature of PTSD onset.

Yehuda, Neylan, Flory, and McFarlane (2013) presented a biological model explaining that stress hormone response creates the neurocircuitry and genetic predispositions for PTSD onset. Brewin et al. (2000) proposed a psychosocial model explaining that exposure to life threat, violence, childhood abuse, adversities, life stressors, protective factors, social support, socioeconomic status, education, and social support all contribute to the risks or protective factors associated with PTSD onset. Janoff-Bulman (1992) supported a cognitive model that altered beliefs and information processing cause the persistent vigilance and fear. The Janoff-Bulman theory holds that the shattered assumptions of the self and the world are what leads to PTSD onset. Learning theorists have explained PTSD onset as the activation of fear networks that trigger maladaptive avoidance behaviors and prevent resolution of PTSD symptoms (Foa & Kozak, 1986). Emotional processing theories have pointed to hyperactivity to and reminders of the original traumatic event, eliciting behavioral avoidance and inability to resolve presenting PTSD symptoms (Foa & Kozak, 1986; Foa & Rothbaum, 1998).

Peri, Gofman, Tal, and Tuval-Mashiach's (2015) embodied simulation theory holds that exposure to traumatic memories is the underlying focus of most therapies that address PTSD. However, Peri et al. found there was not enough emphasis on the impact of the patient-therapist alliance since much of the exposure-based work done by the patient occurs between sessions. Peri et al. noticed that the modeling that occurs during the patient-therapist alliance serves as a vital therapeutic tool in regulating emotions and

reducing or extinguishing fear responses linked to non-threatening fear stimuli. The projective identification of patient and therapist exchanging empathy and emotional awareness was instrumental in affecting desired therapeutic change. Peri et al. advocated for more research to assess the impact of the patient-therapist interaction on PTSD symptom reduction during face-to-face sessions with less reliance on between-session homework.

The above theorists were unable to point to a specific theory to explain PTSD onset, but they asserted that the composite of multiple theories framed an understanding by which researchers could contribute new theoretical perspectives (Brewin et al., 2000; Eraly et al., 2014; Foa & Kozak, 1986; Foa & Rothbaum, 1998; Janoff-Bulman, 1992; Yehuda et al., 2013). The conundrum identified in the literature, however, was that non-life-threatening events such as a loss of finances, career, or friendships could all elicit PTSD symptoms that did not necessarily meet DSM 5 criteria making etiological assumptions difficult to define (Eraly et al., 2014).

Foa and Kozak's (1986) emotional processing theory informs this study. Foa and Kozak posited that stimulus and response memory structures triggered when fear structures activated. The excessive response to these activated fear structures differentiated pathological fear structures from normal fear structures (Rauch & Foa, 2006). When applying this theoretical framework to PTSD, pathological elements added to the excessive stimulus and response elements (Rauch & Foa, 2006). This caused a form of generalized fear that attributed meaning elements and triggered excessive stimulus and response fear structures to otherwise non-threatening structures (Rauch &

Foa, 2006). Symptoms persisted because avoidant behaviors prevented the traumatic experience from processing (Rauch & Foa, 2006; Rosen & Frueh, 2010). The other constructs that the authors attributed to PTSD maintenance were that the world was dangerous and the self was incompetent (Rauch & Foa, 2006; Rosen & Frueh, 2010).

Foa and Kozak (1986) further proposed that extinguishment of PTSD-related fear structures relied on activation of the fear structure and introduction of corrective information to replace pathological constructs with realistic ones. Imaginal exposure and in vivo exposure were thought to activate the traumatic memories, sensations, emotional cognitions, and images associated with the trauma to rescript trauma-based images and sensations during a reconsolidation process (Hernandez et al., 2016; Kip, 2013, 2016; Rauch & Foa, 2006). Therapeutic interventions had to ensure that patients sufficiently engaged to activate the fear structures such that modification occurred (Rauch & Foa, 2006). This theoretical framework was useful in understanding the processes that constituted effective exposure-based PTSD treatment options (Rauch & Foa, 2006).

Literature Review Related to Key Variables

Historical Perspective

Combat-related PTSD, in its many iterations, meanings, and terms has existed for over a century (Levinson, 2015). The historical origins of PTSD and the associated damaging psychological consequences of war date back to Homer's epic work *The Iliad and the Odyssey* (Levinson, 2015). Joseph Mendes Da Costa developed the physiological model known as Da Costa's Syndrom to explain the effects of war on the cardiac condition of his soldiers (Levinson, 2015). Nostalgia was the psychological term used to

explain combat-related PTSD (Levinson, 2015). The syndrome signaled that soldiers needed to return home to familiar environments to recover (Levinson, 2015). Shell shock was the term used during World War I to explain the general sense of powerlessness soldiers experienced (Levinson, 2015; Wilson et al., 2001). The term contextualized how soldiers responded to war-fighting and artillery fire (Levinson, 2015; Wilson et al., 2001). Symptoms of shell shock manifested as anxiety, fear, hysteria, sleep disturbance, and the fight-flight-freeze stress response (Wilson et al., 2001). Battle fatigue was the coined phrase for PTSD symptoms during World War II (Swank & Marchand, 1946). Military leaders viewed battle fatigue as a display of military weakness and cowardice (Levinson, 2015; Perkins, 1955; Swank & Marchand, 1946). The APA published the term gross stress reaction in the 1952 diagnostic and statistical manual of mental disorders (DSM) to formalize the use of the term during the Korean War (APA, 1980; Harris et al., 1995; Levinson, 2015).

The APA recognized PTSD as an anxiety disorder when it published the DSM III in 1980 after the Vietnam War (APA, 1980; Wilson et al., 2001). The indicators supporting a PTSD diagnosis at that time included the presence of intrusive thoughts, maladaptive avoidance behaviors, negative ruminations, and hyperarousal; all at levels of severity that signaled the need for treatment (Hinton & Good, 2016).

Nelson (2015) offered the same historical perspectives of combat-related PTSD mentioned above but added that soldiers experienced exhaustion, the blues, and a soul-crushing sense of self-deterioration. Nelson also found that returning combat veterans no longer felt at home in their familiar surroundings nor could they share combat

experiences with family and friends (see Huang & Kashubeck-West, 2015; Nelson, 2015). Some returning soldiers viewed successful reintegration back to civilian life as an impossible prospect (Nelson, 2015). Nelson concluded that available science was inconclusive about adaptive methods that supported reintegration (Nelson, 2015).

PTSD Defined

Bardhoshi et al. (2015) defined PTSD as a direct or indirect traumatic experience that included injury, sexual or physical violence, the risk of death, or the witnessing of actual death. Selfridge (2014) defined PTSD as the damaging effects experienced by survivors after severe, distressing, life-altering traumatic events. Selfridge found that PTSD involved enduring psychological disturbance attributed to the experience of a major traumatic event.

Friedman (2016) found that traumatic stressors included combat, concentration camp imprisonment, military bombings, and natural and human disasters. The traumatic occurrence had to also overwhelm human adaptation sufficiently to meet the stressor criterion for a PTSD diagnosis (Friedman, 2016). Friedman also found that not all individuals who experienced traumatic events experienced PTSD.

Selfridge (2014) reported that an estimated seven million adult Americans met the diagnostic criteria for PTSD every year. The disorder often manifested after a rape, exposure to military combat situations, an assault, a severe automobile accident, or a natural disaster (Bardhoshi et al., 2016; Selfridge, 2014).

Bardhoshi et al. (2016) and Selfridge (2014) explained that the symptoms of PTSD were elusive and manifested months or years after the traumatic event. The

identified symptoms included reliving the traumatic experiences as nightmares, flashbacks, alienation, problems in social relations, an increased sense of vulnerability and dread, increased anxiety, frustration, anger, and worry (APA, 2000, 2013; Huang & Kashubeck-West, 2015; Selfridge, 2014). Traumatic experiences can leave permanent physical, psychological, and physiological scars (Eraly et al., 2014; Yehuda et al., 2013). The research of Eraly et al. (2014) and Yehuda et al. (2013) has shown that the effects of trauma may permanently impair immune and memory function with hypersensitivity of the sympathetic nervous system, increased startle response, and sleep disturbances. Structural brain imaging results have revealed excessive amygdala activity and reduced activation of the prefrontal cortex and hippocampus (Friedman, 2016; Yehuda et al., 2013). The associated symptoms become chronic lasting through the life span and recurring when triggered by similar stimuli-response retraumatization (Freidman, 2016; Yehuda et al., 2013). These negative emotional states have resulted in impaired immune system and cardiovascular functioning making a PTSD survivor more vulnerable to disease and infection (APA, 2013; Friedman, 2016; Yehuda et al., 2013).

One in six veterans of the most recent conflicts (Operation Enduring Freedom and Operation Iraqi Freedom) met the criteria for PTSD after returning from combat (Bardhoshi et al., 2016; Huang and Kashubeck-West, 2015; Kip et al., 2016; Moran et al., 2013). An estimated 70% of the combat veterans treated within the VA healthcare system had symptoms consistent with a PTSD diagnosis, and the 70% treated within the VA healthcare system represented only those veterans who actually sought treatment

(Bardhoshi et al., 2016; Huang & Kashubeck-West, 2015; Kip et al., 2016; Moran et al., 2013).

PTSD Diagnostic Criteria

The DSM first classified PTSD in 1987 after large numbers of Vietnam veterans experienced difficulty coping with the aftermath of their combat deployment experiences (APA, 1980). Lee, Warner, and Hoge (2015) noted that the use of valid and reliable PTSD psychometrics helped diagnose Vietnam veterans' mental health needs after the war. Behavioral healthcare practitioners and epidemiological researchers continued using these same assessments to diagnose PTSD (Lee et al., 2015). A revision to the PTSD diagnostic criteria occurred in 1994 when the APA published the DSM-IV and again in 2000 when the APA published the DSM-IV-TR (APA, 1994, 2000). The DSM-IV diagnostic criteria for PTSD included a history of exposure and symptoms from each of three symptom clusters to include intrusive recollections, avoidant/numbing symptoms, and hyper-arousal symptoms (APA, 1994). Two other criteria included the symptom duration and level of severity for those symptoms, sufficient to cause significant distress and functional impairment (APA, 1994).

The DSM-5 (2013) included significant changes with empirically supported conceptual and clinical impacts, moving beyond classifying PTSD as an anxiety disorder and instead classifying PTSD as a trauma and stressor-related disorder (APA, 2013). This change focused on the etiological foundation of an external traumatic event preceding all presenting PTSD symptomatology (APA, 2013). The criteria added anhedonic/dysphoric classifiers that included negative cognitions and mood states as well

as anger, impulsivity, and reckless self-harming behaviors (APA, 2013). The DSM-5 stressor criterion (A) emphasized that the catastrophic event had to have caused a threat to or the witnessing of actual death, or injury or a threat to personal physical integrity (APA, 2013). Indirect trauma is the witnessing or learning of a violent or accidental death or perpetration of sexual violence to a loved one (APA, 2013). A criterion excluded from the PTSD diagnosis was the viewing of traumatic experiences via electronic modes (APA, 2013). The onset of all presenting PTSD symptoms had to occur after exposure to the traumatic event (APA, 2013).

The intrusive recollections criterion (B) included language that the recurring intrusive thoughts manifested as daytime ruminations, nightmares, flashbacks, or dissociative episodes (APA, 2013). The recollections had to be powerful enough to have triggered mental cognitions and emotional and physiological responses to the presenting trauma (APA, 2013). The avoidant criterion (C) consisted of the behavioral strategies that PTSD survivors used to prevent reexposure to traumatic stimuli (APA, 2013). The trauma symptoms also caused faulty mental pattern matches between the trauma and appraisals of the self as weak, broken, inadequate, or incapable of a positive future (APA, 2013). Anger, guilt, shame, and lack of trust all led to faulty self-appraisals and a diminished sense of self-efficacy (Paul et al., 2014). Dissociation was another factor in this criterion, and associated symptoms included cutting oneself off from conscious memories or emotions associated with the trauma (APA, 2013). Friedman (2016) found that trauma survivors struggled with positive affect making it difficult for them to give or receive love or sustain close relations.

Symptoms included in the alterations in arousal reactivity criterion (E) resembled panic disorder or generalized anxiety disorder but also included hypervigilance and startle response including paranoia when stressors were extreme (APA, 2013). The criterion also included expressions of aggressive, reckless, self-injurious, and suicidal behaviors (APA, 2013).

The duration criterion (F) included that symptoms had to have persisted at least one month to diagnose symptoms as PTSD (APA, 2013). The functional significance criterion (G) specified that the PTSD survivor must have experienced significant social, occupational, or other distress because of these symptoms (APA, 2013). The exclusion criterion (H) specified that symptoms could not be due to medication, substance use, or other illnesses (APA, 2013).

The above DSM-5 classification of PTSD as an actual disorder filled a knowledge gap that resulted in better informed behavioral health practices (APA, 2013; Friedman, 2016). The etiological focus of PTSD onset shifted from internal stimuli triggered by weakness or traumatic neurosis to that of external stimuli triggered by traumatic events (Friedman, 2016; Swank & Marchand, 1946).

Friedman (2016) and Hoge et al. (2014) found that PTSD symptoms were unique to each trauma survivor and the symptoms often manifested in ways that did not meet diagnostic criteria. Therefore, the psychological and physiological aspects of trauma needed individualized assessment to understand the extent of the perceived threat (Freidman, 2016; Hoge et al., 2014).

The following is a DSM-5 (APA, 2013) summary of the symptoms associated with a PTSD diagnosis:

- Recurrent, involuntary, intrusive memories
- Traumatic nightmares
- Dissociative reactions
- Intense or prolonged distress after exposure to traumatic reminders
- Marked physiological inability to recall key factors of the traumatizing dissociative reactions
- Persistent, distorted, negative beliefs and expectations about oneself or the world
- Feeling alienated from others
- Hypervigilance and irritable or aggressive behaviors
- Self-destructive or reckless behaviors and sleep disturbances.

Assessment of PTSD

Lee et al. (2015) felt that PTSD screening was critical to assess PTSD treatment options. The importance of PTSD screening magnified when over 250,000 service members returned from Operation Desert Shield/Desert Storm in a well-adjusted state during reintegration, only to present months later with behavioral health concerns. This revelation overwhelmed the military health care systems (Lee et al., 2015). This urgent need gave rise to the development of surveys and protocols for clinical interviews conducted by primary behavioral health care providers (Lee et al., 2015). The DoD, VA, and Institute of Medicine refined their standards and their survey timeframes (Lee et al.,

2015). Protocols were disseminated throughout the military and VA healthcare systems, despite the challenges posed by rapid deployment cycles (Lee et al., 2015). The military reengineered the system of primary care for PTSD and depression screening (Lee et al., 2015). The behavioral health data portal (BHD) automated and populated screening protocols and ensured integration of findings to enhance continuum of care measures (Lee et al., 2015). Lee et al. also noted that screening cutoffs needed to be sensitive to purpose and prevalence in the target population to ensure predictive value and reliable false negative to false positive ratios.

Assessments, therefore, offered face validity, but repeated administrations produced less reliable outcomes because validity needed to detect the presence of the condition as well as the severity (Lee et al., 2015). The PTSD checklist (PCL) presented with subjective limitations in the interpretation of the rater's severity assignment when comparing one self-rater to another self-rater (Lee et al., 2015). Data captured at different points in time could also confound the results of the assessments (Lee et al., 2015). The outcomes pointed to the need for cultivating sensitive contextual assessment of the results and an inherent understanding that no one instrument could meet all screening needs (Lee et al., 2015).

Lee et al. (2015) found that the most prevalent assessment tools used within veteran populations were the Structured Clinical Interview for DSM-5 (SCID) for diagnosis only, the Clinician's Administered PTSD scale (CAPS), the Short PTSD Rating Interview (SPRINT) and the PTSD Symptoms Scale – Interview (PSS-I). The above screening tools depend on standard interviews, making administration difficult (Lee et al.,

2015). Thus, self-report instruments accommodate larger screening needs. Lee et al. stated that when a diagnosis of PTSD is identified by a primary care practitioner, the PCL-M (Military) or PCL-C (Civilian) or PCL-S (Specific Stressor) is commonly used and a new instrument, the PCL-5 (DSM-5 compliant), was created but was not in general use at the time. Lee et al. also noted that the PCL consists of 17 questions related to DSM-IV criteria for PTSD, as well as a Likert scale to assess symptom severity ranging from 1 (not at all) to 5 (extremely). Cutoff scores depend on purpose and population (Lee et al., 2015).

A study conducted by Forbes, Creamer, and Biddle (2001) on serial administration of the PCL found variations in the ability to confirm the presence or absence of PTSD symptoms. The study concluded that the PCL underrates improvement when compared to CAPS. Monson, Gradus, Young-Xu, Schnurr, and Price (2008) found that the PCL is effective in the assessment of symptom changes over time. The accuracy issues were concerning to military behavioral health providers because these screening tools are germane to all electronic matrixed data collection and archival patient monitoring platforms (Monson et al., 2008). The PCL-S instrument is more sensitive to overlapping symptoms associated with comorbidities (Lee et al., 2015). Cutoffs were another concern when assessing prevalence scores. In general populations where prevalence scores are lower, higher cutoffs prevent inflation (Lee et al., 2015). In clinical settings, a lower cutoff prevents false negatives (Lee et al., 2015). This was inconsistent with the National Center for PTSD (2018), where PCL cutoff scores were set higher. Terhakopian, Sinaii, Engel, Schnurr, and Hoge (2008) reinforced the importance of

recalibrating cutoff points to prevent high false positive and low predictive value. Lee et al. (2015) found that the most significant limitation with the PCL was the self-reporting nature of the instrument.

Etiology

Karlin (2012) and Wells et al. (2010) theorized that the undertaking of etiological studies enhanced exploration of the determinants of any disorder. Modeling helped to support the identification and validation of PTSD onset and associated symptoms, treatments, and recovery (Bryan, McNaughton-Cassill, Osman, and Hernandez (2013). Bryan et al., (2013) and Cabrera, Hoge, Bliese, Messer, and Castro (2007) found that childhood adversity, sexual or physical abuse, or other traumatic events are associated with PTSD onset and associated comorbid disorders such as depression and suicide. Yehuda et al. (2013) offered compelling research on the importance of biomarkers to aid in the assessment of PTSD.

Prevalence

The National Comorbidity Survey Replication investigated prevalence rates as the diagnosis criteria for PTSD underwent revisions in the DSM III, IV, IV-TR, 5 (APA, 1994, 2000, 2013; Kessler et al., 2005). A total of 8,098 Americans aged 15 to 54 completed surveys (Kessler et al., 2005). Estimated prevalence rates for PTSD were much higher than expected at 7.8% in the general population (Kessler et al., 2005). Kilpatrick (2013) reported that the lifetime prevalence rate of PTSD was at 8% of the adult United States population with women having a lifetime prevalence of 9.7% and men having a lifetime prevalence of 3.6%. Women were at higher risk for exposure to a

traumatic experience such as rape and, therefore, experienced more intense symptoms (Kilpatrick, 2013). LeardMann et al. (2013) estimated that one in five women experienced sexual assault, and the impact of sexual assault could potentially last for months, years, or a lifetime because survivors of sexual assault or rape coped and recovered in uniquely individual ways (Carlson, Stromwall, & Lietz, 2013).

Bardhoshi et al. (2016), Huang and Kashubeck-West (2015), and Moran et al. (2013) found in their research that combat veterans are at higher risk for PTSD with one in six veterans of the most recent conflicts meeting the criteria for PTSD. Bardhoshi et al. (2016) estimated that the prevalence rate for PTSD in veteran populations was 20% with co-occurring major depressive disorder prevalence rates at 37%. Hoge et al. (2014) and Miller (2013) defined PTSD as a medical condition that affected identity. Additionally, the indoctrination associated with military training and the higher rates of exposure to trauma make combat PTSD a paradoxical problem that is much more serious and widespread than the military or the public realizes (Hoge et al., 2014; Miller, 2013). Additionally, many more soldiers return with symptoms of hyperarousal, flashbacks, and other symptoms that do not meet the full criteria for a PTSD diagnosis (Hoge et al., 2014; Huang & Kashubeck-West, 2015). Multiple war zone deployments coupled with quick redeployments create further readjustment difficulties for service members and their families (Gerlock, Grimesey, & Sayre, 2014).

There is documented evidence of the adverse effects of combat through World War I, World War II, the Korean War, the Vietnam War, and the Gulf War (Castro & McGurk, 2007; Harris et al., 1955; Perkins, 1955; Swank & Marchand, 1946). The

United States has been engaged in combat operations in Afghanistan since 2001 and in Iraq from 2003 to 2010 (Castro, 2014). More service members than ever have experienced multiple deployments in rapid succession (Castro, 2014). These wars resulted in more than 6500 deaths, 50,000 wounded-in-action, and 118,000 cases of diagnosed PTSD (Castro, 2014). Castro also found that at the peak of the war in 2012 an estimated 17,000 active duty service members per year met the criteria for PTSD.

The focus of military research was and is on knowing the impact of combat and deployment on the mental health status of service members including risk and protective factors (Castro, 2014). The military, therefore, began the Millennium Cohort (MILCOHORT) Study in 2014 (Castro, 2014) The study is in progress through 2067 (Castro, 2014). The study included service members and veterans dating back prior to the September 11th terrorist incident, offering an objective research baseline (Castro, 2014). Wells et al. (2010) found that PTSD onset after deployment and exposure to combat was between 7.6% and 8.7%, compared to 1.4% to 3% for non-combat or non-deployed personnel. Onset of new diagnoses of depression following combat was 5.7% for men and 15.7% for woman, compared to 3.9% and 7.7%, respectively for men and women who had never deployed (Wells et al., 2010).

Phillips et al. (2016) found that significant advances have led to 90% survival rate among those injured while deployed to conflict areas. The high rate of trauma-related injuries endured by this population, however, have challenged existing medical facilities when meeting long-term care needs (Phillips et al., 2016). The VA has responded with specialized care models and the creation of a veteran registry to improve care (Phillips et

al., 2016). Phillips et al. found that veterans with PTSD and comorbid disorders reported a higher incidence of health problems, used more healthcare services, incurred greater healthcare costs, had higher rates of work absenteeism, and developed maladaptive coping skills to address their depression, pain, and anxiety.

Van Voorhees et al., (2012) found that returning service members experienced a range of mental health disorders and symptoms, most prominent of which was PTSD at 21.8%. Only 38% to 45% were interested in receiving help, but only 23% to 40% of those who expressed an interest actually received professional help (Van Voorhees et al., 2012). The complexity of mental health disorders combined with other situational disadvantages increases the risk for maladaptive transition into civilian life or impairment of existing military roles (Van Voorhees et al., 2012).

Risk Factors

The DSM-5 (APA, 2013) detailed that those at higher risk for PTSD included males, those less educated, those with conduct problems as children, those with a family history of psychiatric disorders, and those with high scores on extroversion and neuroticism. African Americans were at greater risk for PTSD onset than Caucasian Americans (APA, 2000, 2013). Severity, duration, and proximity of exposure to a traumatic event were important indicators affecting the likelihood of PTSD onset (APA, 2000, 2013). There was also evidence that social support, family history, childhood experiences, personality variables, and preexisting mental health disorders influenced PTSD onset, treatment, or recovery (APA, 2000, 2013). PTSD also developed in

individuals without any predisposing conditions when they experienced extreme or life-threatening stressors (APA, 2000, 2013; Hazle, Wilcox, & Hassan, 2012).

Huang and Kashubeck-West (2015) assessed pre-trauma vulnerability factors that included younger chronological age, female gender, ethnic minority, being single, less educated, having experienced a prior trauma, and having a history of psychiatric illness or abuse. Trauma vulnerability factors included the degree of severity of the stress, the intensity of the exposure, having less deployment preparedness, and exhibiting existing maladaptive coping behaviors (Huang-Kashubeck-West, 2015). Combat exposure, specifically, was a strong predictor of PTSD onset (Hoge et al., 2014: Huang & Kashubeck-West, 2015). Thus, the greater the exposure, the greater the severity of PTSD symptoms (Hoge et al., 2014; Huang & Kashubeck-West, 2015).

Protective Factors

Bardhoshi et al. (2016) found that protective factors included behavior (engagement in meaningful activities), cognitive self-efficacy (problem-solving skills), and interpersonal relations (enhanced social support). Negative affect increased functional impairment and worsened specific symptoms especially when psychological intervention was not sought (Bardhoshi et al., 2016).

Comorbidities

Individuals who meet DSM-5 diagnostic criteria for PTSD often meet DSM-5 diagnostic criteria for other co-occurring disorders, such as alcohol use, substance use, depression, dysthymia, anxiety, or personality disorders (APA, 2013). Goodson et al. (2011) and Britvic et al. (2015) found that PTSD is associated with chronic conditions

and diseases that include cardiovascular disease, liver disease, autoimmune disease, dementia, hypertension, fibromyalgia, chronic fatigue syndrome, irritable bowel syndrome, and chronic pain issues. The link between PTSD and coronary disease has also been under scientific investigation because combat veterans are 25%to 33% more likely to develop cardiovascular disease than service members who have not experienced combat (Goodson et al., 2011). Additionally, combat veterans experience poorer health despite controlling for combat-related injuries (Goodson et al., 2011). Research has been focused on the link between PTSD and premature death based on the above findings (Goodson et al. 2011).

Another area of research included vicarious trauma among veterans' family members (Lester et al., 2013). Lester et al. (2013) found that children under the age of 17 experience less incidences of PTSD and that a diagnosis of PTSD was rare, only occurring in less than one half of one percent of children studied. Child-related trauma, however, increased during single and dual-parent deployments and when families lived outside of a military community (Lester et al., 2013; Sensiba & Franklin, 2015). According to the National Center for PTSD (2018), the rates for PTSD among children of combat veterans varies from 3% to 100%. Price (2013) found that these complexities made it difficult for behavioral health practitioners to decide whether to treat comorbidities sequentially or concurrently, bringing into question treatment efficacy, especially when symptoms do not resolve.

PTSD and Guilt

Dettmer et al. (2015) found that the nature of PTSD diagnosis in military populations is the same as PTSD diagnosis in the general population, except for the inclusion of guilt and shame known as the invisible wounds of war or moral injury. Dettmer et al. defined moral injury as a syndrome that occurs when challenged beliefs cause guilt, shame, or blame, with a persistent sense of demoralization that alters self-concept. Dittmer et al. also found that symptoms of moral injury do not respond well to pharmacotherapy. However, the patient-therapist alliance does serve as a protective factor in supporting more adaptive reappraisals of the self and others and the regulation of shame-based and guilt-inducing recollections (Bryan, Ray-Sannerud, Morrow, & Etienne, 2013; Dettmer et al., 2015; Hendin, 2014). Research efforts are now more focused on combat veterans' invisible wounds. Hendin (2014) found that physical war injuries worsened the psychological symptoms associated with the concept of invisible wounds (Hendin, 2014; Vick, 2014). The rise in combat-related suicides is due to the comorbidities resulting from physical and psychological war wounds (Hendin, 2014; Kane, Saperstein, Bunt, & Stephens, 2013; Vick, 2014). Hendin's (2014) research showed that perceived guilt is associated with increased suicides. In fact, Hendin (2014) found that severe combat-related guilt is the major differentiator between veterans attempting suicide and veterans contemplating suicide. The nature of the internalized combat experience is the determining factor in the degree of suicide risk (Hendin, 2014). Hendin's research found that veterans' perceived guilt is associated with nightmares that reflect their guilt. Veterans that struggle with perceived guilt medicate their feelings with

drugs and alcohol (Hendin, 2014). The burden of guilt exacerbates extinguishment of PTSD symptoms (Hendin, 2014). Resolution of PTSD symptoms is closely associated with an understanding of the veteran's unconscious meaning of the traumatic experience (Hendin, 2014; Vick, 2014).

Hendin (2014) noted that cognitive behavioral therapies are empirically supported PTSD therapies, but the treatment effectiveness of these therapies for resolving suicidality was unclear. Prolonged exposure is another empirically supported therapy found effective for military PTSD, but the therapy has not been tested in veteran populations at high risk for suicide (Hendin, 2014; Vick, 2014). Hendin stated this is why VA-approved therapies are not proving effective for the prevention of suicide. This is a critical factor because the rate of suicide in the military from 1980 to 1992 was 11 to 14 suicides per 100,000 per year (Anestis & Bryan, 2013; Castro, 2014; Castro & Kintzle, 2014). More soldiers took their own lives than died in combat in Afghanistan or Iraq, and these statistics do not include drunk driving deaths due to comorbidities associated with military PTSD (Castro & Kintzle, 2014). Suicide rates were stable from 1990 to 2003 among army personnel and then nearly doubled from 2003 to 2010, with suicide rates estimated at 21 suicides per 100,000 per year (Ritchie, 2015). Nelson (2015) cited that in 2012 the United States Department of Veteran's Affairs (2018) estimated that 8,000 veterans committed suicide each year, at an average of 22 suicides per day. The main reason these estimates were on the rise was because soldiers chose to permanently end their suffering when they could not separate themselves from their war memories, images, sensations, and feelings (Nelson, 2015).

Wanklyn et al. (2016) conducted a study of participants who experienced a traumatic event. The aim of the study was to examine the predictors of PTSD and comorbid diagnostic status (Wanklyn et al., 2016). Age, education, higher degree versus each of postsecondary degree, minority status, and partner status were identified. These risk factors led to increased suicides, suicide ideations, attempted suicide, and completed suicides (Wanklyn et al., 2016). PTSD increases the risk of suicide due to a higher prevalence of comorbidities between PTSD and depression, anxiety, phobias, isolation, aggression, homelessness, and maladaptive family systems; all culminating in overall poorer health outcomes (Bardhoshi et al., 2016; Huang & Kashubeck-West, 2015; Schoenbaum et al., 2013).

PTSD and Depression

Van Voorhees et al. (2012) found a link between PTSD and depression among service members exposed to trauma. Both PTSD and depression shared common factors thought to increase vulnerability in three domains (1) behavior avoidance; (2) low cognitive bias; (3) and learning and information bias (Van Voorhees et al., 2012). Castro and Kintzle (2014) and Wanklyn et al. (2016) affirmed in their research that the severity of combat exposure is the key predictor differentiating a comorbid diagnosis from either PTSD or major depressive disorder (MDD) when accounting for rank, deployment era, and wounded in action, while life threat is associated with PTSD. Traumatic loss and life threat leads to an increased rate of diagnosed comorbidities (Wanklyn et al., 2016). Frequency of the severity of the traumatic event is associated with more severe PTSD symptoms (Wanklyn et al., 2016). It is unclear if trauma type serves to differentiate a

PTSD diagnoses, or a PTSD/major depressive disorder (MDD) comorbid diagnosis, because available studies focused specifically on PTSD or represented cumulative outcomes (Wanklyn et al., 2016). The researchers hypothesized whether deployment-related and interpersonal traumas differentiated the diagnoses of PTSD / MDD, or PTSD-only, or MDD-only (Wanklyn et al., 2016).

Raab, Mackintosh, Gros, and Morland (2015) also reported that depression is a highly comorbid condition in veteran populations diagnosed with PTSD. A large meta-analysis of 57 studies across military and civilian samples concluded with a comorbidity rate of 52% (Raab et al., 2015). Raab et al. reported that the reason for this high degree of comorbidity was unclear but pointed to a potential lack of PTSD specificity. There was an association with reduced veteran quality of life defined as the state of mental, social, and physical wellness (Raab et al., 2015). Raab et al. (2015) and Price 92013) found that PTSD negatively affected veteran quality of life, resulting in symptoms that included intense emotions, fear, anger, grief, and guilt.

PTSD and Anxiety

Soldiers receive resilience training in preparation for combat (Schweizer et al., 2017). However, combat exposure tests even the most resilient soldiers (Schweizer et al., 2017). In fact, combat exposure is a proven predictor of negative mental health outcomes (Schweizer et al., 2017). One well-established risk factor is anxiety. Russ and McNally (1985) defined anxiety as increased subjective stress responses, emotion dysregulation, and intrusive memories. Russ and McNally also found that anxiety produced limited access to emotion dysregulation, increased worry, and rumination. Schweitzer et al.

(2017) also noted that anxiety impeded integration and resolution of traumatic experiences. Fear, helplessness, horror, negative cognitions, and ruminations were common responses after experiencing a trauma (Schweizer et al., 2017). Many trauma survivors recovered from these intense posttraumatic symptoms (Schweizer et al., 2017). However, others developed stressor-related disorders such as PTSD and were more susceptible to trauma due to stress modulation dysfunctions (Schweizer et al., 2017). People diagnosed with anxiety experienced greater degrees of emotional dysregulation, were less resilient to stressors-related disorders, and recovered more slowly from the after-effects of their trauma experiences (Agorastos et al., 2013). Anxiety was also associated with less fear reduction and impaired suppression of negative ruminations (Agorastos et al., 2013). Severe anxiety symptoms were also associated with high peritraumatic behaviors leading to the development of PTSD (Agorastos et al., 2013). The degree of severity associated with peritraumatic behaviors depended on the absence or presence of effective coping and resilience skills maintenance (Agorastos et al., 2013).

Empirically Supported Psychotherapeutic Interventions

More than 12,000 published PTSD studies over the last 30 years have advanced knowledge in the behavioral healthcare field (Rosen & Frueh, 2010). Foa, Keane, Friedman, and Cohen (2009) reviewed the most successful PTSD interventions available at that time and concluded that cognitive behavioral therapies and medications are effective in the treatment of PTSD symptoms. Specifically, Foa et al. (2009) found that CPT and PE are effective in treating female victims of adult sexual trauma, survivors of military trauma, and survivors of serious motor vehicle accidents (Foa et al. 2009).

Pharmacologically, sertraline (Zoloft) and paroxetine (Paxil) were the first selective serotonin reuptake inhibitors (SSRIs) to have received FDA approval as indicated treatments for PTSD (Ritchie & Nelson, 2015). Group therapy was also indicated as a supportive treatment for mild PTSD symptoms, especially when group members share trauma experiences and empathize with each other (Foa et al., 2009; Ritchie, 2015). Foa et al. (2009) concluded, however, that PTSD is a complex and debilitating disorder that does not always respond well to available treatments making it difficult to conclude who most benefits from specific PTSD treatments.

The VA/DoD, in 2004, issued the clinical practice guidelines (CPG) for the treatment of PTSD to support veteran populations at the beginning of the conflicts (Bernardy & Friedman, 2012; Department of Veterans Affairs, 2012). The VA mandated as part of a national policy that all veterans diagnosed with PTSD have access to CPT, PE, and EMDR interventions (Bernardy & Friedman, 2012). A successful system-wide training program began in 2011, resulting in the certification of thousands of clinicians (Bernardy & Friedman, 2012).

However, Foa et al. (2009) noted that prior to the September 11 terrorist attacks neither CPT nor PE, the current first-line treatment options, were effective in addressing combat-related PTSD symptoms. Subsequent studies focused on investigating the effectiveness of these PTSD treatment interventions and whether the interventions required modifications or inclusion of complementary psychological or pharmacological treatment approaches (Karlin, 2012). Subsequent randomized controlled trials have since shown that CPT and PE interventions significantly reduce PTSD symptoms in veteran

populations (Karlin, 2012; Ritchie, 2015; Rauch et al., 2012). However, Adler and Castro (2014) reported that even though these first-line therapies have been proven effective, behavioral health practitioners need to consider the nature, intensity, and severity of the traumatic events experienced by these veteran populations. First-line interventions used within veteran populations include the therapeutic interventions listed below.

Cognitive processing therapy (CPT). Chard, Ricksecker, Healy, and Karlin, (2012) reported that Patricia Resick began researching CPT as early as 1988. Resick, Nishith, Weaver, Asten, and Feuer developed a manualized, cognitive-based, trauma-focused, PTSD intervention in 2002. The CPT intervention consists of 12 sessions delivered once or twice per week in structured 50-minute sessions with between-session homework and written trauma accounts (Chard et al., 2012). Chard et al. (2012) found that CPT is an effective treatment for PTSD and comorbid disorders such as depression, anxiety, and guilt. The CPT protocol accommodates individual and group sessions or sessions delivered in mixed settings (Chard et al., 2012; Resick & Schnicke, 1992; Resick et al., 2008). Hernandez et al. (2016) confirmed that CPT includes elements of cognitive therapy and information processing. The aim of the intervention is the restructuring of trauma memories through the process of accommodation (Hernandez et al., 2016).

Chard et al. (2012) noted that the first four sessions of CPT focus on the theoretical underpinnings of CPT. This focus aids patients in building trauma narratives that add meaning, explore feelings, and surface resistance to integrate and reinterpret the trauma experience (Chard et al., 2012). Sessions five to seven focus on cognitive therapy

skills and therapy-specific questionnaires to examine held beliefs impeding wellness (Chard et al., 2012). Sessions eight through 12 introduce the challenging beliefs worksheet to examine beliefs about safety, trust, power, control, intimacy, and esteem for baseline-to-progress changes (Chard et al., 2012; Resick et al., 2012). The therapist processes specific trauma details in written form on a case-by-case basis (Chard et al., 2012). The therapist introduces CPT techniques useful in challenging beliefs about future-focused concerns and the resulting triggers that surface (Chard et al., 2012).

Resick et al. (2008) conducted a randomized controlled trial to compare CPT and PE in a sample of female rape victims. The intent-to-treat sample experienced significant reduction in PTSD and depression symptoms after treatment, at three months and at nine months (Resick et al., 2008). The study revealed that CPT produces modestly greater improvement than PE (Resick et al., 2008). Despite the empirical evidence of CPT effectiveness, there is a 4% to 29% dropout rate and a 4% to 48% non-response rate for cognitive processing therapy (Hembree & Foa, 2010; Kip et al., 2013).

Prolonged exposure (PE). In October of 2010 the VA and the DoD released their VA/DoD clinical practice guidelines for management of PTSD and exposure therapies (Bernardy & Friedman, 2012: Department of Veterans Affairs, 2012). The guidelines categorized prolonged exposure, which was created by Edna B. Foa, PhD, as a first-line treatment for PTSD regardless of the type of trauma or associated comorbidity (Department of Veterans Affairs, 2012; Hembree & Foa, 2010; Karlin, 2012; Rauch et al., 2012; Thomas, Amin, & Friedlander, 2015). Prolonged exposure is an individual therapy consisting of eight to 15, 90-minute sessions with flexible approaches to meet

patient needs (Rauch et al., 2012; Thomas et al., 2015). The PE intervention includes education, in vivo exposure of the trauma, and repeated imaginal exposure of the associated traumatic memories (Rauch et al., 2012; Thomas et al., 2015). Daily, between-session homework, in vivo exercises, and imaginal exposure recordings are critical components of the protocol (see Hembree & Foa, 2010; Paul et al., 2014; Thomas et al., 2015).

Thomas et al. (2015) highlighted that the first session focuses on detailing the trauma experience with an intake of the history and formulation of the diagnosis. Relaxation techniques and psychoeducation play a key role in the process (Thomas et al., 2015). The second session includes psychoeducation on trauma responses to aid in normalizing and acknowledging the trauma experiences (Thomas et al., 2015). The topic of avoidance is important because of its impact on outcomes (Thomas et al., 2015). Between-session exposure exercises are critical components in the recovery process (Thomas et al., 2015).

In the third session, imaginal exposure techniques encourage the patient to recall and record the trauma narrative in session and then listen to the recorded tapes between sessions (Thomas et al., 2015). The subjective units of distress (SUD) scale assesses severity of symptoms throughout the imaginal exposure exercise (Thomas et al., 2015). The goal is to associate the retelling of the trauma narrative with the reality that the retelling will not create a catastrophic event. However, Paul et al. (2014) noted that this step creates the greatest amount of non-compliance, as patients avoid the retelling of their traumatic experiences.

Sessions four through 10 include repeated reviews of the imaginal exposure exercises and homework from prior sessions (Thomas et al., 2015). The patient continues creating tapes and listening to them at home (Thomas et al., 2015). Learning theory and classical conditioning inform the PE protocol (Thomas et al., 2015). Exposure to the trauma memories through in vivo and imaginal exposure continue until extinguishment of the trauma occurs (Paul et al., 2014). Paul et al. (2014) found there is less cognitive intervention in PE, but the assumption made are that the cognitive restructuring occurs with exposure to the trauma memories.

Yuen et al. (2015) conducted a randomized controlled trial comparing the effectiveness of PE with in-office visits and home-based telemedicine after eight to 12 weeks of treatment. Yuen et al. reported no significant treatment outcome differences between the two forms of PTSD treatment. However, Hernandez-Tejada, Acierno, and Sanchez-Carracedo (2017) reported that attrition across all empirically supported psychotherapies was at 30% due to stigma and logistical difficulties. Additionally, home-based treatment with PE had no effect on high dropout rates (Hernandez et al., 2017).

Yuen et al. (2015) also surveyed 82 veterans who dropped out of their PE treatment. The results showed that 50% were non-compliant with the in vivo home assignments and, subsequently, withdrew from the program (Yuen et al., 2015). Kip et al. (2013) reported that CPT treatment dropout rates were estimated between 0% to 50% for PE and non-response rates varied from 20% to 67%.

Eye movement desensitization and reprocessing (EMDR). Shapiro's (2001) eye movement desensitization and reprocessing (EMDR) eight-phase protocol is premised on an adaptive information processing (AIP) model. The model facilitates the accessing and processing of traumatic memories and adverse life experiences to facilitate adaptive resolution (Shapiro, 2001). Shapiro detailed that EMDR consists of eight to 12, 60 to 90-minute weekly sessions. The number and length of EMDR sessions is unique to each PTSD patient offering flexibility in the management of patient needs (EMDR Institute, Inc., 2017). The eight-phase protocol includes a variety of procedures that align with the AIP model to maximize treatment effects (Shapiro, 2001). Procedures include history-taking; assessment of readiness; identification of distressing trauma memories; and imagery and stress reduction techniques to reduce or extinguish trauma images, negative self-beliefs, and related emotions and body sensations (Shapiro, 2001).

Shapiro (2001, 2012) stated that focused attention on bilateral eye movements, tones, or tapping aids help patients resurface trauma images, sensations, and triggers to create new insights, memories, and mental associations. The intervention, initially viewed with scepticism, was endorsed by the APA in 2004, and EMDR is now a first-line, empirically supported protocol for the treatment of PTSD (Shapiro, 2012). Hernandez et al. (2016) stated that the EMDR protocol relies on the theoretical premise that the images and sensations associated with the trauma memory are the source of PTSD symptoms. Shapiro (2012) stated that EMDR therapy supports early intervention when trauma memories, images, sensations, and feelings are not yet fully integrated.

Shapiro also stated that EMDR treatment reduces hyperarousal, negative cognitions, intrusive memories and sensations, and the risk of retraumatization (Shapiro, 2012).

However, Albright and Thyer (2010) examined the effects of EMDR and PTSD among military veterans by reviewing six randomized-controlled trials and three quasi-experimental studies conducted between 1987 and 2008. Albright and Thyer concluded that the findings were inconsistent and that EMDR did not meet the threshold for empirically supported PTSD treatment of combat veterans. Albright and Thyer concluded that EMDR research required larger randomized-controlled-trial studies with credible placebo-controlled treatment to determine efficacy rates for veteran populations with combat-related PTSD (Albright & Thyer, 2010).

Shapiro (2001) theorized, when EMDR was first introduced, that the protocol could desensitize anxiety and related trauma memories, but Shapiro also stated that EMDR was not intended to eliminate PTSD symptoms nor include coping techniques (EMDR Institute, Inc., 2017). Hernandez et al. (2016) compared EMDR with other empirically supported therapies and concluded that 60% to 72% retained their PTSD diagnoses. Kip et al. (2013) reported that the dropout rates for EMDR is between 0% and 36% with a non-response rate between 7% and 92%.

In summary, all the above empirically supported therapies are significant in reducing PTSD symptoms (Rauch et al., 2012). However, as mentioned previously, existing empirically supported therapies are lengthy, time-consuming, and require between-session homework and exposure exercises that could re-traumatize patients (Feeny & Foa, 2005; Rauch et al., 2012). Treatment dropout, non-response, and non-

compliance rates also remain high across these treatment modalities, potentially compromising treatment outcomes (Feeny & Foa, 2005; Hembree & Foa, 2010; Hernandez et al., 2016; Kip et al., 2013; Ritchie, 2015).

Haagen et al. (2015) conducted a meta-analysis of 57 studies and concluded that pretreatment severity levels were associated with post-treatment outcomes, creating lower treatment gains at low and high severity levels when compared with the outcomes of those who tested at moderate severity levels prior to treatment. The Haagen et al. meta-analysis supported the conclusion that exposure-based therapies optimally address veterans' PTSD symptoms and that future studies are suggested to analyze efficacy rates.

However, Ritchie (2015) noted that research consensus has not been reached on the most optimum PTSD treatment approaches. Some practitioners have argued for case formulation while others have advocated for therapist specialization and patient preference to determine appropriate PTSD treatment protocols (Ritchie, 2015). More research is needed to investigate the factors that influence treatment response and inform relapse prevention efforts, despite treatment advancements over the last 30 years. (Feeny & Foa, 2005).

Pharmacotherapy. Ritchie and Nelson (2015) found that in the 1980s Thorazine and Valium were the only psychotropic medications used. Medication augmentation for use in the field occurred in the early 1990s (Ritchie & Nelson, 2015). Depression was treated with selective serotonin reuptake inhibitors (SSRI; Ritchie & Nelson, 2015). Additionally, Prozac (Fluoxetine) received approval for the treatment of depression (Ritchie & Nelson, 2015). Paxil (Paroxetine) and Zoloft (Sertraline) were the only

medications that were FDA-approved for PTSD (Castro, 2014; Ritchie & Nelson, 2015). These medications have been helpful with non-combat-related PTSD symptoms, but they have not been tested for the treatment of combat-related PTSD symptoms (Castro, 2014; Ritchie & Nelson, 2015). Serotonin-norepinephrine reuptake inhibitors (SNRIs) such as Cymbalta (Duloxetine) were effective for neuropathic pain, and Effexor (Venlafaxine) helped with migraines (Ritchie & Nelson, 2015).

Ritchie and Nelson (2015) noted that deployment guidelines do not allow service members to deploy while taking certain prescribed medications. Off-label, second-generation, antipsychotics are useful but their use prevents deployment (Ritchie & Nelson, 2015). Trazadone in low doses and Prazosin help manage trauma-related nightmares (Ritchie & Nelson, 2015). Ambien (Zolpidem) and Lunesta (Eszopiclone) help but are habit-forming (Ritchie & Nelson, 2015). Benzodiazepines are contraindicated because of tolerance, the potential for abuse, and the worsening of PTSD symptoms (Ritchie & Nelson, 2015). Valproic acid (Depakote) and Gabapentin are helpful for depression and comorbid pain (Ritchie & Nelson, 2015). Antidepressants such as Seroquel help to manage hyperarousal and nightmares but weight gain and increased triglycerides make long-term use unsustainable (Ritchie & Nelson, 2015). Ritchie and Nelson concluded that medication management was a trial-and-error process and many medications are not well-tolerated long-term or become risk-factors for military career ascension (Ritchie & Nelson, 2015). Castro (2014) found that pharmacotherapy offers inconsistent relief of symptoms, and ongoing clinical trials are

focused on determining the most therapeutic constructs for the use of pharmacotherapy alone or in combination with other empirically supported PTSD treatment modalities.

Barriers to Successful Treatment

Chard et al. (2012) found that as concise, tested, and well-developed as empirically supported therapies are, existing barriers include therapists' inability to meet veterans' healthcare demands, availability of training time, adherence to training protocols, and the overall complexity and comorbid state of treating PTSD symptoms. The emotional toll on practitioners' resilience and empathic reserves, when delivering trauma-based interventions, is another important PTSD treatment factor (Chard et al., 2012). The patients' retelling of and the therapists' continuous listening to traumatic experiences oftentimes leads to burnout (Chard et al., 2012). Chard et al. found that some therapists do not know how to prevent countertransference, empathic drain, and burnout. Chard et al. advocated for more veteran studies and replications of the same studies to make treatment efficacy comparisons.

Zeiss and Batten (2012) reviewed the VA's overall commitment to empirically supported psychotherapies and found the process to be interdisciplinary and interdepartmental. The guidelines include evidence of diagnoses, treatment options, and the importance of early intervention to prevent PTSD. The guidelines developed by the International Society for Traumatic Stress Studies (ISTSS) focuses on acute stress reaction/disorder to better assess PTSD onset (Zeiss & Batten, 2012).

A review of the literature explored interventions with and without evidence of effectiveness (Zeiss & Batten, 2012). Categorical treatment segmentation includes

specific evidence of pharmacotherapy, adjunctive services, somatic treatments, psychotherapy, and CAM approaches (Zeiss & Batten, 2012). Symptom focus also includes sleep disturbance, pain, irritability, severe agitation, and anger (Zeiss & Batten, 2012). Many of the approaches in use, however, could not readily accommodate patient feedback about inclusion of the family system, dissemination of care in non-traditional settings, and inclusion of CAM (e.g., acupuncture, meditation) in the treatment options (Zeiss & Batten, 2012).

Brown et al. (2015) found that treating returning veterans was a complicated and challenging task because 1,300,000 veterans lived remotely and were not near behavioral health networks, and 1,000,000 dependents reported deterioration in physical or mental health (Brown et al., 2015). The Brown et al. research showed that veteran proximity to medical care facilities was associated with likeliness to seek care. This presented a potential gap in the accessibility and availability of effective and consistent treatment (Brown et al., 2015).

Whealin, Seibert-Hatalsky, Howell, and Tsai (2015) found that a known barrier to effective PTSD treatment in veteran populations is the associated stigma of needing behavioral health care. Veterans avoid treatments that include re-experiencing of trauma memories; a hallmark step in the treatment protocol (Whealin et al., 2015).

Hoge et al. (2004) found early on that the wars were taking a tremendous toll on the mental health of combat veterans. In 2007 the government increased funding for medical research to a total of one billion dollars from 2007 to 2013, as a result of Hoge's findings (Castro, 2014). Castro (2014) confirmed the creation of the psychological health

research continuum framework to ensure availability of empirically supported treatment options for combat veterans in need. Areas of research included risk and resilience, PTSD biomarkers, mental health training, psychological screening, psychological debriefing, third location decompression, combat and suicide, usefulness of psychotherapy and drug therapy for PTSD, role of advanced technology, telemedicine, virtual reality (VR), methods to reduce stigma, barriers to care, and best approaches to disseminate effective interventions (Castro, 2014; Eraly et al., 2014; Reger et al., 2011; Zamorski, Guest, Bailey, & Garber, 2012).

The psychological health research continuum framework, however, did not detail when a solution would be sought, how much the solution would cost, the level of evidence that existed for all solutions, or the protective or risk factors in the etiology of PTSD onset such as branch of service, needs, gender, culture variances, and the complexities of comorbidities (Castro, 2014).

Although the VA focused on the gold standard of therapeutic care for PTSD which included CPT and PE, Nelson (2015) and Paul et al. (2014) found that evidence of treatment efficacy was unclear. The primary in-session therapeutic approach had patients repeatedly reliving the traumatic experience until there was extinguishment of the stimulus-response cycle and the patient experienced relief of associated PTSD symptoms (Nelson, 2015). However, many patients abandoned the therapeutic process prior to experiencing relief of PTSD symptoms (Nelson, 2015). Nelson (2015) and Nelson and Ritchie (2015) also added that SSRIs like Prozac and Zoloft are helpful for some but many others do not experience relief from pharmacotherapy. Drugs used atypically like

Propranolol, initially developed to prevent cardiac episodes, disrupt the brain's ability to track the traumatic memory (Ritchie, 2015). The atypical use of these medications, however, raises ethical considerations because they alter the fight-flight-freeze human response to danger (Nelson, 2015). Nelson concluded that individuals experience trauma in such unique and singular ways that treatment outcomes will vary.

Behavioral health services research within the military has not led to notable improvements in the delivery or coordination of care for veterans with PTSD (Schnurr et al., 2013). Castro (2014) and Hassan and Flynn (2012) confirmed that there was an urgent need for empirically supported psychotherapies that focus on reintegration and reducing the associated hardships for combat veterans diagnosed with PTSD. Castro (2014) concluded that available PTSD healthcare systems serve more as barriers to, rather than facilitators of, the resolution of these social, medical, and physical hardships (Castro, 2014).

Emerging PTSD Interventions

The National Institute of Mental Health (NIMH) website includes information that NIMH-funded research is focused on the customization of PTSD treatments; understanding the mechanisms by which individuals react to trauma; how PTSD symptoms resolve naturally for some in acute care settings; how treatment immediately following a trauma impacts recovery; and what are the factors that determine whether or not a patient responds well to one particular intervention over another (NIMH, 2016). Genetic research focuses on investigating the source of PTSD onset in the brain to better treat or prevent PTSD (NIMH, 2016).

The NIMH and DoD continue to explore and investigate other emerging treatment applications to assess their impact on PTSD symptom reduction (NIMH, 2016; Ritchie, 2015). Ritchie (2015) reported that the emerging treatments under investigation include meditation for combat-related mental health, transcranial magnetic stimulation, and acupuncture and stellate ganglion block. Although preliminary results are promising, meditation for combat-related mental health is an adjunct to traditional PTSD treatments (Khusid, 2015). The use of transcranial magnetic stimulation needs more research to tailor the therapy for PTSD use (Grammer, Cole, Rall, Scacca, 2015). Acupuncture therapy also needs more research to investigate which points are associated with PTSD symptom reduction (Hickey & Koffman, 2015). And, the use of stellate ganglion block requires more research to determine PTSD treatment efficacy (Lipov, 2015).

Another innovative treatment modality under investigation is e-therapy (Whealin et al., 2015). Whealin et al. (2015) found that more than 30% of patients entering the VA healthcare system met the criteria for a mental health disorder of which 52% were PTSD cases. However, 41% of those diagnosed with PTSD lived in rural areas. This challenged the VA to create culturally diverse systems of care (Whealin et al., 2015). E-therapy is a viable option, especially when research reveals that veterans underuse mental health services. Whealin et al. estimated that only 23% to 40% of veterans seek care in person and only 9.5% of newly diagnosed PTSD patients are compliant with PTSD treatment recommendations.

Kuhn et al. (2014) and Rosen et al. (2013) reported that telephone-based interventions, telephone texting exchanges, online-web-based interventions, social

networking sites like Facebook, and clinical video teleconferencing are all used as supplement or replacement therapy tools. Kuhn et al. found that these innovative approaches to effective behavioral healthcare must still include the option of clinic visits and face-to-face appointment scheduling. Whealin et al. (2015) investigated predictors of internet-based service interest that included being female, married, possessing higher education, an ethnoracial minority status, travel distance, and poor quality of life. The role of PTSD as a risk factor, however, remains unclear (Whealin et al., 2015). Predisposing factors include younger age, female, married or cohabitating, minority, and living in a rural area (Morland et al, 2014). Van Voorhees et al. (2012) also advocated for internet-based interventions because these interventions are not stigmatizing, are private, are easily accessible, and CBT principles offer sound empirically-supported benefits. Early intervention include structured learning of coping skills, peer-to-peer chats, and social worker-provided motivational interviewing (MI; Van Voorhees et al., 2012).

Van Voorhees et al. (2012) conducted a pre/post design, phase-one study of 50 veterans to assess feasibility, clinical response, and changes in attitudes relevant to treatment-seeking behavior. A baseline single-group, pre/post comparison screening was repeated at four weeks, eight weeks, and 12 weeks (Van Voorhees et al., 2012). Participants were recent US veterans from any military branch who were experiencing distress and depression as measured by the CES-D. The Van Voorhees et al. (2012) research revealed moderate improvement in PTSD symptoms. However, the research concluded that although there was a 50% to 100% dropout rate in internet intervention,

their study showed a 100% retention rate for one follow-up with a 7% recruitment rate despite results. Van Voorhees et al. did not know, however, if the participants received traditional care during the study. Additionally, comorbid assessment prevented disorder-specific statistical analyses (Van Voorhees et al, 2012). The Van Voorhees et al. study did show an increase in favorable attitude toward treatment-seeking behavior, but a limitation was the small sample and short follow-up timeframe. Van Voorhees et al. found that traditional psychotherapies translated well on an internet platform for a small percentage of the sample and that the protocol needed inclusion of components to specifically address depression and PTSD symptoms. Van Voorhees et al. advocated for more treatment options including traditional and alternative therapies to address the diverse needs of patients with PTSD.

Accelerated resolution therapy (ART). Kip et al. (2016), Ritchie (2015), and Waits et al. (2015) found that despite treatment advancements over the last 30 years, veterans continue to struggle with treatment-resistant PTSD symptoms. A critical need exists for more research to investigate the factors that influence PTSD treatment response and inform relapse prevention efforts (see Hoge, 2011; Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). Hernandez et al. (2016), Hoge, (2011, 2015), Kip et al., and Waits et al. concluded that ART was an emerging, brief, trauma-focused, PTSD intervention delivered in as little as one to five, 60-minute sessions without any between-session homework, the need for adjunctive medication, or the need to record the trauma narrative in session and listen to it repeatedly between sessions. The ART intervention protocol, created in 2008 by Laney Rosenzweig, was built on the same core components as other

proven, empirically supported, PTSD interventions to include a narrative component, in vivo and/or imaginal exposure, cognitive restructuring, and relaxation/stress modulation (Hernandez et al., 2016; Hoge, 2015; Kip et al., 2016).

Kip et al. (2016) and Waits et al. (2015) found that ART differentiated itself from other therapies because the treatment focus is on the patient's trauma images rather than cognitions. Use of imagery, metaphors, and Gestalt techniques help conceptualize the trauma and associated guilt, shame, and other deep emotions to dismantle the trauma and create separation between the patient's sense of self and the traumatic stimuli (Kip et al., 2016; Waits et al., 2015). This results in a new awareness and understanding that helps normalize the trauma by rescripting the metaphorical components until the patient achieves resolution of the presenting trauma. The process also helps resolve associated comorbid sequalae that surfaces organically through the lens of the restructuring process (Hoge, 2015; Kip et al., 2016; Waits et al., 2015).

Finnegan et al. (2016) found that ART provides brief and sustaining resolution of PTSD symptoms and Finnegan advocated for consideration of ART as a first-line treatment protocol for PTSD, refractory PTSD, and PTSD with comorbidities such as depression, anxiety, and substance use. Finnegan et al. (2016) and Kip et al. (2016) noted that three proven trauma-focused therapy components which included (a) imaginal exposure (IE); (b) imagery rescripting (IR); and (c) smooth pursuit eye movements (EM), form the theoretical base for ART (Kip et al., 2014a). Kip et al. (2014) found that the above components support effective PTSD symptom reduction such as intrusive thoughts, sensations, emotions, and images.

The major components of ART include imaginal exposure where patients recall details of their trauma (with as much or as little verbalizing as desired) while focusing on the physiological thoughts, sensations, or feelings (Hoge, 2015; Kip et al., 2016). Exposure and reactivation of the trauma occurs for brief therapeutic periods followed by the diminishment or extinguishment of distressing, somatic, physiological and psychological discomforts (Hoge, 2015; Kip et al., 2016). Imagery rescripting techniques help the patient replace the old narrative, images, sensations, and feelings with more adaptive appraisals of the trauma memory, images, and sensations (Kip et al., 2014a, 2014b).

Kip et al. (2014b) theorized that the excessive activation of the hippocampus and amygdala and the decreased inhibition of the prefrontal cortex serve as barriers to extinguishment of emotional traumatic memories. Kip et al. further theorized that the ART process could create structural malleability, desensitize fear-based memories, make them susceptible to change, and allow reconsolidation to occur. Kip et al. (2014b) also felt that the therapeutic alliance is significant because the ART-certified behavioral health practitioner engages the patient in bilateral eye movements throughout the ART process. Metaphorical and Gestalt techniques, used throughout the process strengthen and anchor new memories, sensations, feelings, and images (Kip 2012, 2013, 2014a). Kip et al. theorized that the ART session concludes when the patient confirms extinguishment of presenting trauma memories, sensations, and feelings and achieves a rescripted, nonthreatening, adaptive version of the original trauma event. Kip et al. (2014a, 2014b,

2016) and Waits et al. (2015) found that the differentiators associated with ART, when compared with other evidence based first-line treatments, include:

- Shorter therapeutic timeframes.
- Going beyond framing and desensitizing the presenting trauma narrative to changing the distressing images, thoughts, and sensations of the presenting trauma with a resolved narrative that strengthens self-efficacy.
- The ability to engage the patient in the therapeutic process with as little verbalizing of the traumatic event as desired by the patient, offers a unique therapeutic approach not possible with other available PTSD treatment options.
- Inclusion of metaphorical use to activate the IE and IR components.
- Use of specific sets of standardized smooth-pursuit eye movements to extinguish distressing images in a manner that the images could not be accessed mentally regardless of the patient's deliberate intent to recall.

ART research. Kip et al. (2012, 2013, 2014a) and Waits et al. (2015) reviewed the seven federally and privately funded research efforts related to ART. Four of the studies were ongoing at the time. Three completed studies resulted in four peer-reviewed, data-based publications and one peer-reviewed, case-based publication (see Kip et al., 2012, 2013, 2014a; Waits et al., 2015b).

In the first prospective cohort study, Kip et al. (2012) evaluated ART to assess its effectiveness as an exposure-based PTSD intervention. A total of 80 adults enrolled in the program. They ranged in age from 21 to 60 years. A total of 66 participants

completed treatment (Kip et al., 2012). A total of 54 participants provided follow-up data at two months (Kip et al., 2012). The ART intervention protocol included an average of three sessions (Kip et al., 2012). The ART protocol includes a total of one to five sessions (Kip et al., 2012). Administration of the PCL-C occurred at pre, post, and two-month follow-up (Kip et al., 2012). Delivery of the ART intervention occurred without any adverse effects (Kip et al., 2012). Empirical evidence was promising for the use of ART as an effective treatment alternative for PTSD symptom reduction in veteran populations (Kip et al., 2012; Waits et al., 2015).

A total of 29 randomly-assigned participants with symptoms of military PTSD received ART treatment during the controlled trial study of ART conducted by Kip et al. (2013). A total of 28 randomly-assigned participants with symptoms of military PTSD received an attention control (AC) regimen consisting of two sessions of fitness counseling or career counseling (Kip et al., 2013). All participants assigned to the AC group were eventually offered ART treatment and a three-month follow-up (Kip et al., 2013). The sample mean age was 41 ± 13 years with 19% female, 54% Army, and 68% with prior PTSD treatment (Kip et al., 2013). Kip et al. reported that study participants completed the ART protocol in 3.7 ± 1.1 sessions with a 94% completion rate. The Kip et al. study results concluded that ART when compared to AC showed a significantly greater mean reduction in PTSD symptoms, as well as depression, anxiety, and guilt symptoms ($p<.001$). Kip et al. reported that results were sustained at three-month follow-up with an added reduction in aggression ($p<.0001$). Adverse effects were minimal to none with no serious impact (Kip et al., 2013). Study outcomes concluded that ART

could be a promising alternative treatment approach for combat-related PTSD and treatment-resistant or refractory PTSD (Kip et al., 2013; Waits et al., 2015).

Waits, et al, (2015) confirmed that study efforts focused on subgroup analysis for military sexual trauma and treatment-resistant or refractory PTSD. Waits et al. advocated for more research to further support the treatment advantages by use of ART for PTSD symptom reduction in veteran populations.

Benefits of ART intervention for veteran PTSD. The above randomized controlled trials conducted by Kip et al. (2012, 2013) examined the use of ART among combat veterans. Aggregate outcomes showed that ART offered meaningful results for the effective treatment of PTSD (Kip et al., 2012, 2013). The National Registry of Evidence-Based Programs and Practices (NRE-PP) and SAMHSA classified ART as an evidence-based therapy considered effective in the treatment of trauma and other anxiety and stressor-related disorders, as well as for the treatment of depression and resilience/self-concept (see Kip, 2015, 2016; Waits et al., 2015).

The ART intervention is a trauma-focused treatment choice not currently approved or widely offered to service members and veterans within the VA/DoD behavioral health system (Ritchie, 2015; Waits et al., 2015). The manualized, brief, and directive ART intervention delivered in one to five sessions may reduce dropout and non-response rates and more expediently resolve veterans' debilitating PTSD symptoms (Ritchie, 2015; Waits et al., 2015). The ART protocol does not include between-session homework, trauma narrative recordings, adjunctive medications, or prolonged exposure to the trauma memories, thereby reducing risk of retraumatization (Ritchie, 2015; Waits

et al., 2015). The use of ART results in permanent resolution of trauma symptoms and its associated physical, mental, physiological, and emotional side-effects (see Hernandez et al., 2016; Kip et al., 2012, 2013, 2014a, 2014b; Waits et al., 2015). Waits et al. (2015) also noted that, during the ART session, ART-trained clinicians reported minimal or no debilitating effects associated with delivery of trauma-based therapies.

Summary

Posttraumatic stress has existed for over a century in its many iterations. There were many ways to define the disorder over the decades. Theorists have debated regarding assessment, diagnosis, and treatment approaches. Research and treatment advances have occurred over the decades. However, the etiology of PTSD is unclear and remains unique to each individual (Hoge, 2011; Hoge et al., 2014; Ritchie, 2015).

Combat PTSD presents with many challenges and behavioral health practitioners, researchers, and theorists offer conflicting viewpoints about whether PTSD is an injury or a disorder (Ritchie, 2015). While some researchers and practitioners conclude that PTSD diagnostic criteria are too broad, others conclude they are not conclusive enough (Ritchie, 2015).

Empirically supported research has proven there are sound therapies available for the treatment of PTSD such as CPT, PE, EMDR, traditional talk therapy, and pharmacotherapy (Ritchie, 2015). However, these interventions present with barriers to effective resolution of symptoms due to the complex nature of combat-related PTSD (Hoge, 2011; Hoge et al., 2014; Ritchie, 2015; Waits et al., 2015). Additionally,

available treatment options do not align well with the cultural, physiological, psychological, and social needs of veterans who do seek care (Ritchie, 2015).

The DoD and the VHA provided clear PTSD treatment guidelines, but many patients remain treatment-resistant and continue to suffer with PTSD symptoms that worsen their disorder and lead to other physiological and psychological sequelae (Bernardy & Friedman, 2012). Cultural barriers that impede effective PTSD treatment and outcomes include the stigma associated with asking for behavioral health care; avoidance of the traumatic memories and images; the challenges associated with treatment side-effects; continuum of care limitations; and the risk of compromising military career ascension (Castro, 2014; Nash & Watson, 2012; Ritchie, 2015).

Also, the guilt and shame service members experience when they are involved in a killing or witness the killing of another service member impedes PTSD recovery (see Castro, 2014; Hoge et al., 2014; Ritchie, 2015). The concept of moral injury needs further research to investigate how these factors contribute to comorbid disorders such as depression, anxiety, and suicide (see Dettmer et al., 2015; Leardmann et al., 2013; Ritchie, 2015). These comorbidities become a critical research focus because, since 2008, veteran suicide rates have exceeded civilian rates, and the current rate of suicide in veteran populations is 22 suicides per day (see Dettmer et al., 2015; Leardmann et al., 2013; Ritchie, 2015).

The DoD and VA healthcare system have approved CPT, PE, and EMDR for all veterans who present for PTSD treatment. However, use of available behavioral healthcare services is low, and it is unclear which treatment protocols best serve the

needs of veterans diagnosed with PTSD (see Castro, 2014; Haagen et al, 2015; Ritchie, 2015). Hoge et al. (2014) and Waits et al. (2015) found that the low utilization rates, the high dropout, non-response, and non-compliance rates are all due to lengthy and time-consuming therapies, resistance to the required between-session homework, and the potentially retraumatizing exposure exercises that include repeatedly recalling trauma memories, sensations, and feelings (see Feeny & Foa, 2005; Hembree & Foa, 2010; Hernandez et al., 2016; Hoge et al., 2014; Kip et al., 2013; Ritchie, 2015). Veterans suffering with symptoms of chronic PTSD are also more treatment-resistant, resulting in modest to moderate results (Friedman, 2016; Hernandez et al., 2016; Ritchie, 2015).

Study findings from experts in the field of PTSD research all conclude with urgent requests for more research to assess alternative treatment options (see Hawley et al., 2016; Kip et al., 2016; Mott et al., 2014; NIMH, 2016; Ritchie, 2015). Research focus is on investigating the factors that contribute to PTSD onset (Hawley et al., 2016; NIMH, 2016; Ritchie, 2016). Military researchers are advocating for ways to hasten the approval process of alternative and emerging interventions for use in clinical settings (Hawley et al., 2016; Kip et al., 2016; Mott et al., 2014; NIMH, 2016; Ritchie, 2015).

The ART intervention analyzed in this study is a brief, empirically supported, trauma-focused intervention that combines key components of other empirically supported PTSD therapies (see Hoge, 2015, Kip et al., 2016; Waits et al., 2015). The ART procedure allows the patient to process the trauma experience while attending to sets of bilateral eye movement until the scene and sensations associated with recalling the trauma event desensitize (Hoge, 2015; Kip et al., 2013, 2016). After the desensitization

process, the patient replaces old images of the traumatic event with new images that elicit sensations associated with resolution of the presenting concerns (Hoge, 2015; Kip et al., 2013, 2016). This process is known as voluntary image replacement (Hoge, 2015; Kip et al., 2016). A review of the available literature concluded that ART is an effective PTSD intervention not approved or widely offered within the VA/DoD behavioral health system (see Hoge, 2015; Kip et al., 2013, 2014; Ritchie, 2015; Waits et al., 2015, 2017).

Foa and Kozak's (1986) emotional processing theory formed the basis for the theoretical framework of this study and the theory aligned well with the ART protocol, as both are based on sufficiently reactivating the trauma memory to extinguish negative images, emotions, and sensations before introducing corrective information during a reconsolidation phase (Kip et al., 2016).

Therefore, this study filled the gap in the literature by conducting the first quantitative analysis to determine which variables predict the veterans who most benefit by use of ART for PTSD symptom reductions. The study's focus is also on whether the variation in PTSD symptom reduction is greater for one of three PTSD symptom severity groups to determine mean reduction amounts among the low, moderate, and high PTSD symptom severity groups (Field, 2013; Kip et al., 2016). This secondary analysis of existing data may allow for the creation of a PTSD treatment-matching predictive model to enhance treatment outcomes, reduce the comorbidities and suicidality commonly associated with unresolved PTSD, minimize the need for multiple PTSD treatment approaches, and inform behavioral practitioners about the utility of a predictive

treatment-matching model that predicts PTSD symptom reduction amounts by use of ART in veteran populations.

To answer the research questions and hypothesis, chapter 3 includes details of the research design, rationale, and method. A multiple regression analysis supported assessment of the selected continuous variables to predict which veterans most benefit from ART for PTSD symptom reduction. Informed by the literature, this was the first attempt to create a scientific predictive treatment-matching model to inform practitioners regarding which veterans benefit most from ART for PTSD symptom reduction. An ANOVA test was computed to answer the second research question regarding the variation in mean PTSD symptom reduction among the three identified PTSD symptom severity groups at low, moderate, and high PTSD symptom severity levels. The study findings were used to determine where statistically significant mean PTSD symptom reduction differences existed among the three PTSD symptom severity groups.

Chapter 3: Research Method

Introduction

In this study, I used a quantitative strategy of inquiry informed by Foa and Kozak's (1986) emotional processing theory. This strategy of inquiry relied on a prior prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522), to conduct the secondary analysis (Kip et al., 2016). The purpose of this quantitative study was to determine whether the continuous independent variables number of deployments, guilt, depression, and anxiety, as measured by secondary data pretreatment self-rating scales used in the original study, predict the continuous dependent variable PTSD symptom reduction, as measured by the difference between secondary data pretreatment and posttreatment PCL-M scores before and after ART, in a sample of combat veterans who participated in the prospective cohort treatment study of ART from which I drew the dataset (see APA, 2013; Edward et al., 1996; Henning & Frueh, 1997; Huang & Kashubeck-West, 2015; Kip et al., 2016; Kubany, 2004; Ree et al., n.d.; Weathers et al., 1998). For purposes of this study, veterans are defined as active-duty, reservist, or discharged service members who are serving or served in any branch of the United States armed forces (see Huang & Kashubeck-West, 2015; Hunt, Burgo-Black, & Agarwal, n.d.; Xue et al., 2015).

In this chapter, I detail the design and rationale of the study, outlining the dependent and independent study variables. The chapter includes a review of the strengths and limitations of the design, as well as how the study design aligns with the research questions and hypotheses. The method section includes descriptions of the

target population, the sampling strategy, the sampling frame with inclusions and exclusions, and sampling procedures, all as determined by the prospective cohort treatment study of ART conducted in 2016 from which I obtained the dataset. Information is provided on the procedural steps I took for approval of and access to the secondary data (Kip et al., 2016). There is also a detailed review of the secondary data instrumentation used with reliability and validity values and relevance to their appropriateness in the study. The chapter includes operationalization of variables and explanation of measurement strategies. The secondary data analyses plan includes variables, measurement strategies, and statistical tests. There is an explanation of the threats to internal and external validity specific to the use of secondary data. I conclude the chapter with a discussion of any ethical concerns related to this study and a summary of the chapter.

Research Design and Rationale

In this study, I used a correlational research design (see Curtis, Comiskey, Dempsey, 2016; Dziak, 2016). The research design included a secondary analysis of existing data from a prior prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522; Kip et al., 2016). It is important to note that a correlational research design uncovers relationships, but correlation does not imply causation (Curtis et al., 2016; Field, 2013). However, correlational research designs do assess the direction and strength of the relationships (Curtis et al., 2016). This helps narrow the findings that support future experimental research to investigate causation (Curtis et al., 2016). I did not seek to examine the relationship between or among the

variables of interest in this study (see Creswell, 2013). Pretreatment scores from self-rating scales previously used in the prospective cohort treatment study of ART supported the analysis of the predictor independent variables number of deployments, guilt, depression, and anxiety (see Bryan et al., 2013; Kip et al., 2016; Raab et al., 2015; Xue et al., 2015). I used the same secondary data to measure the difference between pretreatment and posttreatment PTSD symptom scores before and after ART to analyze the dependent variable, PTSD symptom reduction.

These variables may help predict which veterans most benefit from ART intervention for PTSD symptom reduction (see Kip et al., 2016). A predictive treatment-matching model based on a potential ART candidate's pretreatment measures for number of deployments, guilt, depression, and anxiety may help predict the amount of PTSD symptom reduction by use of ART (see Kip et al., 2016).

Kip et al. (2016) used the data from the same prospective cohort treatment study of ART in a published study that compared ART intervention among two different veteran populations. However, as informed by the literature, there are no available studies that have assessed predictor variables to determine which variables predict the amount of PTSD symptom reduction by use of ART in veteran populations. No other researchers have attempted to identify a predictive PTSD treatment-matching algorithm for PTSD symptom reduction by use of ART in veteran populations, and no study findings have identified mean PTSD symptom reduction differences among PTSD symptom severity groups, comparing said PTSD symptom severity groups to determine

statistically significant mean PTSD symptom reduction differences among the three groups (see Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016).

As I noted in Chapter 2, Haagen et al. (2016) conducted a meta-analysis of 57 PTSD intervention studies in veteran populations and concluded that pretreatment severity levels are associated with PTSD treatment outcomes. Haagen et al. noted lower treatment gains at low and high severity levels when compared with the outcomes of those who tested at moderate severity levels prior to treatment. Haagen et al. concluded that exposure-based therapies optimally address veteran PTSD symptoms but Haagen advocated for additional studies to analyze efficacy rates. As noted in the previous chapter, Kip et al. (2012, 2013, 2014a, 2014b, 2016) have conducted randomized controlled trials of ART for veteran PTSD symptom reduction, and Waits, Marumoto and Weaver (2017) reviewed the ART research to date concluding that ART offers an effective alternative to existing trauma-based treatment options used within the military healthcare system.

However, Kip et al. and Waits et al. concluded that additional research was needed to know which veterans benefited most from available trauma-based treatments for PTSD symptom reduction to prevent the need for multiple treatment approaches. Ritchie (2015) stated there is a need within the military healthcare system for more effective PTSD treatments and that additional research was needed to better match veteran PTSD symptoms with specific treatments to increase effectiveness rates. The ART research findings, to date, have neither addressed predictive PTSD treatment-

matching modeling, nor have the findings helped to determine efficacy rates among symptom severity levels (see Ritchie, 2015; Waits et al., 2017).

I determined that a correlational research design was best for this study (Curtis et al., 2016). This design supports investigation of the relationship between variables to know how they interact (Dziak, 2016). The us of available secondary data mitigates the cost, low response rates, risks, and delays usually experienced with other research design options (Curtis et al., 2016; Kip et al., 2016). The self-administration of each of the valid and reliable secondary data instruments selected from the original prospective cohort treatment study of ART I used for this study minimized the need for additional researchers and lowered the potential for interviewer bias (see Curtis et al., 2016; Kip et al., 2016; Witt, 2016). I analyzed this secondary ART dataset to contribute to research on PTSD symptom reduction by use of ART in veteran populations (see Kip et al., 2016).

I selected the ART intervention for analysis in this study because it is a brief, trauma-focused intervention for the treatment of PTSD symptom reduction in veteran populations (see Hernandez et al., 2016; Hoge, 2015; Kip et al., 2012, 2013, 2014a, 2014b, 2016; Ritchie, 2015; Waits et al., 2015). There is a critical need to continue researching PTSD treatment options for veterans with PTSD (see Hoge, 2015; Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). The ART intervention includes a minimum of one to five sessions without the need for homework or the retelling of the trauma narrative (Hoge, 2015; Kip et al., 2016). The brevity of the treatment protocol is significant when compared to other trauma-based interventions that include anywhere from eight to 12 sessions or more, often resulting in high dropout and non-compliance

rates (Kip et al., 2016). Treatment completion rates are also quite high for the ART intervention, estimated at 90%.

Methodology

Population

The target population from the secondary dataset consisted of veterans who served in any conflict area at any time and were experiencing PTSD symptoms (Kip et al., 2016). This study, therefore, included male and female veterans 18 years of age or older with prior combat deployment who were experiencing symptoms of psychological trauma (Kip et al., 2016). The United States Census Bureau (2014) estimated there were 21.8 million United States armed forces veterans, of which an estimated 20% suffer with PTSD symptoms. This percentage does not include veterans with undiagnosed PTSD symptoms (United States Census Bureau, 2014).

Sampling and Sampling Procedures

My analysis of secondary data from a prior prospective cohort treatment study of ART includes data from adult male and female active-duty, reservist, and discharged veteran United States service members with a history of veteran PTSD symptoms who completed ART intervention during that study (Kip et al., 2016). The inclusion criteria from the prior prospective cohort treatment study of ART are (a) U.S. service member or veteran; (b) over 18 years of age; (c) a military history of prior deployments to any conflict area; (d) a history of combat-related PTSD or military sexual trauma; (e) a score of ≥ 40 on the PCL-M checklist; (f) the ability to speak and read English at a proper level of understanding (Hardwick, 2016; Kip et al., 2016).

Exclusion criteria from the prior prospective cohort treatment study of ART are (a) suicide ideation or intent including homicidal ideation or intent (b) psychotic behavior or being in psychological crisis (determined by the original study's medical intake form data and at the discretion of the original study's clinician (c) brain injury that prohibits the ability to speak, write, or take specific actions (d) active engagement in any other PTSD psychotherapy treatment protocol (e) other major psychiatric disorders (e.g., bipolar disorder) that could interfere with treatment; (f) active participation in any alcohol or drug abuse treatment program; (g) any psychological or medical conditions that place the participant at a higher risk for adverse emotional reactions (e.g., heart attack, seizures), as assessed by the original study's principal investigator and ART clinician (Hardwick, 2016; Kip et al., 2016).

The software G*Power 3.1.9.2 (2016) generated a power analysis for a multiple regression analysis with four independent variables and a power analysis for ANOVA with three independent groups at low, moderate, and high PTSD symptom severity levels (see Button et al., 2013). For each analysis, the sample consisted of a minimum of 85 study participants, providing 80% power, with a Type 1 error rate of alpha .05, and a moderate effect size of .25 (see Button et al., 2013; Kip et al., 2016).

Recruitment, Participation, and Data Collection

The secondary analysis of existing data used for this study included study participants recruited from veteran membership organizations within the Tampa Bay area, as well as through academic programs at a local university (Hardwick, 2016; Kip et al., 2016). The sampling frame consists of all study participants from the original study

who consented and voluntarily took part in the prospective cohort treatment study of ART (Hardwick, 2016; Kip et al., 2016). The dataset for this study includes all study participants who completed ART treatment during the prospective cohort treatment study of ART (Kip et al., 2016). The data source provider granted permission to use the secondary dataset and provided the deidentified dataset after Walden University's institutional review board (IRB) approval (IRB 06-25-18-0020711). The data source provider (the original study's principal investigator) sought approval from the university's institutional review board prior to commencement of the prospective cohort treatment study of ART conducted in 2016 (Kip et al., 2016). An executed Walden University Data Source Agreement, the study title and purpose, as well as my curriculum vitae, and proof of completion of the National Institute of Health Office of Extramural Research (n.d.) NIH web-based training course, Protecting Human Research Participants (for their records only, since secondary data was used for this study) was submitted to the data source provider, to comply with stated requirements for use of data. The proposal was approved by the Walden University IRB and the approval documentation from the Walden University IRB was submitted to the data source provider in order to receive the deidentified secondary dataset to conduct the study analyses (NIH, 2016).

ART Intervention Administration

ART, the trauma-based intervention created by Laney Rosenzweig in 2008 and selected for analysis in this study, was selected because it is a trauma-based psychotherapy that uses the same components found in other empirically supported, trauma-focused psychotherapies (see Hernandez et al., 2016; Hoge, 2015: Kip et al.,

2016; Waits et al., 2015). The components include narrative components, in vivo and imaginal exposure, cognitive restructuring, and relaxation/stress modulation (see Hernandez et al., 2016; Hoge, 2015; Kip et al., 2012, 2013, 2014a, 2014b, 2016). The ART procedure differs from other first-line, trauma-focused treatments in several important ways (Kip et al., 2016). ART includes a minimum of one to five treatment sessions (Kip et al., 2016). The ART protocol is effective with or without the retelling of the trauma narrative (Hoge, 2015; Kip et al., 2016). The ART intervention does not include any homework (Hernandez et al.; Hoge, 2015; Kip et al., 2016).

An average of less than four ART treatment sessions has resulted in clinically meaningful veteran PTSD symptom reduction in prior ART research findings (Kip et al.2016). Amelioration of PTSD symptoms in less than four sessions is significant when compared to prolonged exposure (PE) at eight to 12 sessions, cognitive processing therapy (CPT) at 12 sessions, and eye movement desensitization and reprocessing (EMDR) at 8 to twelve sessions (see Foa et al., 2009; Kip et al., 2016; Resick et al., 2008; Shapiro, 2001). Trauma-focused interventions with a greater number of treatment sessions result in higher treatment dropout rates (see Haagen, et al., 2015; Hernandez-Tejeda et al., 2017; Kip et al., 2012, 2013, 2014a, 2014b, 2016). The dropout rate is up to 50% for PE, up to 30% for CPT, up to 36% for EMDR, and up to 6% for ART (see Foa et al., 2009; Kip et al., 2016; Panchen, Blankenship, Yarvis, & Resick, n.d.; Shapiro, 2001). Existing veteran PTSD ART treatment study findings show a reduction in PTSD symptoms and comorbid disorders such as depression and anxiety (Kip et al., 2016). However, none of the published ART research studies to date have included an analysis

of predictor variables with the aim of building a scientific PTSD treatment-matching algorithm to inform behavioral practitioners regarding which PTSD treatment candidates most benefit from ART intervention for PTSD symptom reduction in veteran populations (Field, 2013; Kip et al., 2016). Additionally, none of the available ART studies include analysis of the variation in mean PTSD symptom reduction by symptom severity groups to measure mean PTSD symptom reduction differences when groups are stratified by PTSD symptom severity levels (Haagen et al., 2015). This study, therefore, analyzed which of the four identified variables predict which veterans most benefit from ART intervention for PTSD symptom reduction and whether the variation in mean PTSD symptom reduction, by use of ART, differs among PTSD symptom severity groups after examining mean PTSD symptom reduction amounts by PTSD symptom severity levels (Kip et al., 2016).

Participants in the original prospective cohort treatment study of ART received individual one-hour ART treatment sessions (Kip et al., 2016). Licensed ART-trained behavioral health clinicians conducted the ART treatment sessions (Hardwick, 2016; Kip et al., 2016). The ART treatment sessions took place in private offices and each office was reserved for one study participant and one ART-trained clinician (Hardwick; Kip et al., 2016). The ART sessions took place weekly, and each patient completed ART sessions within a one-month timeframe (Kip et al., 2016).

Hoge (2015) and Kip et al. (2016) reported that the ART protocol includes the same trauma-focused therapeutic components used in existing empirically supported, first-line trauma-based interventions. The therapist supports the process by moving a

hand back and fourth for a series of forty bilateral smooth-pursuit left-to-right eye movements, during each phase of the ART process (see Hardwick, 2016; Kip et al., 2016; Waits et al., 2015). The veteran "watches" the original or new trauma memory while simultaneously following the therapist's hand from left to right (see Hardwick, 2016; Kip et al., 2016; Waits et al., 2015). The ART protocol is effective whether the veteran does or does not choose to retell the trauma experience to the therapist during the ART process (Kip et al., 2016). This is an important differentiation when comparing ART with other trauma-based interventions because most other PTSD interventions require that patients retell their trauma narrative despite the risk of retraumatization (Foa & Kozak, 1986; Hoge, 2015, Kip et al., 2016).

The first phase of ART also includes imaginal exposure whereby the veteran recalls details of the traumatic event while simultaneously focusing attention on the sensations, feelings, and thoughts that surface (see Hardwick, 2016; Hoge, 2015; Kip et al., 2012, 2013, 2014a, 2014b, 2016). As the veteran briefly experiences reactivation of the presenting trauma memories, the period of reactivation that follows supports extinguishment of any presenting somatic or emotional symptoms (see Hoge, 2015; Kip et al. 2016; Waits et al., 2015). Reactivation of the presenting trauma memories repeats a second time followed each time by diminishment or extinguishment of presenting somatic or emotional symptoms (Kip et al., 2016).

The ART imagery rescripting phase allows the veteran to change or replace negative images and cognitions with new more positive images and cognitions (see Finnegan et al., 2016; Hoge, 2015; Kip et al., 2016; Waits et al., 2015). A more positive

narrative that diminishes or extinguishes intrusive negative thoughts and images replaces the negative traumatic narrative, whether sensory or emotional (Hernandez et al., 2016; Hoge, 2015; Kip et al., 2012, 2013, 2014a, 2014b, 2016). This was consistent with memory reconsolidation theories where theorists thought that the trauma-focused memories embedded themselves in the images (see Hernandez et al., 2016; Hoge, 2015; Kip et al., 2012, 2013, 2014a, 2014b, 2016). Therefore, processing and rescripting these trauma-focused images is the preferred approach to memory reconsolidation and reduction or extinguishment of veteran PTSD symptoms (Foa & Kozak, 1986). The ART protocol consists of one to five ART treatment sessions depending on the presenting trauma symptoms (Kip et al., 2016). Kip et al. (2016) explained that successful completion of an ART treatment session is consistent with the veteran able to recall the trauma memory without any associated physiological arousal and able to visualize the more positive rescripted narrative rather than the original traumatic narrative.

Secondary Data

Th study design included a dataset derived from a prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522; Kip et al., 2016). All processes were followed and approval was secured from the Walden University IRB as well as the data source provider's IRB, as referenced in the recruitment and data collection section of this chapter, before acquiring the dataset and conducting the analyses (IRB Number 06-25-18-0020711).

Instrumentation

Listed below are the reliable and valid secondary data self-rating scales from which the data was sought for this study's analyses (see Hardwick, 2016; Kip et al., 2013, 2014a, 2014b, 2016; Waits et al., 2015).

Demographics form. Secondary analysis of existing socio-demographic data produced descriptive statistics of the makeup of the secondary data study participants to include age, gender, marital status, race, and education (Kip et al., 2016). Continuous variables appear as mean ± standard deviation (SD), and categorical variables appear as frequencies and percentages (Field, 2013).

PTSD Checklist-Military (PCL-M). The posttraumatic stress disorder checklist-military (PCL-M) is a self-report measure used to screen, diagnose, and rescreen for PTSD symptom changes before, during, and after treatment (Weathers et al., 1998). The 17-item checklist measures the 17 PTSD symptoms reported in the DSM-IV (American Psychiatric Association, 1994). A Likert scale from 1 (not at all) to 5 (extremely) is used to score the 17 items (Weathers et al., 1998). The PCL-M is an effective tool for assessment of veteran PTSD symptoms because it includes questions related to stressful military experiences (see Dickstein et al., 2015; Hardwick, 2016; Kip et al., 2016; Waits et al., 2015). Completion of the PCL-M takes five to ten minutes making it a convenient and widely-used tool in veteran PTSD research studies (see Dickstein et al., 2015; Weathers et al., 1998). All published ART studies have included the PCL-M (see Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016).

The PCL-M score is the sum of the total symptom severity scores from 17 to 85 from each of the 17 items (Weathers et al., 1998). A licensed therapist should interpret the results of the PCL-M (Kip et al., 2016; Weathers et al., 1998). The higher the PCL-M score the higher the level of PTSD symptom severity (Weathers et al., 1998). The PTSD prevalence rate in the target population informs cutoff scores for assessment of PTSD symptoms (see Dickstein et al., 2015.; Kip et al., 2016; Weathers et al., 1998).

Test-retest reliability for the PCL-M is .96. Internal consistency (alpha coefficient) is .97 for all 17 symptoms (Dickstein et al., 2015; Kip et al., 2016; Weathers et al., 1998). Strong correlations between the PCL and the Mississippi Scale accounted for strong convergent validity at .93 (Weathers et al., 1998). Measurement of the dependent variable PTSD symptom reduction occurred by analyzing secondary data scores to calculate the difference between pretreatment and posttreatment PCL-M scores before and after ART to determine the amount of PTSD symptom reduction (Kip et al., 2016).

Trauma-Related Guilt Inventory (TRGI). Measurement of the predictor independent variable guilt occurred by analyzing the raw pretreatment scores from the TRGI scale used in the original prospective cohort treatment study of ART (Kip et al., 2016). Kubany et al. (1996) created the TRGI to assess trauma survivors' experiences of guilt. Kubany et al. defined guilt as an unpleasant feeling with an accompanying belief that one should have thought, felt, or acted differently. Trauma-related guilt is often associated with PTSD in veteran populations (Kubany et al., 1996; Kubany, 2004). The guilt can vary and be associated with cognitive themes such as guilt for having survived

the traumatic incident, not having done more at the time of the traumatic incident, and not having saved those who died during the traumatic event (Kubany et al., 1996). Paul et al. (2014), Popiel (2014), and Bryan et al. (2013) have reported a positive relationship between guilt and post-trauma psychopathology contributing to the maintenance of PTSD symptoms.

The TRGI consists of three scales and three subscales (Kubany et al., 1996). The scales include (a) the four-item global guilt scale (b) a six-item distress scale and (c) a 22-item guilt cognition scale (Kubany et al., 1996). The three subscales which correspond to the cognitive factors include (1) a hindsight-bias/responsibility subscale (7 items) (b) a wrongdoing subscale (5 items) and (c) a lack of justification subscale (4 items). The TRGI measures blame, cognition, distress, emotional trauma, guilt, hindsight bias, responsibility, and trauma (Kubany et al., 1996). Kubany et al. (1996) used a 5-point Likert scale ranging from 4 (extremely true) to 0 (not at all true), or from 4 (always true) to 0 (never true). Subscale coefficient alpha range from .66 to .94. Test-retest reliability coefficient range from .73 to .86.

Center for Epidemiologic Studies-Depression (CES-D) Scale. Measurement of the predictor independent variable depression occurred by analyzing the raw pretreatment scores from the CES-D scale used in the original prospective treatment study of ART (Kip et al., 2016). The CES-D is a 20-item, brief, self-report measure that assesses symptoms of depression (in the prior week) in the general population (Radloff, Lewinsohn, Seeley, Roberts, & Allen, 1997). Radloff et al. (1997) created response options ranging from 0 to 3 defined as follows: 0 (rarely or not at all); 1 (some or little of

the time); 2 (moderately or much of the time); 3 (most or almost all of the time). Scores range from 0 to 60 with higher scores indicative of greater depressive symptoms (Radloff et al., 1997). The standard cutoff score suggesting depression is ≥ 16 (sensitivity = .95 and specificity = .29). The CES-D was found reliable with a high internal consistency reported with Cronbach's alpha at .79 (Radloff, 1977). The CES-D includes common factors found across other measures of depression including the Beck Depression Inventory (BDI), the Hamilton Rating Scale for Depression (HRSD), and the Zung Self-Rating Scale (see Ben Barnes, Hayes, Contractor, Nash, & Litz, 2018; Worboys, 2013; Zung et al., 1998). Wanklyn et al. (2016) found that higher depression scores impeded PTSD symptom resolution.

State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). Measurement of the predictor independent variable anxiety occurred by analyzing the raw pretreatment scores from the STICSA scale used in the original prospective cohort treatment study of ART (Kip et al., 2016). Ree et al. (2000) designed the STICSA to assess cognitive and somatic symptoms of anxiety pertaining to one's mood in the moment (state) and in general (trait). Ree et al. created the STICSA to include somatic and cognitive subscales. The STICSA cutoff score is ≥ 43 (sensitivity of .73 and specificity .74).

Operationalization

PTSD symptom reduction. For this study, the dependent variable PTSD symptom reduction is the difference between pretreatment and posttreatment PCL-M scores, before and after use of ART to determine the amount of PTSD symptom

reduction (Kip et al., 2016). The aim of the study analysis is to define the predictors that predict PTSD symptom reduction by use of ART (the PTSD intervention selected for this analysis) to create a PTSD treatment-matching algorithm that informs practitioners which veterans benefit most by use of ART for PTSD symptom reduction. This predictive treatment-matching model offers potentially broad implications for effectively selecting ART candidates who may most benefit from ART intervention for PTSD symptom reduction.

Number of deployments. The continuous independent variable number of deployments is the movement of military soldiers to assigned conflict areas (Hoge, 2011, 2015). Many soldiers deployed to combat areas return with polytraumas (Hoge, 2011, 2015). The polytraumas are often single-event injuries caused by improvised explosive devices (Xue et al., 2015). An estimated 27% to 36% of veterans returning from the most recent conflict areas in Afghanistan and Iraq met the criteria for mental health disorders and an estimated 11% to 20%of those veterans met the criteria for PTSD (Xue et al., 2015).

Xue et al. (2015) estimated that as the number of deployments increased so did the potential for PTSD onset and maintenance. Therefore, for the purposes of this study, measurement of the continuous independent variable number of deployments occurred using numerical data from the original study's Demographics Form (Kip et al., 2016). The Demographics Form included question number 12 asking study participants to numerically list the total number of tours of duty defined as deployment to a conflict area (Kip et al., 2016). Numerical data for the continuous independent variable number of

deployments supported a multiple regression analysis to assess the effect of number of deployments on veteran PTSD symptom reduction (Curtis et al., 2016). The resulting model attaches a coefficient to this variable to predict which veterans most benefit from ART for PTSD symptom reduction.

Guilt. Guilt is an unpleasant or negative feeling with an associated belief that more could have occurred to change the outcome of what happened (Kubany et al., 1996). Guilt has been positively correlated with PTSD onset and maintenance (Bryan et al., 2013). The disorder most commonly associated with combat guilt is PTSD (Kubany et al., 1996). Guilt is a consistent factor in veteran PTSD research (Xue et al., 2015). Guilt is associated with avoidance, a risk factor in PTSD symptom reduction and recovery (Henning & Frueh, 1997). Kubany et al. (1996) and Xue et al. (2015) also found that combat related guilt is the most significant predictor of suicide, specifically in veterans with combat exposure (Huang & Kashubeck-West, 2015; Xue et al., 2015).

Kubany et al. (1996) designed the TRGI to assess trauma survivors' experiences of guilt. The TRGI consists of three scales and three subscales (Kubany et al., 1996). The scales include (a) the four-item global guilt scale (b) a six-item distress scale and (c) a 22-item guilt cognition scale (Kubany et al., 1996). The three subscales which correspond to the cognitive factors include (a) a hindsight-bias/responsibility subscale (7 items) (b) a wrongdoing subscale (5 items) and (c) a lack of justification subscale (4 items). Measurement of the continuous independent variable guilt occurred by calculating study participants' pretreatment scores from the TRGI scale, administered during the prospective cohort treatment study of ART (Kip et al., 2016). A multiple regression

analysis using pretreatment scores from the TRGI will support assessment of the effect of guilt on veteran PTSD symptom reduction (Kip et al., 2016; Kubany et al., 1996). The resulting model attaches a coefficient to this variable to predict which veterans most benefit from ART for PTSD symptom reduction.

Depression. Depression is a persistent sadness that affects thoughts, feelings, and behaviors (Radloff et al., 1997; Van Voorhees et al., 2012). This can lead to increased risk of suicide and other comorbid disorders (Van Voorhees et al., 2012). Van Voorhees et al. (2012) found a link between depression and PTSD among service members exposed to trauma. Both depression and PTSD share common factors thought to increase vulnerability in three domains; behavior avoidance, low cognitive bias, and learning and information bias (Van Voorhees, 2012). Avoidance is associated with PTSD maintenance (Van Voorhees et al., 2012).

The CES-D is a 20-item, brief, self-report measure that assesses symptoms of depression (in the prior week) in the general population (Radloff et al., 1997). Radloff et al. (1997) created response options ranging from 0 to 3 for each item (0=rarely or not all of the time; 1=some or little of the time; 2=moderately or much of the time; and 3=most or almost all of the time). Scores range from 0 to 60 with high scores indicative of greater depressive symptoms (Radloff et al., 1997). Measurement of the continuous independent variable depression occurred by using the pretreatment CES-D scale scores from the prospective cohort treatment study of ART (Kip et al., 2016). A multiple regression analysis using pretreatment scores from the CES-D will support assessment of the effect of depression on veteran PTSD symptom reduction (Kip et al., 2016; Radloff et al.,

1997). The resulting model attaches a coefficient to this variable to predict which veterans most benefit from ART for PTSD symptom reduction (Curtis et al., 2016; Field, 2013; Kip et al., 2016).

Anxiety. Anxiety is defined as a feeling of tension, the presence of negative cognitions, and physiological reactions such as elevated blood pressure (Ree et al., n.d.). The STICSA is used to assess probable cases of clinical anxiety (Ree et al., n.d.). Studies reveal that higher anxiety scores impede PTSD symptom resolution (Kip et al., 2016). Measurement of the continuous independent variable anxiety occurred by using the pretreatment STICSA scale scores from the prospective cohort treatment study of ART (Kip et al., 2016). A multiple regression analysis supported assessment of the effect of anxiety on veteran PTSD symptom reduction (Kip et al., 2016; Ree et al., n.d.). The resulting model attaches a coefficient to this variable to predict which veterans most benefit from ART for PTSD symptom reduction (Curtis et al., 2016; Field, 2013; Kip et al., 2016).

Data Analysis Plan

Software application. The IBM's Statistical Package for the Social Sciences (SPSS) 23 (2015) software application supported the statistical analyses for this study. A password-protected laptop kept in a secure and locked location ensured protection of the SPSS software application and the associated study data and statistical output (Frankfort-Nachmias & Nachmias, 2008; Piotrowski, 2013).

Data cleaning and screening procedure. Secondary analysis of existing data is an expedient and cost-efficient research design choice (Cheng & Phillips, 2014). The

secondary data used for this study was derived from a prospective cohort treatment study of ART (Kip et al., 2016). The strength of the dataset was ensured by obtaining the original study's purpose, available documentation, data codebooks, and sampling criteria (Cheng & Phillips, 2014). Analysis of the dataset confirmed internal and external validity (Cheng & Phillips, 2014). This ensured the generation of meaningful data results (Cheng & Phillips, 2014).

Adherence to the above data cleaning and screening procedures occurred after Walden University IRB approved for commencement of the study (Cheng & Phillips, 2014). Frequency tables and cross-tabulation of all proposed variables ensured data accuracy and confirmed any missing data (Cheng & Phillips, 2014). The data was analyzed to identify outliers. Normality was tested for skewness (data distribution) and kurtosis (flat or peaked distribution).

Research questions and hypotheses. The research questions and hypotheses selected for this study are as follows:

RQ1: What is the effect of number of deployments, guilt, depression, and anxiety in predicting PTSD symptom reduction for veterans who complete ART?

H_o1: Number of deployments, guilt, depression, and anxiety do not predict PTSD symptom reduction for veterans who complete ART.

H_a1: At least one predictor, number of deployments, guilt, depression, and anxiety will predict PTSD symptom reduction for veterans who complete ART.

RQ2: What is the variation in PTSD symptom reduction among low, moderate, and high PTSD symptom severity groups?

H_o2: There is no variation in PTSD symptom reduction among low, moderate and high PTSD symptom severity groups.

H_a2: There is variation in PTSD symptom reduction for at least one of the three (low, moderate, high) PTSD symptom severity groups.

Descriptive statistics. Informed by the literature review in chapter 2, the socio-demographic characteristics of age, gender, race, marital status, and education describe the makeup of the study sample (Cheng & Phillips, 2014; Curtis et al., 2016; Kip et al., 2016).

Multiple regression analysis. As a predictive analysis, a multiple regression analysis and specifically its findings helped answer the first research question and test its hypotheses. The analysis supports choosing and fitting a PTSD treatment-matching model to predict PTSD symptom reduction based on the multiple independent variables of number of deployments, guilt, depression, and anxiety (Frankfort-Nachmias & Nachmias, 2008; Witt, 2016). Multiple regression allows the researcher to analyze the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained (Field, 2013; Witt, 2016). In summary, the regression analysis findings supported assessment of which factors predict veteran PTSD symptom reduction, as well as the validity of the model (Field, 2013; Green & Salkind, 2014).

Confirmation of a set of assumptions were necessary to ensure proper use of a multiple regression analysis (Field, 2013: Laerd Statistics, 2015; Witt, 2016). There must be a continuous dependent variable (Field, 2013). The continuous dependent variable for

this study is PTSD symptom reduction. There are two or more independent variables measured at the continuous or nominal level. This study includes four continuous independent variables defined as number of deployments, guilt, depression, and anxiety (Field, 2013; Kip et al., 2016; Witt, 2016). There should be independence of errors or residuals (Field, 2013). There should be a linear relationship between the predictor variables (and composite) and the dependent variable (Field, 2013). Linearity assumes each of the predictors is linearly related to PTSD symptom reduction, and this study design used scatterplots to assess this assumption (Field, 2013). There should be homoscedasticity of residuals explained as equal error variables (Field, 2013). Visual inspection of a plot of studentized residuals versus unstandardized predicted values confirmed homoscedasticity of residuals (Field, 2013). There should be no multicollinearity (Field, 2013). Observation of the variance inflation factor or VIF confirmed absence of multicollinearity (Field, 2013). Any VIF values less than 10 confirms the assumption is valid (Field 2013). There should be no significant outliers, high leverage points, or highly influential points (Field, 2013). The errors (residuals) should be normally distributed (Field, 2013). A limitation with all regression analyses is that relationships can be correlated, but uncertainty regarding causality remains (Curtis et al., 2016; Field, 2013).

The aim of this type of multivariate analysis is to assess how much the independent variables number of deployments, guilt, depression, and anxiety account for the variation in the dependent variable PTSD symptom reduction (Field, 2013; Kip et al., 2016). For example, if the predictor independent variable depression results in being a

significant predictor, for every one-unit increase in the predictor depression, the dependent variable PTSD symptom reduction will decrease or increase by the number of unstandardized beta coefficients (Field, 2013). Analysis to determine a predictive PTSD treatment-matching algorithm was attempted to better inform behavioral health practitioners and researchers regarding which veterans benefit most from ART for PTSD symptom reduction.

Multiple regression models supported this correlational studies and R^2, also known as the coefficient of determination, supported evaluation of the model fit (Field, 2013; Laerd Statistics, 2015). The R^2 is 1 minus the ratio of residual variability (Field, 2013; Laerd Statistics, 2015). Thus, when the variability of the residual values around the regression line is small in relation to the overall variability, the predictions from the regression equation are good (Field, 2013; Laerd Statistics, 2015). The R^2 value is an indicator of how well the model fits the data (Field, 2013; Laerd Statistics, 2015). When R^2 is close to 1.0, the specified variables in the study explain most of the variability (Field, 2013; Laerd Statistics, 2015).

ANOVA. Group comparison tests and associated findings helped answer the second research question and test its hypotheses (Field, 2013; Laerd Statistics, 2015). ANOVA tests supported this study because the aim was to assess the differences in the scale-level dependent variable PTSD symptom reduction by the nominal-level variable PTSD symptom severity (Field, 2013; Laerd Statistics, 2015). The nominal-level variable PTSD symptom severity consisted of three groups defined as low PTSD symptom severity group (group participants with pretreatment PCL-M scores from 40-

50); moderate PTSD symptom severity group (group participants with pretreatment PCL-M scores from 51-60); and high PTSD symptom severity group (group participants with pretreatment PCL-M scores at or greater than 61). This ANOVA test helped to determine the variation in mean PTSD symptom reduction and the mean reduction amount for each of the three symptom severity groups (Field, 2013).

The assumptions associated with ANOVA are that the dependent variable is a continuous (interval or ratio) level of measurement (Field, 2013; Laerd Statistics, 2015). The dependent variable in this study PTSD symptom reduction is a continuous level of measurement. The independent variable is a categorical (nominal or ordinal) variable (Field, 2013; Kip et al., 2016; Laerd Statistics, 2015). The independent variable for this ANOVA test is PTSD symptom severity with a low, moderate, and high symptom severity group (Field, 2013; Laerd Statistics, 2015). ANOVA, a parametric test, assumes there is normal distribution of the data (Field, 2013; Laerd Statistics, 2015). The ANOVA test also assumes homogeneity of variance which means that the variance among the identified PTSD symptom severity groups (low, moderate, high) will be about equal (Field, 2013; Laerd Statistics, 2015). The ANOVA test also assumes the observations are independent of each other (Field, 2013; Laerd Statistics, 2015). The ANOVA test is not robust to the assumption of independence violations (Field, 2013; Laerd Statistics, 2015). The findings are trustworthy if violations to the assumptions of normality and homogeneity are present and if there are equally-sized groups and sufficiently large samples (Field, 2013; Laerd Statistics, 2015). However, the ANOVA test is invalid if violation of the independence assumption exists (Field, 2013; Laerd Statistics, 2015).

Post-hoc tests (*t* tests) helped analyze the mean differences among the three PTSD symptom severity groups at low, moderate, and high severity levels to assess which of the three PTSD symptom severity groups were statistically significantly different from each other (Field, 2013).

Threats to Validity

Secondary analysis of existing data mitigates many potential threats to validity (Cheng & Phillips, 2014). A potential threat to internal validity for the original study design could have been maturation defined as natural occurrences that happen over time potentially influencing participants (Cheng & Phillips; Salazar, Crosby, & DiClemente, 2015). Another potential threat to internal validity could be statistical regression defined as regression to the mean on similar tests due to extreme study participant scores (Field, 2013; Salazar et al., 2015). There are no other threats anticipated for this study.

Ethical Procedures

The original prospective cohort treatment study of ART from which the dataset was sought was originally approved by the data source provider's IRB to ensure that risks to participants in the original study were minimized when compared with anticipated benefits; that the participant selection process was equitable; that informed consent was sought and properly documented; that the data collection process was supervised to ensure continued participant safety throughout the course of the research study; and that the privacy of the research participants was maintained (Creswell, 2009; Kip et al., 2016).

For purposes of this study, the use of a password-protected personal laptop for the storage of the deidentified secondary data ensured further privacy and confidentiality of

the deidentified study participants contained in the dataset (Creswell, 2009; Hardicre, 2014; Kip et al., 2016; Piotrowski, 2013). Deletion of all applicable electronic information associated with the secondary data will occur five years from approval of the completed dissertation (Hardicre, 2014; Piotrowski, 2013). There are no other anticipated ethical issues (Creswell, 2009; Piotrowski, 2013).

Dissemination of Findings

The approved dissertation will be available on the ProQuest database. at https://www.proquest.com, for public access.

Social Change Implications

The research implications of this quantitative study are broad. The ability to use a predictive PTSD treatment-matching model to predict which veterans most benefit from ART for PTSD symptom reduction may reduce the need to attempt different types of PTSD interventions to achieve PTSD resolution; may reduce associated comorbidities such as guilt, depression and anxiety; may reduce associated suicidality; and may prevent medication overuse and alcohol and drug dependence (Kip et al., 2016; Xue et al., 2015). Additionally, analyzing the variation in mean PTSD symptom reduction by low, moderate, and high PTSD symptom severity groups will better inform practitioners about ART treatment efficacy (see Hoge, 2015; Kip et al., 2016; Waits et al., 2015). Therefore, this correlational study introduces the importance of a predictive treatment-matching model that may inform ART intervention practices to address the PTSD symptom severity needs of the 21.8 million veterans diagnosed with PTSD. There is a need for

further experimental research to assess causation (see Hoge, 2015; Kip et al., 2016; Waits et al., 2015).

Other social change implications associated with this study include raising awareness for alternate PTSD treatment interventions that meet the psychological needs of veterans suffering with PTSD symptoms and to encourage further research that supports more expedient and targeted PTSD treatment approaches in veteran populations (see Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). The ART intervention is a trauma-focused treatment protocol administered in a minimum of one to five sessions that does not include homework or between-session exercises (Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). The ART protocol is effective whether the veteran does or does not retell the trauma experience during the ART intervention, thereby reducing the risk of retraumatization (Kip et al., 2016; Waits et al., 2016). The findings in this study will contribute to ongoing ART research within veteran populations.

Summary

A quantitative strategy of inquiry informed by Foa and Kozak's (1986) emotional processing theory supports this correlational study (Curtis et al., 2016; Field, 2013). A secondary analysis of existing data from a prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522) informed this strategy of inquiry (Kip et al., 2016). The purpose of this study is to determine whether any of the predictor independent variables informed by the literature review and identified as number of deployments, guilt, depression, and anxiety predict the dependent variable PTSD symptom reduction. The analysis also shows the variation in mean PTSD symptom

reduction by PTSD symptom severity group at low, moderate, and high PTSD symptom severity levels (Field, 2013). The study aims to develop a predictive PTSD treatment-matching algorithm that determines which veterans benefit most from ART for PTSD symptom reduction. In addition, the study will analyze variations in mean PTSD symptom reduction amounts by symptom severity groups stratified at low, moderate, and high PTSD symptom severity levels as well as determine statistically significant differences in mean PTSD symptom reduction among the three PTSD symptom severity groups. The conceptual framework of a predictive PTSD treatment-matching model can be applied to other variables and PTSD treatment interventions as well.

Measurement of the dependent variable PTSD symptom reduction occurred by calculating the difference between pretreatment and posttreatment PCL-M scores obtained from secondary data derived from a prospective cohort treatment study of ART (Field, 2013; Kip et al., 2016).

To measure the independent predictor variables number of deployments, guilt, depression, and anxiety, the study relied on pretreatment scale scores derived from a prior prospective cohort treatment study of ART (Kip et al., 2016). The number of deployments listed in the Demographics Form, the pretreatment TRGI scores to measure guilt, the pretreatment CES-D scale scores to measure depression, and the pretreatment STICSA scale scores to measure anxiety all supported the use of a multiple regression analysis (Field, 2013). An ANOVA test supported analysis of the variation in PTSD symptom reduction by PTSD symptom severity group at low, moderate, and high PTSD symptom severity levels. Post hoc tests were also performed to assess statistically

significant mean PTSD reduction differences among the three PTSD symptom severity groups (Field, 2013).

The ART intervention selected for analysis in this study is a brief, trauma-focused intervention for the treatment of PTSD symptom resolution in veteran populations (see Hoge, 2015; Kip et al., 2012, 2013, 2014a, 2014b, 2016; Ritchie, 2015; Waits et al., 2015). The ART intervention includes a minimum of one to five sessions without the need for homework or the retelling of the trauma experience (Hoge, 2015; Kip et al., 2016). The brevity of the treatment protocol is significant when compared to other trauma-based interventions that include anywhere from eight to 12 sessions or more, often resulting in high dropout and non-compliance rates (Kip et al., 2016). Treatment completion rates are also high for the ART intervention, estimated at 90%. This study was informed by the literature showing there is a critical need for continued PTSD research to determine the factors that influence PTSD symptom reduction (see Hoge, 2015; Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). This study fills the gap in understanding by developing the first predictive PTSD treatment-matching model to predict which veterans most benefit from ART for PTSD symptom reduction.

Although other research designs such as true experimental and pretest-posttest quasi-experimental designs were considered, a correlational study supports this strategy of inquiry (Field, 2013). The secondary data obtained for this study mitigated the cost, low response rates, risks, and delays associated with original studies (Cheng & Phillips, 2014; Field, 2013). The three secondary data self-rating scale scores used in this study

were from valid, reliable instruments widely-used in PTSD research within veteran populations (Hardwick, 2016; Kip et al., 2016).

Veterans, defined as active duty, reservist, or discharged service members who served or are serving in any branch of the United States armed services define the target population (Hoge et al., 2014; Kip et al., 2016). The sample consists of adult male and female service members with prior deployments to conflict areas and a history of combat-related PTSD or military sexual trauma who consented, were enrolled as study participants, and completed ART treatment during the prospective cohort treatment study of ART (Kip et al., 2016).

Descriptive statistics include the socio-demographic characteristics of age, gender, race, marital status, and education (Kip et al., 2016). These socio-demographic characteristics describe the makeup of the study's sample (Field, 2013). Multiple regression analysis is used to determine whether number of deployments, guilt, depression, and anxiety predict PTSD symptom reduction by use of ART to build a PTSD treatment-matching model that predicts which veterans benefit most from ART for PTSD symptom reduction. An ANOVA test supports analysis of the variation in mean PTSD symptom reduction by PTSD symptom severity group stratified by low, moderate, and high PTSD symptom severity levels. Post hoc tests were used to assess which of the three groups experienced statistically significant mean PTSD differences when compared to each other.

Adherence to ethical standards consistent with the use of secondary data were maintained throughout the study to include confirmation of informed consent, equitability

in the sample selection process, confidentiality and privacy of all study participants, as well as security of the dataset and eventual proper disposal of all electronic secondary data within five years of dissertation completion (Piotrowski, 2013).

The research implication of this quantitative strategy of inquiry are broad. A predictive PTSD treatment-matching model that predicts which veterans most benefit from ART for PTSD symptom reduction may lead to a more specific and expedient way to administer the ART treatment protocol. This approach may support timely and targeted ART treatment for veterans who need it most, thereby reducing the incidence of refractory PTSD, and associated comorbidities, chronic illnesses, and suicides (see Hoge et al., 2014; Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). The creation of this predictive PTSD treatment-matching model may be applicable across other identified variables and PTSD interventions to predict PTSD symptom reduction.

Chapter 4 includes the results of the analysis outlined in this chapter. Baseline descriptive and demographic characteristics of the sample support the analysis (Field, 2013). The chapter includes statistical assumptions (Walden University, n.d.). Study findings organized by research question and associated hypotheses include statistics, associated probability values, confidence intervals, and effect sizes (Field, 2013). The study also include post-hoc analysis to support ANOVA testing (Field, 2013). Applicable tables and figures also show statistical results (Field, 2013).

Chapter 4: Results

Introduction

In Chapter 3, I detailed the quantitative strategy of inquiry I used, which was informed by Foa and Kozak's (1986) emotional processing theory. The approved deidentified dataset I used to conduct this analysis of secondary data was drawn from a prior prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522; Kip et al., 2016).

The purpose of this study was to show whether the independent variables number of deployments, guilt, depression, and anxiety predicted the dependent variable PTSD symptom reduction (Kip et al., 2016). The sample consisted of combat veterans who participated in the prospective cohort treatment study of ART, from which the secondary data was drawn (Kip et al., 2016). I also aimed to assess whether mean PTSD symptom reduction differed among the three identified PTSD symptom severity groups classified at low, moderate, and high PTSD symptom severity levels (Kip et al., 2016). Additionally, for the purpose of this study, veterans were defined as active-duty, reservist, or discharged service members who served in any branch of the United States armed forces (Hoge, 2011).

I sought to develop a predictive PTSD treatment-matching model based on potential ART candidates' self-rated pretreatment measures of the number of deployments, guilt, depression, and anxiety, and whether these variables are predictive of the amount of PTSD symptom reduction in response to the use of ART (see Kip et al., 2016). The identified gap in the literature was that there were no existing research

studies that analyzed predictor variables to predict which veterans benefit most from ART for PTSD symptom reduction. Further, no other researchers have attempted to identify a predictive PTSD treatment-matching model for effective use of ART, and no other researchers have determined mean PTSD symptom reduction amounts among PTSD symptom severity groups stratified by PTSD symptom severity levels (see Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016).

The research questions and hypotheses selected for this study were as follows:

RQ1: What is the effect of number of deployments, guilt, depression, and anxiety in predicting PTSD symptom reduction for veterans who complete ART?

H_o1: Number of deployments, guilt, depression, and anxiety do not predict PTSD symptom reduction for veterans who complete ART.

H_a1: At least one predictor, number of deployments, guilt, depression, and anxiety will predict PTSD symptom reduction for veterans who complete ART.

RQ2: What is the variation in PTSD symptom reduction among low, moderate, and high PTSD symptom severity groups?

H_o2: There is no variation in PTSD symptom reduction among low, moderate and high PTSD symptom severity groups.

H_a2: There is variation in PTSD symptom reduction for at least one of the three (low, moderate, high) PTSD symptom severity groups.

In Chapter 4, I provide an overview of the purpose, research questions, and hypotheses as detailed above. Data collection techniques are briefly outlined. Descriptive statistics are presented to characterize the study participants. Statistical

assumptions and detailed results of a multiple regression analysis and ANOVA test with post hoc analysis are presented. The chapter concludes with a summary of the findings and an introduction to Chapter 5.

Data Collection (Secondary Data)

My use of an approved deidentified dataset eliminated the need to recruit study participants (see Curtis et al., 2016; Field, 2013). The additional benefits of using secondary data include the reduced turnaround timeframes, costs, low response rates, risks, and delays associated with other research design options (see Curtis et al., 2016)

The secondary data I analyzed included study participants recruited from veteran membership organizations within the Tampa Bay area of Florida, and from academic programs at a local university (Hardwick, 2016; Kip et al., 2016). The sampling frame consisted of all study participants from a prospective cohort treatment study of ART who consented to and voluntarily completed ART (Kip et al., 2016). The data source provider granted me permission to use the secondary data and provided the deidentified dataset after the Walden University IRB approval (IRB Number 06-25-18-0020711). The deidentified dataset included adult male and female active-duty, reservist, and discharged veteran United States service members over 18 years of age with a history of combat-related PTSD symptoms who completed ART intervention during that study (Kip et al., 2016).

Results

Data Cleaning and Screening

An approved deidentified dataset was received as an electronic IBM SPSS data file. The data file was loaded into a password-protected laptop maintained in a locked office (see Button et al., 2013; Frankfort-Nachmias & Nachmias, 2008; Kip et al., 2016; Piotrowski, 2013). I conducted a data cleaning and screening procedure to remove any cases with missing data (see Cheng & Phillips, 2014).

Baseline Demographic Statistics

Informed by the literature review in Chapter 2, I used the socio-demographic characteristics of age, gender, race, marital status, and education to describe the makeup of the study participants (see Cheng & Phillips, 2014; Curtis et al., 2016; Kip et al., 2016). Figure 1 shows there were a total of 108 study participants ranging in age from 23 to 76, with a mean age of 43 (*SD* = 12.67). Males comprised 92% (*n* = 100) of the study participants, and females comprised 8% *(n* = 8) of the study participants (Figure 2).

The breakdown of the study participants by race (Figure 3) showed that 85% (*n* = 92) identified as White, 11% (*n = 12)* identified as Black or African American, 2.8% (*n = 3)* identified as Asian, and .9% (*n* = 1) identified as American Indian/Alaskan Native. Figure 4 shows that 44% (*n* = 47) of the study participants were married, 32% (*n* = 34) were divorced or separated, 19% (*n* = 21) were never married, 3% (*n* = 3) were living with someone, and 3% (*n* = 3) were widowed. Figure 5 shows that the study participants'

education in years ranged from 9 to 28 years, with a mean of 14.5 years of education (*SD* = 2.68).

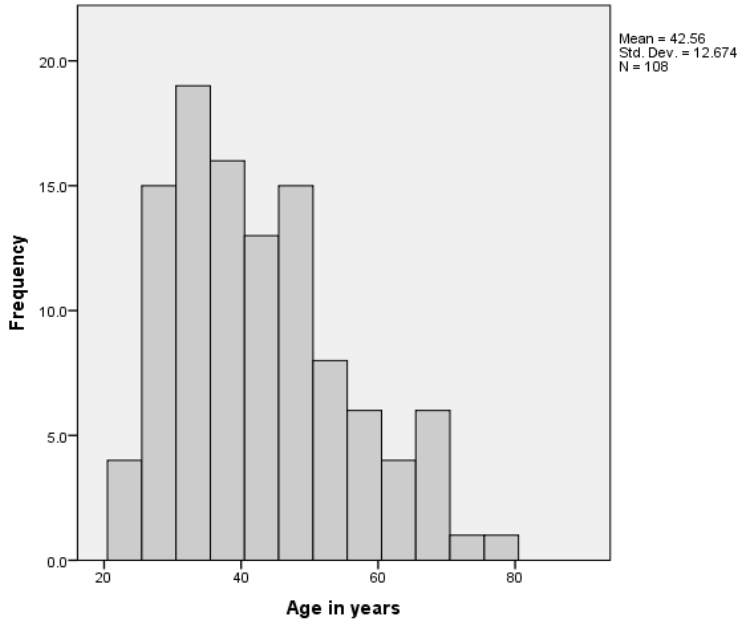

Figure 1. Histogram—age in years.

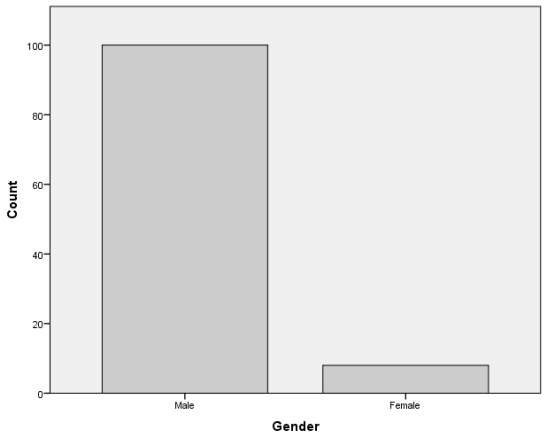

Figure 2. Frequency table—gender.

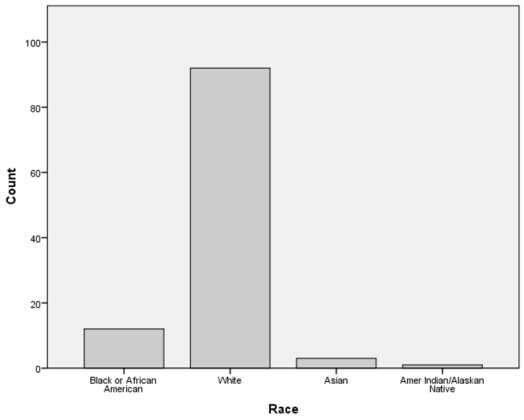

Figure 3. Frequency table-race.

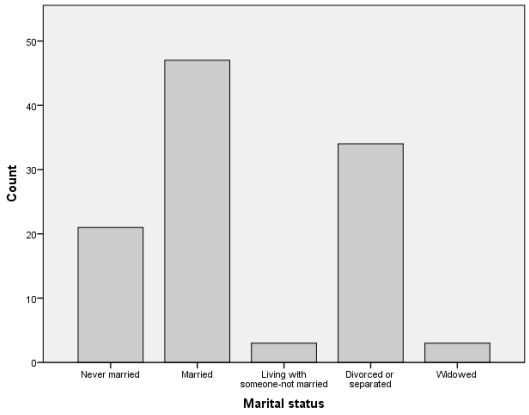

Figure 4. Frequency table - marital status.

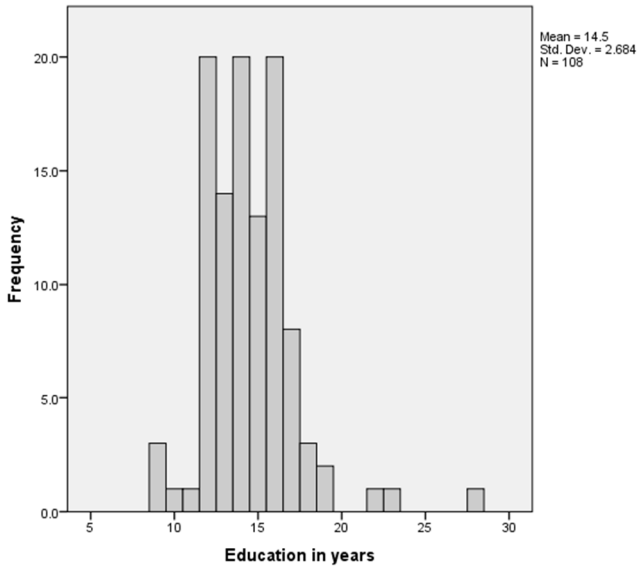

Figure 5. Histogram-education in years.

Multiple Regression Analysis

I selected a multiple regression as a predictive analysis to answer the first research question and test its hypotheses (see Field, 2013). The aim of the analysis was to support choosing and fitting a treatment-matching model that would predict PTSD symptom reduction based on the independent variables of number of deployments, guilt, depression, and anxiety (see Frankfort-Nachmias & Nachmias, 2008; Witt, 2016). Multiple regression allowed for the analysis of the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained (see Field, 2013; Witt, 2016).

I used a standard multiple regression to predict the amount of PTSD symptom reduction (the difference between each study participant's pretreatment and posttreatment PCL-M scale scores) in a sample of 108 study participants (Kip et al., 2016; Weathers et al., 1998). The participants were derived from an approved secondary dataset obtained from a prospective cohort treatment study of ART (Kip et al., 2016). The dataset included each study participant's (a) total number of deployments (1, 2, 3, and 4 representing 4 or more deployments); (b) pretreatment level of guilt, as measured by the mean TRGI score; (c) the pretreatment level of depression, as measured by CES-D score; and (d) the pretreatment level of anxiety, as measured by the STICSA score (Edwards et al., 1966; Kip et al., 2016; Kubany et al., 1996; Radloff et al., 1997; Ree et al., n.d.).

Multiple regression assumptions. The assumptions associated with a multiple regression were tested to determine if the selected model was valid (Field, 2013; Laerd Statistics, 2015). The eight assumptions tested were as follows:

1. There must be a continuous dependent variable. PTSD symptom reduction was a continuous dependent variable (Field, 2013; Laerd Statistics, 2015).
2. There are two or more independent variables measured at the continuous or nominal level. Number of deployments, guilt, depression, and anxiety were all measured at the continuous level (Field, 2013; Laerd Statistics, 2015).
3. There should be independence of errors (residuals). The Durbin-Watson statistic can range from 0 to 4, but a value of approximately 2 indicates that there is no correlation between residuals (Field, 2013; Laerd Statistics, 2015). As shown in Table 1, there was independence of residuals assessed by a Durbin-Watson statistic of 1.698.

Table 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	175[a]	.031	-.007	15.77491	1.698

Note. Predictors: (Constant),Number of Deployments, Guilt- TRGI-Pre-ART, Depression-CESD-PreART, Anxiety-STICSA-PreART. Dependent Variable: PTSD Symptom Reduction

4. There should be a linear relationship between the predictor variables number of deployments, guilt, depression, anxiety (and composite) and the dependent variable PTSD symptom reduction. The plots (Figure 6 through 9) indicate there was a linear relationship (Field, 2013; Laerd Statistics, 2015).

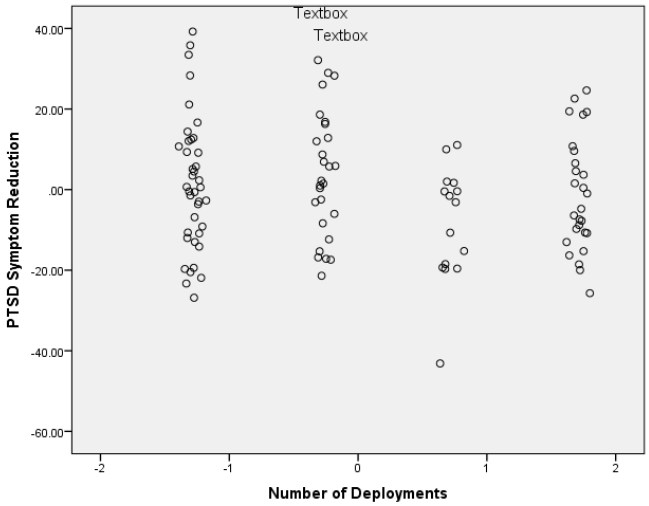

Figure 6. Partial regression plot – number of deployments. Dependent variable: PTSD symptom reduction.

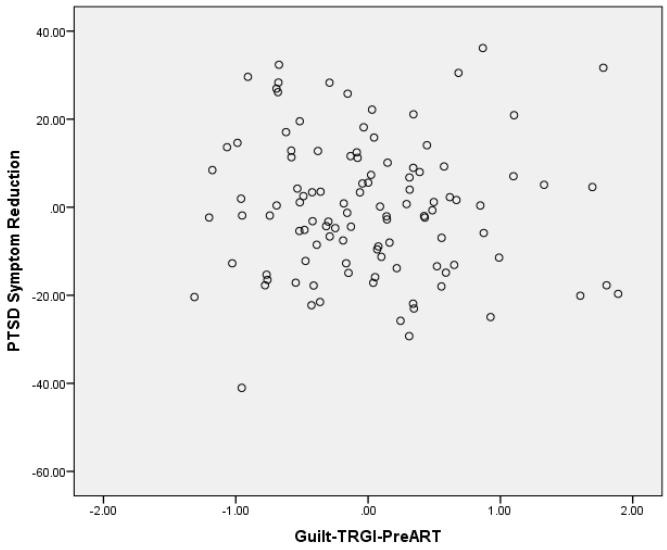

Figure 7. Partial regression plot – guilt-TRGI-preART. Dependent variable: PTSD symptom reduction.

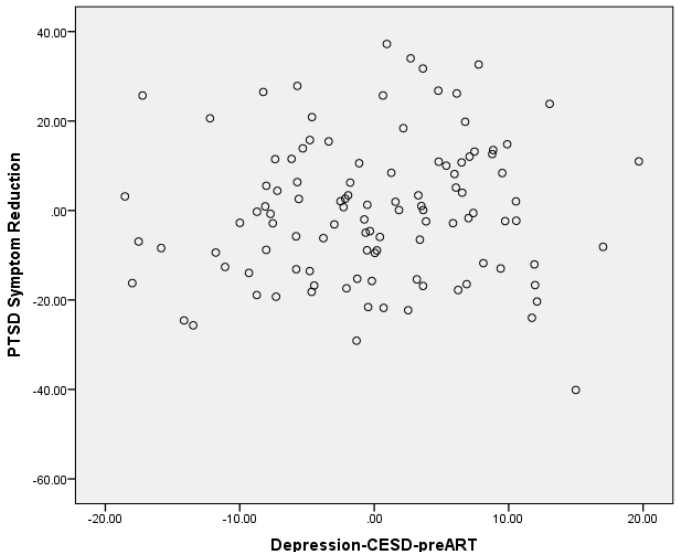

Figure 8. Partial regression plot – depression-CESD-preART. Dependent variable: PTSD symptom reduction.

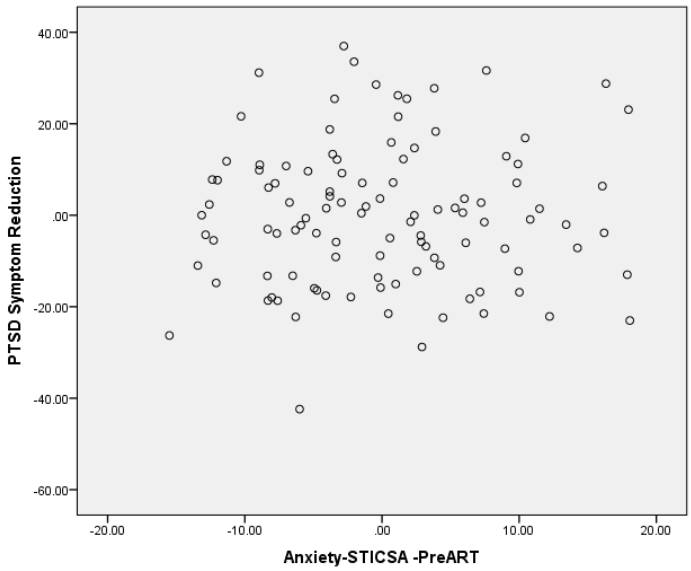

Figure 9. Partial regression plot – anxiety-STICSA-preART. Dependent variable: PTSD symptom reduction.

5. There should be homoscedasticity of residuals (equal error variables).

Figure 10 does show a random pattern. This is indicative of homoscedasticity, as

assessed by inspection of a plot of studentized residuals versus unstandardized predicted value (Field, 2013; Laerd Statistics, 2015).

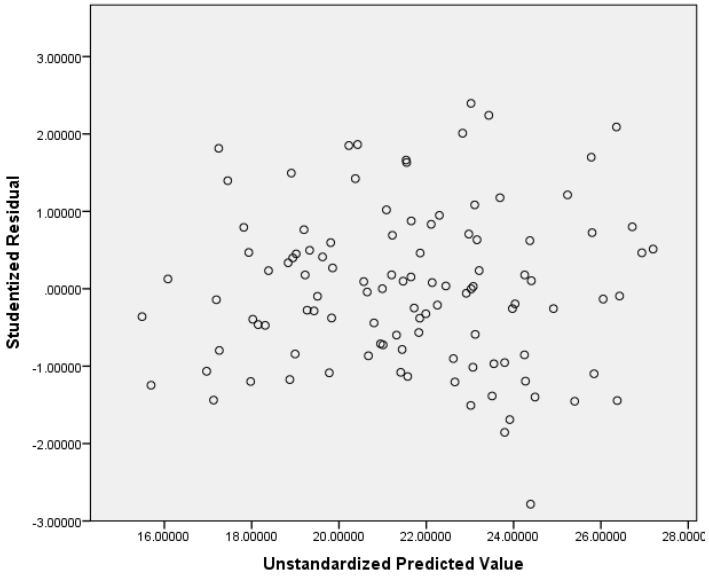

Figure 10. Plot of studentized residuals versus unstandardized predicted values.

6. There should be no multicollinearity. Table 2 showed VIF values were below 10. Tolerance values were all well above .2, confirming absence of multicollinearity (Field, 2013; Laerd Statistics, 2015).

Table 2

Coefficients

	Unstandardized Coefficients		Standardized			95.0% Confidence Interval for B		Correlations			Collinearity Stats.	
Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero Order	Partial	Part	Tolerance	VIF
1 (Constant)	21.042	6.658		3.161	.002	7.839	34.246					
# of Deployments	-1.653	1.273	-.126	-1.298	.197	-4.179	.872	-.123	-.127	-.126	.999	1.001
Guilt/TRGI	-1.113	2.226	-.051	-.500	.618	-5.527	3.301	-.016	-.049	-.049	.899	1.112
Depression/CESD	.131	.190	.098	.688	.493	-.246	.508	.110	.068	.067	.460	2.175
Anxiety/STICSA	.049	.190	.038	.261	.795	-.327	.426	.093	.026	.025	.439	2.280

Note. Dependent Variable PTSD Symptom Reduction

7. There should be no significant outliers, high leverage points, or highly influential points. The SPSS case wise diagnostic table output will show participants' standardized residuals greater than ±3 standard deviations when the SPSS software identifies outliers. There were no outliers. Therefore, the SPSS output did not produce a case wise diagnostics table. The dataset was inspected for high leverage and influential points. High leverage points were inspected by reviewing the LEV_1 variable in the data to identify any cases greater than .2. None were found. Influential points were inspected by reviewing the COO_1 variable in the dataset to identify any cases with a Cook's Distance value greater than 1. None were found (Field, 2013; Laerd Statistics, 2015).
8. The errors (residuals) should be approximately normally distributed. The histogram in Figure 11indicates that the normality of errors assumption was met (Field, 2013; Laerd Statistics, 2015).

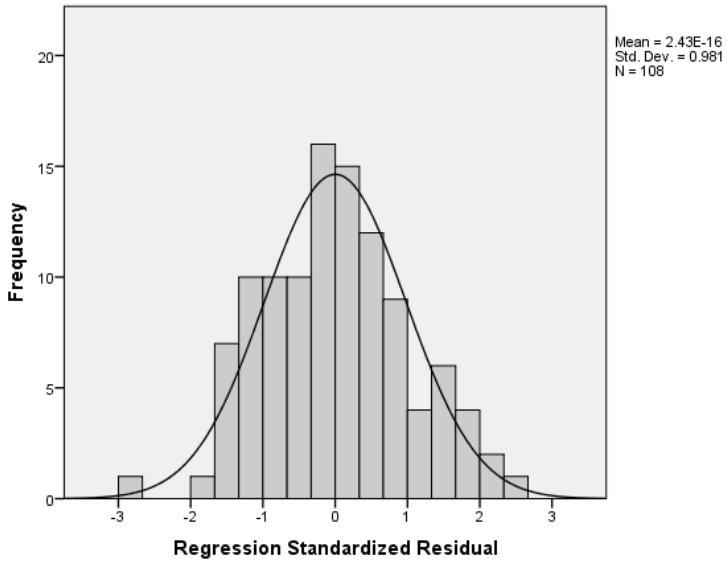

Figure 11. Histogram. regression srandardized Residual - Dependent variable: PTSD symptom reduction

The normal P-P plot in Figure 12 also verifies that the normality of errors assumption was met because the dashed line did not deviate from the straight line (Field, 2013). This data concluded that the model was reliable (Field, 2013).

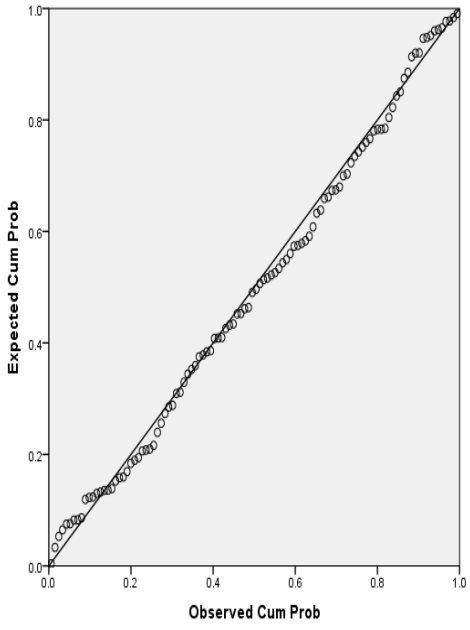

Figure 12. Normal p-plot of expected versus observed cumulative probability. Dependent vaariable: PTSD symptom reduction.

Computing a Multiple Regression

A standard multiple regression was computed to assess if the predictor variables number of deployments, guilt, depression, and anxiety predicted the amount of PTSD symptom reduction (Field et al., 2013; Kip et al., 2016). The model was also assessed for its validity (Green & Salkind, 2014). The data used for this analysis were found in the approved deidentified secondary data derived from a prospective cohort treatment study of ART (Kip et al., 2016). The null hypothesis was that no predictors predicted the amount of PTSD symptom reduction. The alternative hypothesis was that at least one predictor, number of deployments, guilt, depression, or anxiety predicted the amount of PTSD symptom reduction after ART treatment. The significant level alpha was set at .05. A sample size of 108 participants (Table 3) with four predictors, number of deployments, guilt, depression, and anxiety was appropriate, as this would detect a moderate effect size of .25 (Field, 2013).

Table 3

Descriptive Statistics

	Mean	Std. Deviation	N
PTSD Symptom Reduction	21.6184	15.72095	108
Number of Deployments	2.28	1.198	108
Guilt-TRGI PreART	1.3919	.72263	108
Depression-CESD PreART	28.1382	11.83403	108
Anxiety-STICSA- PreART	44.7516	12.13736	108

Table 4 shows that the adjusted *R* Square value is -.007. The negative value occurred because the model contained terms that did not help to predict the dependent variable, PTSD symptom reduction (Field, 2013).

Table 4

Model Summary [b]

Model	*R*	Square	Adjusted *R* Square	Std. Error of Estimates	Durbin-Watson
1	.175[a]	.031	-.007	15.77491	1.698

Note. a. Predictors: (Constant), Number of Deployments, Guilt-TRGI-PreART, Depression-CESD-PreART, Anxiety-STICSA-PreART. b. Dependent Variable: PTSD Symptom Reduction.

Based on the ANOVA results in Table 5, the study failed to reject the null hypothesis, $F(4, 103) = .817$, $p=.517$.

Table 5

ANOVA[a]

Model		Sum of Squares	df	Mean Squares	F	Sig.
1	Regression	813.548	4	203.387	.817	.517[b]
	Residual	25631.325	103	248.848		
	Total	26444.874	107			

Notes. a. Dependent Variable: PTSD Symptom Reduction
b. Predictors: (Constant), Number of Deployments, Guilt-TRGI-PreART, Depression-CESD-PreART, Anxiety-STICSA-PreART.

ANOVA Test

Group comparison tests answered the second research question and its hypothesis (Field, 2013; Laerd Statistics, 2015). The aim of conducting an ANOVA test was to assess the differences in the scale-level dependent variable PTSD symptom reduction by

the nominal-level variable PTSD symptom severity consisting of three symptom severity groups (Field, 2013; Laerd Statistics, 2015). The three groups were defined as low PTSD symptom severity group (group participants with pretreatment PCL-M scores at or below 50); moderate PTSD symptom severity group (group participants with pretreatment PCL-M scores between 51-60); and high PTSD symptom severity group (group participants with pretreatment PCL-M scores at or greater than 61).

Post-hoc tests (*t* tests) were conducted to analyze the mean differences among the three PTSD symptom severity groups at low, moderate, and high PTSD symptom severity levels to assess which of the three PTSD symptom severity groups were different from each other (Field, 2013).

ANOVA Test Assumptions

The assumptions associated with ANOVA were as follows:

1. The dependent variable is a continuous (interval or ratio) level of measurement (Field,
   2013; Laerd Statistics, 2015). The dependent variable PTSD symptom reduction was a continuous level of measurement.
2. The independent variable is a categorical (nominal or ordinal) variable (Field, 2013; Laerd Statistics, 2015). The independent variable for this ANOVA test was PTSD symptom severity with a low, moderate, and high symptom severity group (Field, 2013; Kip et al., 2016; Laerd Statistics, 2015).

3. The ANOVA test assumes the observations are independent of each other (Field, 2013; Laerd Statistics, 2015). The participants were classified by symptom severity levels to create three independent groups.

4. There are no significant outliers in the groups of the independent variable in terms of the dependent variable (Field, 2013; Laerd Statistics, 2015). This was confirmed as assessed by box plots (Figure 13) and mean plots (Figure 14).

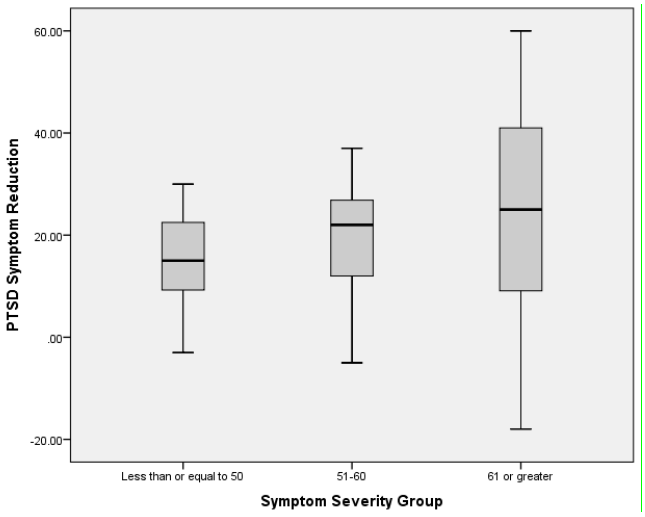

Figure 13. Box plots.

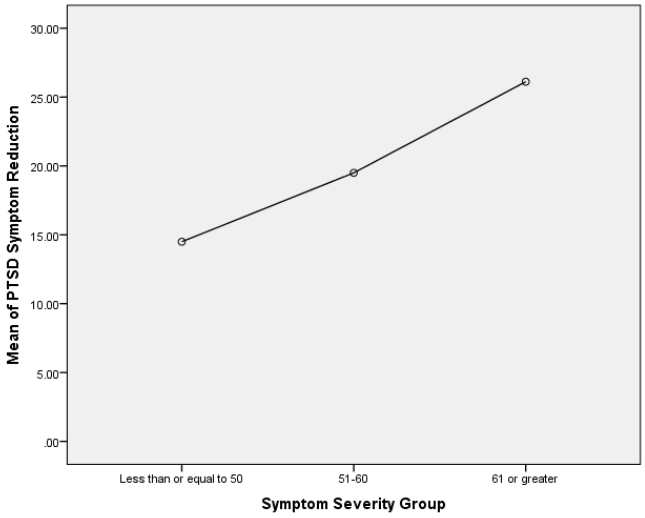

Figure 14. Mean plots.

5. ANOVA, a parametric test, assumes there is normal distribution of the data (Field, 2013; Laerd Statistics, 2015). Table 6 shows that PTSD symptom severity was normally distributed for the low, moderate, and high level of symptom severity, as assessed by Shapiro-Wilk's test ($p > .05$).

Table 6

Test of Normality

		Shapiro-Wilk		
	Symptom Severity Group	Statistics	df	Sig.
PTSD Symptom Reduction	≤ 50	.931	28	.066
	51-60	.954	26	.282
	≥ 61	.971	55	.213

6. The ANOVA test assumes homogeneity of variance which means that the variance among the identified PTSD symptom severity groups (low, moderate, high) will be about equal (Field, 2013; Laerd Statistics, 2015). The assumption of homogeneity of variance was violated *(p*< .05), as assessed by Levene's test of homogeneity of variances (Table 7).

Table 7

Test of Homogeneity of Variance
Dependent Variable: PTSD Symptom Reduction

Levene Statistic	df1	df2	Sig.
10.500	2	105	.000

Computing A One-Way Welch ANOVA

To correct the violation of the assumption of homogeneity of variance, a one-way Welch ANOVA was required to compute whether the mean difference in the dependent variable PTSD symptom reduction was different for groups with different PTSD symptom severity levels. Table 8 shows that study participants were classified into three groups: low (*n* = 27), moderate (*n* = 26), and high (*n* = 55) levels of PTSD symptom severity (Laerd Statistics, 2015).

Table 8

Descriptive Statistics
Dependent Variable: PTSD Symptom Reduction

Symptom Severity Group	N	Mean	Std. Deviation	Error	Lower Bound	Upper Bound	Min	Max
Low ≤ 50	27	14.4977	9.33930	1.79735	10.8032	18.1922	-3.00	30.00
Moderate 51-60	26	19.5002	11.62894	2.28062	14.8031	24.1972	-5.00	37.00
High ≥ 61	55	26.1153	18.35775	2.47536	21.1525	31.0781	-18.00	60.00
Total	108	21.6184	15.72095	1.51275	18.6195	24.6172	-18.00	60.00

As stated previously in the assumptions section, the ANOVA assumptions confirmed there were no outliers and the data was normally distributed for each group, as assessed by box plot, mean plot, and Shapiro-Wilk test (p=.066, p=.282, p=.213) respectively. The assumption of homogeneity of variance was violated, as assessed by Levene's test of homogeneity of variance (p=.0005). To correct the violation, a one-way Welch ANOVA test was computed. For the dependent variable, the mean PTSD symptom reduction was statistically significantly different among the different PTSD symptom severity groups, Welch's $F(2, 63.875) = 7.204$, $p = .002$, as shown in Table 9. Therefore the analysis failed to accept the null hypothesis.

Table 9

Robust Tests of Equality of Means

	Statistic[a]	df1	df2	Sig.
Welch	7.204	2	63.875	.002

Note. a. Asymptotically F distributed; Dependent Variable PTSD Symptom Reduction.

The mean PTSD symptom reduction score differed from the low PTSD symptom severity group (M = 14.5, SD = 9.3) to the moderate PTSD symptom severity group (M = 19.5, SD = 11.6), to the high PTSD symptom severity group (M = 26.1, SD = 18.4) in that order (Laerd Statistics, 2015). Games-Howell post hoc analysis revealed that the mean difference from the low to high PTSD symptom severity group (11.62, 95% CI [4.31, 18.92]) was statistically significant (p = .001), as shown in Table 10. Figure 15 shows a graphical representation of the Welch ANOVA results. Additionally, there was a moderate to large effect size of .38 for the statistically significant low to high PTSD symptom severity groups (www.webpower.psychstat.org).

Table 10

Games-Howell Multiple Comparisons

	(I) Symptom Severity Group	(J) Symptom Severity Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Upper Bound	Lower Bound
Games Howell	≤ 50	51-60	-5.00248	2.90374	.207	-12.0255	2.0205
		≥ 61	-11.61762	3.05906	.001	-18.9232	-4.3120
	51-60	≤ 50	5.00248	2.90374	.207	2.0205	12.0255
		≥ 61	-6.61514	3.36580	.728	-14.6694	1.4392
	≥ 61	≤ 50	11.61762*	3.05906	.001	4.3120	18.9232
		51-60	6.61514	3.36580	.128	-1.4392	14.6694

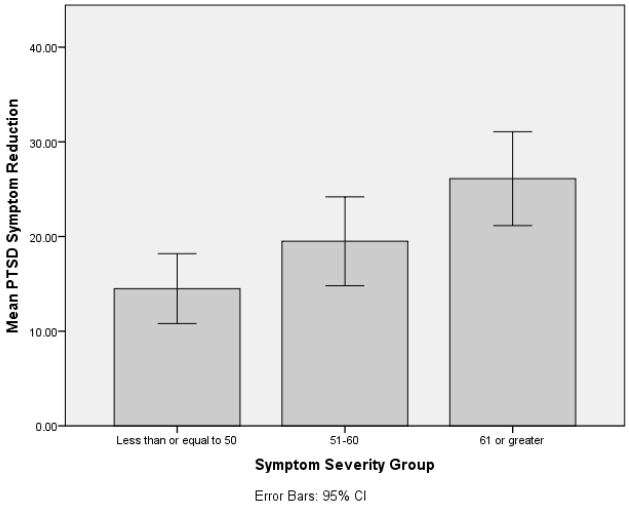

Figure 15. Graphical representation of Welch ANOVA results.

Summary

A deidentified secondary dataset was used to conduct a quantitative strategy of inquiry (Kip et al., 2016). The purpose of the study was to assess if the independent variables number of deployments, guilt, depression, and anxiety predicted the dependent variable PTSD symptom reduction in a sample (n=108) of combat veterans who completed ART (Kip et al., 2016). The study also aimed to show whether mean PTSD symptom reduction amounts differed among the three PTSD symptom severity groups classified at low, moderate, and high symptom severity levels (Field, 2013).

A predictive treatment-matching model for PTSD symptom reduction was sought based on study participants' secondary data that included total number of deployments and pretreatment self-rating scale scores for guilt, depression, and anxiety (Kip et al., 2016). This quantitative strategy of inquiry, informed by the literature, was the first of its kind to assess whether predictors of PTSD symptom reduction by use of ART could be identified.

The deidentified data was received in SPSS format (Kip et al., 2016). The dataset was stored in a password-protected laptop (Piotrowski, 2013). The data was screened and cleaned prior to producing the output (Field, 2013).

Descriptive statistics defined the socio-demographic characteristics of the 108 study participants (Field, 2013). The majority of the study participants (n=92) were married White males with a mean age of 43 and an average of 14.5 years of education (Kip et al., 2016).

A multiple regression analysis was conducted to answer the first research question regarding whether number of deployments, guilt, depression, and anxiety could predict PTSD symptom reduction after use of ART (Field, 2013). All eight assumptions associated with a multiple regression were met (Laerd Statistics, 2015). The study failed to reject the null hypothesis $F(4, 103) = .817$, p=.517 (IBM Corp, 2015).

Group comparison tests answered the second research question regarding whether mean PTSD symptom reduction amounts differed among the low, moderate, and high PTSD symptom severity groups (Laerd Statistics, 2015). The ANOVA assumptions confirmed there were no outliers and the data was normally distributed for each group (Laerd Statistics, 2015). The assumption of homogeneity of variance was violated (p=.0005). In order to correct the violation for the assumption of homogeneity of variance, a Welch ANOVA test was conducted (Field, 2013; Laerd Statistics, 2015). The results of the Welch ANOVA were significant $F(2, 63.875)=7.204$, p=.002. The study failed to accept the null hypotheses.

Games-Howell post hoc analysis revealed that the mean differences from the low to high PTSD symptom severity group (11.62, 95% CI [4.31, 18.92]) was statistically significant (p=.001). The statistically significant low to high PTSD symptom severity groups showed a moderate to large effect size of .38 (www.webpower.psychstat.org).

The results of the analyses presented in this chapter are synthesized in Chapter 5 to formulate a discussion of the study findings and detail how the findings in this study contributed to the body of available literature presented in the literature review found in Chapter 2. A theoretical analysis of the findings address generalizability, validity, and reliability of the findings to recommend opportunities for possible future research grounded in the results of this study.

Chapter 5: Discussion, Conclusions, Recommendations

Introduction

Chapter 5 includes a synopsis of the purpose and nature of this study. A summary of the key findings supports the salient components of the correlational study design, analysis, and outcomes. The multiple regression, ANOVA, and post hoc analyses are presented herein along with recommendations for future research. Additionally, I present the socio-demographic characteristics of the study participants. The findings are further categorized by each of the predictor variables number of deployments, guilt, depression, and anxiety as measured by secondary data scores from valid and reliable self-rating scales used in the prospective cohort treatment study of ART from which I drew the deidentified dataset (Kip et al., 2016). I also present the study's theoretical implications for future research consideration, and I discuss implications for social change at the individual, family, organizational, and social levels. I offer a conclusion at the end of the chapter to encapsulate the study's impact on and contributions to the available literature.

Purpose of the Study

The purpose of this correlational study was to determine whether the independent variables number of deployments, guilt, depression, and anxiety predicted the dependent variable PTSD symptom reduction by use of ART (Kip et al., 2016). The ART intervention is an empirically validated brief trauma-based intervention (Kip et al., 2016). The study sample consisted of veterans defined as active duty, reservist, and discharged service members with a history of deployments and associated PTSD symptoms (see Huang & Kashubeck-West, 2015; Hunt et al., n.d.; Kip et al., 2016; Xue et al., 2015). I

also aimed to assess whether mean PTSD symptom reduction differed among three identified PTSD symptom severity groups classified at low, moderate, and high levels of PTSD symptom severity (Field, 2013; Kip et al., 2016; Laerd Statistics, 2015).

My aim was to develop a predictive PTSD treatment-matching model for PTSD symptom reduction by use of ART. The deidentified dataset I used included study participants' self-reported number of deployments, and pretreatment self-rated measures for (a) guilt as measured by the TRGI; (b) depression as measured by the CESD; and (c) anxiety as measured by the STICSA, to predict the amount of PTSD symptom reduction by use of ART (Edwards et al., 1996; Kip et al., 2016; Kubany et al., 1996; Ree et al, n.d.).

I conducted the study to address a gap in the literature. Specifically, my review of existing research revealed that there were no existing studies focused on identifying predictors of PTSD symptom reduction by use of ART (see Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016). My review also revealed there were no other studies that attempted to identify a predictive PTSD treatment-matching model for PTSD symptom reduction by use of ART (see Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016). My review of available studies also showed there were no other studies that determined mean PTSD symptom reduction by symptom severity groups stratified by low, moderate, and high symptom severity levels (see Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016).

Nature of the Study

I conducted a multiple regression analysis to assess whether number of deployments, guilt, depression, and anxiety, as measured by self-rated pretreatment scale scores, predicted which veterans benefitted most from ART for PTSD symptom reduction (see Kip et al., 2016, Laerd Statistics, 2015). The dependent variable PTSD symptom reduction was measured by calculating the difference between participants' pretreatment and posttreatment PCL-M scale scores (Kip et al., 2016). An ANOVA test was conducted to compare the mean PTSD symptom reduction among three symptom severity groups at low, moderate, and high PTSD symptom severity levels (see Field, 2013; Kip et al., 2016). Post-hoc tests showed which of the three PTSD symptom severity groups experienced statistically significant mean PTSD symptom difference when compared to each other (see Field, 2013). The secondary analysis of existing data derived from a prospective cohort treatment study of ART registered at www.clinicaltrials.gov (NCT02030522) included a sample of 108 adult male and female veterans with a history of combat deployments and associated PTSD symptoms who completed ART (Kip et al., 2016).

Summary of Key Findings

The purpose of this correlational study was to assess if the independent variables number of deployments, guilt, depression, and anxiety predicted the dependent variable PTSD symptom reduction in a sample of combat veterans ($N = 108$) who completed ART (Kip et al., 2016). I also aimed to show whether mean PTSD symptom reduction

amounts differed significantly among the three PTSD symptom severity groups classified at low, moderate, and high PTSD symptom severity levels (see Field, 2013).

This quantitative study, as informed by the literature review, was the first of its kind to assess whether predictors of PTSD symptom reduction could be identified prior to commencing ART. I received the deidentified data from the data source provider in SPSS format and stored the data in a password-protected laptop. The data was screened and cleaned prior to producing the output.

Descriptive Statistics

Descriptive statistics were produced to define the socio-demographic characteristics of the 108 study participants. The majority (n = 100) of the 108 study participants were males (92.6%). A total of 92 (85.2%) study participants identified as White, and 47 (43.5%) identified as married (Kip et al., 2016). The mean age of the participants was 43 (SD = 12.7) with the mean years of education at 14.5 years (Kip et al., 2016).

Multiple Regression

I conducted a multiple regression analysis to answer the first research question regarding whether number of deployments, guilt, depression, and anxiety predicted the amount of PTSD symptom reduction by use of ART (see Field, 2013; Kip et al., 2016). All eight assumptions (Field, 2013; Laerd Statistics, 2015) associated with a multiple regression were met. The study failed to reject the null hypothesis, $F(4, 103) = .817$, $p = .517$.

ANOVA Test

I used group comparison tests to answer the second research question regarding whether mean PTSD symptom reduction amounts differed among the low, moderate, and high PTSD symptom severity groups (Laerd Statistics, 2015). The ANOVA assumptions confirmed there were no outliers and the data was normally distributed for each symptom severity group (Laerd Statistics, 2015). The assumption of homogeneity of variance was violated ($p = .0005$). In order to correct the violation for the assumption of homogeneity of variance, I conducted a Welch ANOVA test. The results of the Welch ANOVA test were significant $F(2, 63.875) = 7.204$, $p = .002$. The study failed to accept the null hypothesis.

Post hoc Analysis

Games-Howell post hoc analysis revealed that the mean difference from the low to high PTSD symptom severity group (11.62, 95% CI [4.31, 18.92]) was statistically significant ($p = .001$) with a moderate to large effect size of .38 (www.webpower.psychstat.org, 2018).

Interpretation of the Findings and Recommendations for Future Studies

Combat veterans were the focus of this study. The literature showed that combat veterans are at higher risk for PTSD onset with prevalence rates ranging from 2% to 17% when accounting for all wars (see Bardhoshi et al, 2016; Fischer, 2014; Hoge, 2011; Huang & Kashubeck-West, 2015; Moran et al., 2013). The effects of combat-related PTSD cause medical, psychological, physiological, and social hardships for veterans, their families, and the communities in which they live (Castro, 2014). Proven PTSD

interventions exist such as CPT, PE, and EMDR as detailed in Chapter 2 (see Chard et al., 2012; EMDR Institute, 2017; Rauch et al., 2012; Shapiro, 2001, 2012). However, Hoge et al. (2014), Kip et al. (2016), and Waits et al. (2015) found that these existing therapies are lengthy and time-consuming, resulting in high dropout and noncompliance rates. Combat veterans continue suffering with PTSD symptoms as a result. Ritchie (2015) and Waits et al. (2015) have advocated for continued research to find other factors that influence PTSD treatment response and inform relapse prevention efforts. In this study, I aimed to address the need for additional research by introducing a PTSD treatment-matching algorithm analysis to determine who benefits most from a particular PTSD treatment approach, before commencing treatment.

The development of a similar predictive treatment-matching model was attempted in the medical community by Nauert (2018). Nauert conducted a study to develop a statistical algorithm to predict which patients responded best to antidepressants prior to commencing a course of treatment. I aimed to accomplish something similar by identifying which predictor variables predicted the amount of PTSD symptom reduction by use ART and whether symptom severity levels influenced the amount of PTSD symptom reduction when comparing mean PTSD symptom reduction differences among three groups with different PTSD symptom severity levels. Developing a more effective treatment-matching model to predict PTSD symptom reduction and determining how symptom severity levels impact the amount of PTSD symptom reduction could possibly reduce or eliminate the number of trauma-based interventions attempted and the number

of treatment sessions needed to resolve PTSD and its associated comorbidities (see Kip et al., 2016).

Socio-Demographic Characteristics

The socio-demographic characteristics of age, gender, race, marital status, and education were selected to define the makeup of the study sample. These socio-demographic characteristics were not considered as predictor variables for this study because I aimed to identify predictor variables that could be measured and could predict PTSD symptom reduction. Informed by the literature review, the predictor variables number of deployments, guilt, depression, and anxiety were selected for this study because they directly influenced PTSD onset and the associated PTSD-related comorbidities that complicate PTSD resolution.

Number of Deployments

A review of the literature showed that combat exposure was a significant predictor of PTSD onset, and the greater the exposure the greater the severity of PTSD symptoms (Hoge et al., 2014; Huang & Kashubeck-West, 2015). The study findings showed that number of deployments was a nonsignificant predictor of PTSD symptom reduction (IBM Corp, 2015). However, the secondary data used for this analysis listed the choices for number of deployments on the Demographics form data derived from the dataset as 1, 2, 3, or 4 or more (Kip et al., 2016). The predictor variable number of deployments, therefore, requires further research scrutiny by including all possible number of deployments, as well as the dates of each deployment to determine the amount of time between deployments and the associated length of time of each deployment in

order to better analyze the impact of this data on the study outcomes (Hoge et al., 2014). Although number of deployments did not significantly predict the amount of PTSD symptom reduction in this study, this predictor variable merits more refined research analysis to determine the effects of deployments on PTSD symptom reduction.

Guilt

Dettmer et al. (2015) found that the nature of PTSD diagnosis in military populations was the same as in civilian populations except for the inclusion of guilt (Bryan et al., 2013). A review of the literature showed that perceived guilt associated with combat-related PTSD caused a persistent sense of demoralization that altered self-concept (Dettmer et al., 2015). Guilt was an important predictor variable because of its association with increased suicides (Anestes & Bryan, 2013; Hendin, 2014). Hendin (2014) found that severe combat-related guilt was the major differentiator between veterans who attempted suicide and veterans who contemplated suicide (Anestes & Bryan, 2013). Veterans struggling with guilt had greater incidences of self-medicating with drugs and alcohol, thereby prolonging their PTSD symptoms (Hendin, 2014). As clear as the literature was regarding the association of guilt and PTSD, associated comorbidities, and suicide guilt was a nonsignificant predictor of PTSD symptom reduction by use of ART in this study. It is suggested that researchers include pretreatment and repeated posttreatment measures of perceived guilt in future studies to determine the impact of ART on depression and associated comorbidities over time and their relevant impact on PTSD symptom reduction. The dataset used in this study measured perceived guilt with the TRGI. Researchers are encouraged to determine

which assessment best measures perceived guilt and whether physiological assessment of guilt, if possible, may produce more sensitive results regarding how guilt may predict PTSD symptom reduction.

Depression

Raab et al. (2015) reported that depression was a highly comorbid condition in veteran populations diagnosed with PTSD. Depression was selected as a predictor variable because of its association with PTSD onset, treatment-resistant PTSD, and the persistence of other comorbid disorders (Raab et al., 2015). The study findings showed that depression was a nonsignificant predictor of PTSD symptom reduction (IBM Corp, 2015). It is suggested that researchers include pretreatment and repeated posttreatment measures of depression in future studies to determine the impact of ART on depression and associated comorbidities over time and how those measures may predict PTSD symptom reduction. Additionally, although the secondary data measured depression with the CES-D researchers are encouraged to determine which assessment protocol best measures depression symptoms, as this predictor variable merits further research to determine its impact on PTSD and whether it can predict the amount of PTSD symptom reduction after introduction of a specific trauma-based intervention.

Anxiety

Anxiety was selected as a predictor for PTSD symptom reduction because it was a proven predictor of negative mental health outcomes (Schweizer et al., 2017). Schweizer et al. (2017) noted that anxiety impedes integration and resolution of traumatic experiences. Schweizer noted that although many trauma survivors recover from their

posttraumatic symptoms, others develop stressor-related disorders such as PTSD and are more susceptible to trauma due to stress modulation dysfunction (Schweizer et al., 2017). People diagnosed with anxiety experience greater degrees of emotional dysregulation, are less resilient to stressor-related disorders, and recover more slowly from the after-effects of their trauma experiences (Agorastos et al., 2013). Although the literature review revealed that anxiety could be a strong predictor of PTSD onset, it was a nonsignificant predictor of PTSD symptom reduction (IBM Corp, 2015). There are, however, implications for future study. For example, individuals who score high on anxiety measures may experience more heightened levels of trauma especially during the peri-trauma phase of a life-threatening event (Agorastos et al., 2013; Schweizer et al., 2017). Researching the impact of anxiety during the peri-trauma phase and its association with PTSD onset may advance available knowledge of potential barriers to PTSD resolution (see Agorastos et al., 2013; Schweizer et al., 2017). It is suggested that researchers include pretreatment and repeated posttreatment measures of anxiety in future studies to determine the impact of ART on anxiety over time and how that influences prediction of PTSD symptom reduction. Additionally, studies that compare PTSD and the symptom severity levels associated with both PTSD and anxiety may help determine whether higher levels of perceived anxiety as well as higher levels of PTSD symptom severity impede PTSD resolution and, therefore, PTSD symptom reduction.

Implications of Symptom Severity Levels on PTSD Symptom Reduction

To answer whether the dependent variable, PTSD symptom reduction differed among groups with different symptom severity levels, Welch ANOVA test results

showed significant findings and the study failed to accept the null hypothesis $F(2, 63.875)=7.204$, $p=.002$. Games-Howell post hoc analysis revealed that the mean PTSD symptom reduction difference from the low to high PTSD symptom severity group (11.62, 95% CI [4.31, 18.92]) was statistically significant ($p = .001$). It is also important to note that each PTSD symptom severity group at the low, moderate, and high PTSD symptom severity levels experienced a mean difference greater than 10 points (IBM, 2015). The PCL-M self-rating scale threshold when measuring improvement as clinically significant is between 10 and 20 points. An improvement of 5 points is considered a minimum threshold for patient response to a treatment, and 10 points of improvement is considered clinically meaningful improvement (Weathers et al., 2013). The low symptom severity group ($n=27$) with a total pretreatment PCL-M score at or lower than 50, showed a mean PTSD symptom reduction of 14.5. The moderate PTSD symptom severity group ($n=26$) with a total pretreatment PCL-M score between 51 and 60 showed a mean PTSD symptom reduction of 19.5. And, the high PTSD symptom severity group ($n=55$) with a total pretreatment PCL-M score at or greater than 61 showed a mean PTSD symptom reduction of 26.1. Therefore, patients who present with higher pretreatment PCL-M scores may experience greater amounts of PTSD symptom reduction. Additionally, it is important to conduct further research on the makeup of study participants who score at or greater than 61 on the PCL-M scale at pretreatment to determine what other factors influence PTSD symptom reduction in order to possibly isolate statistically significant predictors of PTSD symptom reduction. This study included this important second research question to determine not only whether groups at

different PTSD symptom severity levels differed significantly in their mean PTSD symptom reduction, but actually which groups were significantly different and what were the mean PTSD symptom reduction amounts. It is recommended that future research studies stratify participants by PTSD symptom severity levels to determine the makeup of the group and the factors that influence PTSD symptom reduction. These findings did show that immediate relief of PTSD symptoms was possible with a course of one to five sessions of ART, regardless of the length of time a patient suffered with PTSD symptoms. To date, ART offers the most expedient treatment for PTSD symptom reduction in the least amount of sessions and the Welch ANOVA test showed results that support use of ART at every level of PTSD symptom severity, but statistically significant results were evident between the low and high PTSD symptom severity groups.

The Theoretical Implications of the Study Findings

Rosen and Frueh (2010) found that the brain stores and recalls traumatic memories in a manner resulting in fragmentation. Yehuda et al. (2013) presented a biological model explaining that stress hormone response creates the neurocircuitry and genetic predisposition for PTSD onset. Foa and Kozak's (1986) emotional processing theory pointed to hyperactivity to and reminders of the original traumatic event which elicits behavioral avoidance and inability to resolve presenting PTSD symptoms. Although the literature review showed that the predictor variables number of deployments, guilt, depression, and anxiety were isolated as potential predictors of PTSD onset, the study revealed that PTSD onset may be a very complicated, multifactorial phenomenon unique to each individual (Kip et al., 2016). Just as no single

theoretical framework has fully contextualized PTSD onset, the findings in this study show that no one predictor predicted the amount of improvement or PTSD symptom reduction prior to commencement of a particular PTSD treatment intervention, in this case ART.

Limitations of the Study

The Study Sample

The dataset contained a sample of 108 study participants derived from a prior prospective cohort treatment study of ART (Kip et al., 2016). A limitation when using an available dataset is that the researcher must utilize the sample identified in the dataset and the variables contained therein (Cheng & Phillips, 2014). The majority (92.6%) of the sample consisted of males (*n*=100). A total of 92 (85.2%) participants identified as White. A total of 12 (11.1%) participants identified as Black or African American. A total of 3 (2.8%) participants identified as Asian. A total of 1 (.9%) participant identified as American Indian/Alaskan Native. Although the participants in this study are representative of a combat veteran population, it is important to note that PTSD is underreported within the military population (see Hoge, 2015; Waits et al., 2015).

The government classifies race as White, Black or African American, American Indian/Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, Multiracial, and Other (Reynolds & Shendruk, 2018). Additionally, the government views ethnicity as separate from race and includes the category of either Hispanic or Latino or not Hispanic or Latino under the classification of ethnicity (Reynolds & Shendruk, 2018). This study did not include the socio-demographic characteristic of ethnicity to define the makeup of

the study sample. Since Hispanic or Latino is classified by the government as ethnicity rather than race, statistics on participants who identified their ethnicity as Hispanic or Latino were not included in this study's socio-demographic characteristics (Reynolds & Shendruk, 2018). It is suggested that future studies include both race and ethnicity and that the classifications be distinct and clear in order to effectively stratify study participants. Additionally, the secondary data included active duty, reservist, and discharged service members who served in any branch of the United States armed forces (Hoge, 2011). It is unclear if the duration of the PTSD symptoms or the particular branch of military service influences PTSD symptom reduction. Therefore, researchers are encouraged to consider stratifying these different classifications to refine the study analyses.

Generalizability

The study findings are generalizable to US Armed Forces veterans with a history of combat deployment who experienced PTSD symptoms. However, the construct of a predictive PTSD treatment-matching model used to predict the amount of PTSD symptom reduction by use of a treatment intervention is generalizable to any identified population, any predictor variables, and any PTSD-related interventions (Nauert, 2018).

Use of Self-Rating Scales

The predictor variables guilt, depression, and anxiety were measured indirectly by the self-rating scale scores contained in the dataset (Kip et al., 2016). Self-rating scales by their nature are subject to self-perception of the severity level of the constructs measured. It is suggested that researchers consider the use of practitioner-administered

measures in future studies to reduce self-rater bias (Hoge, 2015). Additionally, consideration should be given to physiological measures of the constructs guilt, depression, and anxiety. For example, measuring saliva samples to determine the level of cortisol as representative of the level of anxiety may better predict PTSD symptom reduction for patients with PTSD symptoms.

Implications for Social Change

At the individual level, researchers are encouraged to determine whether the number of pretreatment assessments that study participants complete support better understanding of the treatment outcomes. For example, the secondary data for this study included multiple pretreatment assessments that measured perceived guilt, depression, and anxiety (Kip et al., 2016). However, none of these measures were predictors of PTSD symptom reduction. Evaluation and refinement of the pretreatment assessment process may result in better alignment with the constructs under analysis. Additionally, it is suggested that researchers focus equally on predictive PTSD treatment-matching algorithm analysis for PTSD symptom reduction (Nauert, 2018). A valid predictive PTSD treatment-matching model can support analysis of any combination of predictor variables and treatment intervention types (Nauert, 2018). Application of a predictive treatment-matching model may reduce the need for patients to endure multiple PTSD intervention attempts as well as excessive numbers of treatment sessions in a trial-and-error manner to achieve PTSD symptom resolution (see Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). Pretreatment scales can also be targeted toward identification of

predictive PTSD treatment-matching algorithms to strengthen the merits of pretreatment assessments and refine future research efforts.

At the family level, providing educational programs that help family members understand the PTSD treatment-matching model and why a particular intervention is selected will best serve the family system in adapting to the needs of the individual diagnosed with PTSD. A PTSD treatment-matching model approach can better tailor the process so family members understand the timeframe within which treatment efficacy may be anticipated and know specifically how to support the family member through the process of change.

At the organizational level, researchers are encouraged to consider studies that target the creation of algorithms that predict the amount of improvement possible prior to administration of a particular intervention (Nauert, 2018). There are many studies that focus on treatment efficacy but fewer studies that focus on predicting the amount of improvement possible by use of algorithms to match a patient with a treatment to provide the most effective path to PTSD symptom resolution (Hardwick, 2016; Kip et al., 2012, 2013, 2014a, 2014b, 2016).

At the societal level, the use of a PTSD treatment-matching algorithm may support a more targeted approach in matching a patient with an intervention resulting in more expedient resolution of their PTSD symptoms (see Ritchie, 2015; Waits et al., 2015). This, in turn, may reduce the complexities and comorbidities associated with PTSD (Lester, 2013).

Conclusion

This study attempted to identify the first predictive PTSD treatment-matching model to statistically predict the amount of PTSD symptom reduction possible prior to commencement of a trauma-based intervention. This study chose ART as the treatment of choice for analysis (Kip et al., 2016). As identified in the literature review in Chapter 2, researchers have not concluded whom benefits most from any specific PTSD treatment intervention (see Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). This study's nonsignificant findings for predictors of PTSD symptom reduction may be indicative of the complex nature of PTSD diagnosis and treatment and why myriad study findings show inconclusive results when attempting to determine which trauma-based treatments work best.

Although number of deployments, guilt, depression and anxiety were nonsignificant predictors of PTSD symptom reduction in this study, much was learned from this study's findings. The study findings, informed by what is known in the literature, revealed that number of deployments guilt, depression, and anxiety are important variables that require further research with different assessment scales, more stratified samples, and more specific information regarding, for example, length and number of deployments and duration of PTSD symptoms, as well as differentiating between active duty, reservist, and retired service members when conducting study analyses.

The study findings also showed that the predictor variables anxiety and depression, specifically, require more research refinement to determine how the peri-

trauma phase is impacted by anxiety symptoms and the influence of this co-occurring phenomena on PTSD symptom reduction. Depression and its relationship with guilt and suicide requires further research to determine how guilt influences PTSD symptom reduction. The predictor variables guilt, depression and anxiety are influenced by PTSD symptom severity levels, as evidenced in the Welch ANOVA test results and Games-Howell post hoc analysis. Stratifying participants by symptom severity levels and examining the make-up of each group may yield additional factors that predict PTSD symptom reduction, especially in PTSD symptom severity groups experiencing significant mean PTSD symptom reduction differences.

The study also revealed that ART, the brief trauma-based intervention selected for analysis in this study, resulted in clinically meaningful mean PTSD symptom reduction of 10 or more points as measured by the PCL-M scale scores of all three PTSD symptom severity groups at low, moderate, and high levels of PTSD symptom severity. This study also contributed to the validity of ART as a meaningful intervention for PTSD symptom reduction in veteran populations. The use of an intervention that can offer immediate relief of PTSD symptoms in as little as one to five sessions is significant when an average of 22 veterans per day continue to choose suicide over living with their PTSD symptoms (see Nelson, 2015: Ritchie, 2015).

The study's findings support the urgent need for continued research to explore predictive PTSD treatment-matching models that may lead to more expedient and sustained resolution of PTSD symptoms and the comorbidities associated with this disorder, potentially eliminating the need for multiple PTSD intervention attempts as well

as excessive numbers of treatment sessions to achieve PTSD symptom resolution (Kip et al., 2016; Ritchie, 2015; Waits et al., 2015). Veterans suffering with PTSD survived combat. They are now relying on behavioral health practitioners and researchers to help them survive their PTSD (see Kip et al., 2016; Nelson, 2015; Ritchie, 2015; Wanklyn et al., 2016).

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