THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND POSTTRAUMATIC STRESS DISORDER IN VETERANS

by

Robert C. Huseth

A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Exercise Science

Middle Tennessee State University
August 2018

Thesis Committee:

Dr. Sandra L. Stevens, Chair

Dr. Jennifer L. Caputo

Dr. Dana K. Fuller

This research is dedicated to the men and women of the Armed Forces.

ACKNOWLEDGEMENTS

There have been many teachers both in life and the classroom that have helped me realize my successes thus far in education and to them I give my gratitude. My deepest thanks is extended to my committee, Drs. Caputo and Fuller. Through their expertise and devotion to research, this thesis was made possible. To my committee chair, Dr. Stevens, my sincerest thanks is given not only for this thesis, but for this line of research as it would not have been made clear for me to pursue without your help. Through your passion for giving every student the best possible opportunities in which to pursue their dreams, you have given me mine.

While there are a myriad of individuals who have supported me in my progression in the field of higher education, I would have yet to find this path were it not for my wife Brieanna. Through the difficulties of deployments to the transition back to civilian life, the love of my life has been, and will always be, the lighthouse which navigates me through the most arduous of tribulations. Thank you Brie, for giving me both the strength and courage to be who I am today.

ABSTRACT

The purpose of this study was to explore the association between physical activity and PTSD symptomology in veterans. Military veterans (males = 74, females = 4) were included in the study if they served, active or reserve, for a period of at least one complete contract (2-8 years). Recruitment of veterans was accomplished via word of mouth and Facebook. Participants completed an online 31-question survey, which included a demographics section, a PCL-5 (PTSD Checklist version 5) section, and the International Physical Activity Questionnaire (IPAQ). A multiple linear regression was used to predict the intensity of PTSD symptoms (as determined by the PCL-5 value) in relation to the amount of moderate and vigorous physical activity when controlling for sedentary time. The α level was set at .05 for all analyses.

The regression analysis was not significant, indicating that time spent engaged in moderate to high intensity activity was not a significant predictor of PTSD symptoms, when controlling for sedentary time (R= .27, p =.094). However, Pearson's Correlation Coefficient, exploring the relationship between PTSD symptoms and metabolic equivalent (MET)x min/week, demonstrated a moderate inverse relationship (r = -.26, p = .02), suggesting that as level of physical activity increased, symptoms of PTSD decreased. Results from this analysis indicate that 9% of the variation in PTSD symptomology can be explained by variations in amount of physical activity. While this 9% difference may seem to be a modest change in the baseline, it represents the difference between clinical and subclinical classifications of PTSD in veterans. Other more common ways of treating PTSD include medication with Zoloft and Paxil. Both

drugs are approved by the Federal Drug Administration for the use in treating combat related PTSD; however, neither of these two drugs have been shown to be effective in treating these particular ailments (Castro, 2014). This highlights the need for a different approach in treating veterans suffering from PTSD.

TABLE OF CONTENTS

Page

LIST OF TABLES AND FIGURES

Page

LIST OF ABREVIATIONS

PTSD =	Posttraumatic Stress Disorder
VA =	Department of Veteran's Affairs
OEF =	Operation Enduring Freedom
OIF =	Operation Iraqi Freedom
MET =	Metabolic Equivalent
DSM-5 =	Diagnosis and Statistical Manual of Mental Disorders
PCL-5 =	PTSD Checklist DSM-5
MOS =	Military Occupational Specialty
DOD =	Department of Defense
CAOETPSD =	Committee of the Assessment of Ongoing Efforts in the Treatment of Posttraumatic Stress Disorder
PDHRA =	Post Deployment Re-Assessment
DMHA =	Deployed Mental Health Assessment
TBI =	Traumatic Brain Injury
mTBI =	Mild Traumatic Brain Injury
PDS =	Posttraumatic Diagnostic Scale
IPAQ =	International Physical Activity Questionnaire

LIST OF APPENDICES

Page

CHAPTER I

INTRODUCTION

According to the American Psychiatric Association, Post-Traumatic Stress Disorder (PTSD) is an anxiety problem stemming from a traumatic event such as a natural disaster, an accident, sexual assault, or a combat related incident (Lurigio, 2015). Though less than 10% of the total population in the United States of America (USA) will experience long-term PTSD (symptoms that last longer than 12 months), an additional 8.5% of the population will exhibit short-term PTSD (Lurigio, 2015). If left untreated, PTSD can have a progressively debilitating effect on individuals (Priebe et al., 2009). This progression is commonly observed in military personnel, when exposure to trauma is unavoidable and repetitive (Priebe et al., 2009).

A group within the veteran population that is at an even greater risk of experiencing PTSD, and the associated comorbidities, are combat arms veterans. Recent research conducted at the University of Split Hospital and School of Medicine in Croatia examined the comorbidities associated with PTSD in a veteran population (Priebe et al., 2009). This research identified a significant increase in risk for cardiovascular, pulmonary, dermatological, and metabolic diseases and an increased mortality risk, primarily as a result of suicide (Priebe et al., 2009). Research has shown that veterans who have operated in the combat zones of Iraq and Afghanistan are nearly 5.7 times more likely to commit suicide than their civilian counterparts (Jakupcak et al., 2009). Jakupcak (2009) found veterans who have multiple comorbidities are at an even greater risk for suicide than those suffering from a singular issue.

The Department of Veteran's Affairs (VA) office of Suicide Prevention found that approximately 20 veterans commit suicide per day, compared to 92 civilian suicides (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2017). This indicates that 8% of the population (veterans) accounts for approximately 18% of all suicides in the U.S. In addition, according to the Chief of Infantry and Commandant of U.S. Army Infantry School Brigadier General Bryan Owens, only about 15% of the veteran population have combat positions (Molinaro, 2010). Of this 15%, the VA recognizes that 15% of the veterans exposed to direct combat in OEF (Operation Enduring Freedom) and OIF (Operation Iraqi Freedom) demonstrate clinical levels of PTSD symptoms (Lapierre, Schwegler, & LaBauve, 2007).

Due to PTSD being acknowledged by the VA as one of the leading comorbidities associated with suicide attempts and/or ideations, it is reasonable to assume that the majority of suicides in a veteran population come from some manifestation of PTSD directly related to combat exposure (Hudenko, Homaifar, & Wortzel, 2018). When these percentages are pieced together, it appears 20% of all suicides in the USA may be related to combat veterans with PTSD who make up .18% of the population. This suggests that reducing the severity and frequency of PTSD in combat veterans could substantially reduce the number of suicides per day in the USA. Not only would this have an impact on the veterans' wellbeing, it would also have a positive economic effect on the USA.

Currently the most frequently implemented interventions for PTSD are medication and psychotherapy. While the literature demonstrates positive results with these techniques, they have not resulted in a reduction in the number of veterans with PTSD or the number of veteran suicides per day (National Center for PTSD, 2010).

While little work has been done to explore the relationship between physical activity and PTSD in combat veterans, it has been shown to have a positive effect on PTSD in other populations.

Diaz and Motta (2008) conducted a nonrandomized study with 12 female adolescents with varying levels of PTSD symptoms. This pilot study showed 91% of the adolescents had reduced PTSD symptomology following a basic walking program at a moderate intensity. Another study conducted by De Moor in 2006 showed those that exercised at 4 METs (Metabolic Equivalent) or more for at least 60 minutes per week were on average less depressed, neurotic, and anxious than non-exercisers (De Moor, Beem, Stubbe, Boomsma, & De Geus, 2006). Depression, neuroticism, and anxiety were all measured using the short version of the Beck's Depression Inventory. These conditions have been demonstrated to be directly associated with those who suffer from PTSD, which, as stated earlier, is the leading comorbidity associated with suicidal ideations. With the potential for positive results from this intervention on other populations, it may be beneficial to explore the effects of physical activity on symptoms of PTSD in combat veterans to determine if a similar relationship exists.

Purpose of Study

The purpose of this study was to explore the association between physical activity and PTSD symptomology in veterans.

Research Hypothesis

It was hypothesized that a higher level of physical activity would be associated with lower PTSD symptomology when controlling for sedentary time. In addition, when

controlling for sedentary time, moderate and vigorous physical activity will decrease PTSD symptoms

Significance of Study

The current literature indicates that PTSD is an ever-present mental health issue within the US. Veteran populations have been shown to have an increased risk for PTSD symptoms within their lifetimes. The veterans at greatest risk for this mental health disorder are those exposed to combat situations. As stated earlier, PTSD is one of the leading comorbidities found in attempted and completed suicides. This increased likelihood for suicidal ideations is not just a problem for the veteran and their families, but also an economic burden for the USA. The current treatment options for PTSD are lacking in being effective for all veterans. Current literature in the field of exercise as a means of treatment shows great promise; however, the area of study is in a nascent stage.

CHAPTER II

REVIEW OF LITERATURE

This review of literature begins with an explanation of what Post-Traumatic Stress Disorder (PTSD) is according to the American Psychiatric Association. The next section discusses the lifestyle of an active duty military member in regards to training routine and deployment considerations. Following the explanation of the stresses the veteran experiences, suicide in the combat veteran population is discussed in detail. Then the economic impact that these suicides have on the USA is focused on, followed by the current diagnosis pipeline and treatment options afforded to the combat veterans experiencing PTSD. Lastly, the current literature in the field of physical activity and its association with PTSD symptoms is discussed.

Post-Traumatic Stress Disorder

According to the American Psychiatric Association, Post-Traumatic Stress Disorder is an anxiety problem stemming from a traumatic event such as a natural disaster, an accident, sexual assault, or combat related incident (Lurigio, 2015). Approximately 8.3% of the US population will experience prolonged symptoms related to PTSD in their lifetime (Kilpatrick et al., 2013). According to the Diagnosis and Statistical Manual of Mental Disorders (DSM-5), long-term PTSD is diagnosed when any PTSD symptom continues for more than 12-months (Lurigio, 2015). Though less than 10% of the total population of the USA will have long-term PTSD symptoms, another portion of the population will experience PTSD for shorter durations. In the DSM-5, short-term PTSD is defined as any symptom continuing for less than 12 months.

Approximately 8.5% of individuals in the U.S. are categorized as having short-term PTSD (Lurigio, 2015).

Regardless of classification (short- or long-term), PTSD symptoms can worsen to the level of being debilitating for an individual (Priebe et al., 2009). This progression has been observed in military personnel, where level of severity is tracked. The levels of PTSD and their disability percentages as defined by the VA are presented in Table 1. These classification are used to monitor progression of the disorder to track the number of veterans with the condition.

Table 1

VA PTSD Rating Scale

Definition	Percent Disabled
Total occupational and social impairment, due to such symptoms as: Gross impairment in thought processes or communication; persistent delusions or hallucinations; grossly inappropriate behavior; persistent danger of hurting self or others; intermittent inability to perform activities of daily; disorientation to time or place; memory loss for names of close relatives, own occupation, or own name	100
Occupational and social impairment, with deficiencies in most areas, such as work, school, family relations, judgment, thinking, or mood, due to such symptoms as: suicidal ideation; obsessional rituals which interfere with routine activities; speech intermittently illogical, obscure, or irrelevant; near-continuous panic or depression affecting the ability to function independently, appropriately and effectively; impaired impulse control; spatial disorientation; neglect of personal appearance and hygiene; difficulty in adapting to stressful circumstances; inability to establish and maintain effective relationships	70
Occupational and social impairment with reduced reliability and productivity due to such symptoms as: flattened affect; circumstantial, circumlocutory, or stereotyped speech; panic attacks more than once a week; difficulty in understanding complex commands; impairment of short- and long-term memory; impaired judgment; impaired abstract thinking; disturbances of motivation and mood; difficulty in establishing and maintaining effective work and social relationships	50
Occupational and social impairment with occasional decrease in work efficiency and intermittent periods of inability to perform occupational tasks, due to such symptoms as: depressed mood, anxiety, suspiciousness, panic attacks, chronic sleep impairment, mild memory loss	30
Occupational and social impairment due to mild or transient symptoms which decrease work efficiency and ability to perform occupational tasks only during periods of significant stress, or; symptoms controlled by continuous medication	10
A mental condition has been formally diagnosed, but symptoms are not severe enough either to interfere with occupational and social functioning or to require continuous medication	0

Note. VA = Department of Veteran's Affairs; PTSD = Posttraumatic Stress Disorder.

PTSD in Military Personnel

The high occurrence of PTSD in veterans may be related to the traditionally high-tempo training regimen and a lifestyle that exposes them to greater risk of events that could lead to PTSD, compared to the civilian population. Thus, a population specific measure, the PTSD Checklist DSM - 5 (PCL-5), is used to aid in the diagnoses of PTSD among veterans. Those with an even greater training tempo than the majority of veterans in the military are those within the combat arms spectrum. Infantry, and those with jobs that put them directly in the line of fire on the front line of the battlefield, are considered combat arms positions. A veteran with the military operational specialty (MOS) of an infantryman can have his or her training and deployments broken into three phases.

The first phase is training in preparation for deployment. The regimen can consist of amphibious assault tactics, air assault/rescue tactics, tactics pertaining to specific area of operation, peacetime tactics, or, more typically, a combination of these tactics. This phase can last 3 months to 12 months, depending on current events around the globe. During this phase, it is not unusual for veterans to remain away from home the majority of the time they are not currently deployed.

The second phase is the deployment phase where veterans will be conducting their missions around the globe. This can range from a quick reaction force that is standing by for conflict, to being deployed into a combat zone on the front lines engaging enemy forces. Even during peacetime, a veteran can be deployed for disaster relief that can have a component of active threats. These deployments require a fighting force to be ever-present and the current unit will be unable to return home until an additional unit

properly relieves them. This phase can range anywhere from 6 months to an indefinite period due to the requirement of having a unit present at all times.

The final phase in an infantry unit's regimen is the rest and refit phase that traditionally lasts 2-3 months upon returning home. This phase is also seen in the first phase and can be designated as an administrative stand-down. The administrative stand-down is where no training is allowed to occur and is used to rest and refit the veterans so the unit can be prepared for the next major training evolution. This phase is important for the infantry unit as it is a time to cycle the veterans that are leaving the unit out and replenish unfilled ranks in preparation for a new training portion. During the training portion, this administrative stand-down is used to give momentary rest to the veterans and to fulfill any medical/logistical need for the veteran. Due to this fast-paced routine consisting of the three phases, it is common for a veteran with a standard 4 year contract in an infantry job to be away from home for 3 or more years.

Many military members will deploy multiple times throughout their careers for prolonged periods. During these deployments, they may encounter stressful situations that cannot be avoided such as combat, disaster relief, problems with other military members, and/or issues with family back home. These situations, by themselves, could cause temporary PTSD symptoms for a civilian population, which would clear up over time with proper medical care; however, being in an unfamiliar environment and having to be away from loved ones for extended periods can cause these issues to linger and go unresolved for a much greater amount of time. This extended time has an exponential effect on stress and may result in long-term PTSD (Priebe et al., 2009).

The cumulative effect of stressors experienced by military personnel, places all veterans at increased risk for developing PTSD. Veterans, regardless of occupation, are twice as likely to experience PTSD symptoms in their lifetimes when compared to civilians (Davidson, Babson, Bonn-Miller, Souter, & Vannoy, 2013). Furthermore, the rate of PTSD in veterans who are directly exposed to combat is even greater. In the most recent Gulf War campaigns, Iraq and Afghanistan, the PTSD rate, subthreshold and clinical, in combat veterans directly exposed to combat was approximately 44% (Lapierre, Schwegler, & LaBauve, 2007). Many combat veterans will undergo multiple traumatic events within a short time period with little to no time to decompress. These events, compounded with the traditional issues of deployment (i.e. distance from family and friends), magnifies issues related to PTSD. Though the effects of PTSD can be debilitating, the comorbidities that are associated with PTSD can be problematic as well.

In a study at the University of Split Hospital and School of Medicine in Croatia, researchers examined the comorbidities of veterans with PTSD (Priebe et al., 2009). Their research showed that, 15 years after the war of 1991-1995 in Croatia, combat veterans diagnosed with PTSD demonstrated a significant increase in risk for cardiovascular, pulmonary, dermatological, and metabolic diseases. A major predictor of these comorbidities was the length of time spent in a combat zone. When adjusted for confounding factors such as age, education, work experience, and marital status, the adjusted odds ratio remained significant for all comorbidities. Individuals with PTSD were four times more likely to be diagnosed with a neurological disease. They were twice as likely to be diagnosed with diseases affecting the musculoskeletal system which allows movement. They were also twice as likely to sustain dermatological diseases, and 1.4

times more likely to be diagnosed with cardiovascular and metabolic diseases. In addition to the increased risk of comorbidities from PTSD severity, there was an increased mortality risk, primarily a result of suicide (Priebe et al., 2009). The likelihood of a combat veteran committing suicide is increased when compared to a civilian population.

Suicides in Veterans

While there are several comorbidities to PTSD in combat veterans, suicide has attracted the most attention via the media. OEF and OIF veterans with PTSD were nearly 5.7 times more likely to attempt suicide when compared to civilian counterparts (Jakupcak et al., 2009). This statistic is representative of veterans with PTSD and one additional comorbidity. Jakupcak et al. also found that most PTSD veterans have multiple comorbidities associated with PTSD and the likelihood of attempted suicide increased exponentially with each additional diagnosis.

The VA office of Suicide Prevention (2017) conducted a meta-analysis of varying suicide statistics within veteran and civilian populations. The analysis reported that while veterans make up only 8% of the population, 20 suicides occur within this sub-population each day. When considering that there are 92 civilian suicides per day, this means that 8% of the population accounts for nearly 20% of daily suicides in the USA (U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention, 2017). In addition, according to the Chief of Infantry and Commandant of U.S. Army Infantry School Brigadier General Bryan Owens, only about 15% of the veteran population have combat positions (Molinaro, 2010). Of this 15%, the VA recognizes that about 15% of the veterans that were exposed to direct combat in OEF and OIF demonstrate clinical levels of PTSD symptoms (Lapierre et al., 2007). Because PTSD has been acknowledged

by the VA to be one of the leading comorbidities associated with suicide attempts and/or ideations, it is reasonable to assume that the majority of suicides in a veteran population come from some manifestation of PTSD (Hudenko et al., 2018). When these percentages are pieced together, it appears 20% of all suicides may be related to veterans with PTSD who make up .18% of the population (see Figure 1). This suggests that reducing the severity and frequency of PTSD in combat veterans with PTSD could substantially reduce the number of suicides per day in the USA. Not only would this have an impact on the veterans' wellbeing, it would also have a positive economic effect on the USA.

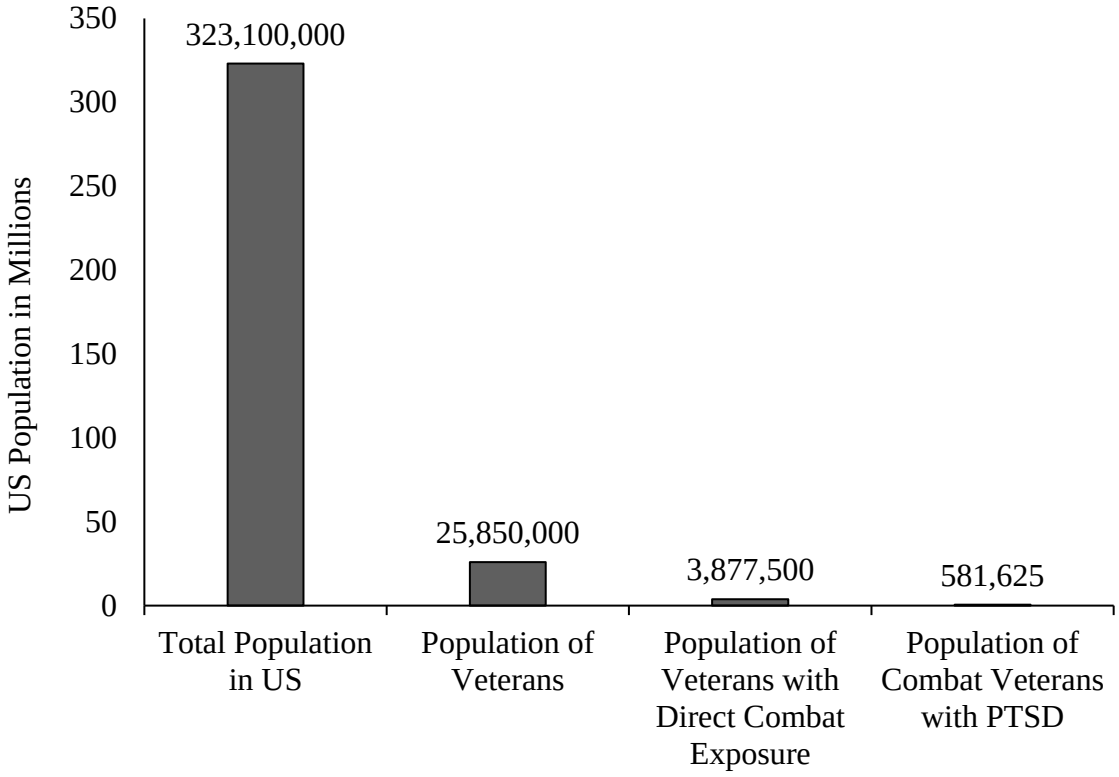

Figure 1. Suicides in USA, 20% of all suicides may be related to combat veterans with PTSD, who make up 0.18% of the population.

Economic Impact of Veterans with PTSD

In addition to comorbidities, there are financial ramifications associated with the growing combat veteran population with PTSD. In 2016, the cost to the VA treating those with PTSD amounted to over 2 billion dollars in the first year of medical expenses (Reisman, 2016). According to the VA, PTSD is the third most compensated disability for veterans (Bass & Golding 2012). However, even with the potential for monetary compensation, the stigma associated with PTSD causes many veterans to avoid treatment, thereby underestimating the actual cost of PTSD for the VA. The not-for-profit organization, Blue Star Families, conducted a survey in 2010 showing that 60% of veterans exhibiting symptoms of PTSD did not seek medical treatment (Shiffer et al., 2017). This could potentially cause veterans with PTSD to seek treatment for the comorbidities of PTSD, without treating the primary issue, which, in turn, could cost the VA needless expenditures. It is estimated that the medical cost for treating veterans with PTSD is 3.5 times higher than those without PTSD (Reisman, 2016). This inflated cost is tied to treating PTSD comorbidities and is unrelated to the additional costs associated with suicide.

Suicides in the USA cost an average of 93.5 billion dollars annually (Shepard, Gurewich, Lwin, Reed, & Silverman, 2016). Approximately 97% of the cost is attributed to indirect costs that are termed lost productivity (Shepard et al., 2016). This puts the average cost to the USA for veteran suicides at nearly 19 billion dollars annually. Again, the combat veteran with PTSD makes up the vast majority of this cost. In order to reduce the cost of suicides from PTSD, the diagnosis and treatment options must first be identified and improved.

Current Diagnosis and Treatment Options for PTSD

Often, it is a veteran's family or coworkers that notice changes in behavior before the veteran. It is not uncommon for a spouse to either let the veteran know something has changed or contact the veteran's chain of command in order to start the process of diagnosis and rehabilitation. Unfortunately, by the time that many of these problems are addressed, the veteran's medical stand-down within the battalion's training routine may have passed and it becomes difficult to seek treatment. Though most chain of commands will tell veterans to seek help if they have problems, doing so could cause issues with the veteran's promotion time and reliability within the unit. Many veterans will opt to avoid issues in order to prevent disrupting the training regimen and symptoms, therefore, may progress.

In order to track PTSD so that a formal diagnosis of PTSD can be made, the Department of Defense (DOD) uses four separate evaluation forms pre-, between, post-deployment, and another post-deployment that waits a minimum of 545 days before completion (Committee of the Assessment of Ongoing Efforts in the Treatment of Posttraumatic Stress Disorder [CAOETPSD], 2012). The DD-2795 Pre-Deployment Health Assessment is designed to assess the mental state of the veteran and the physical health of the individual just prior to deployment. This is the only form used to determine whether a veteran is deployable or non-deployable. One issue with this is that the veteran is inclined to lie on this document due to the possibility of affecting his/her unit's combat readiness. The other problem is that if this is the first deployment for the veteran then it will take an entire training cycle post-deployment for a medical examiner to determine if there are underlying issues (CAOETPSD, 2012).

The second document is the DD-2796 Post-Deployment Health Assessment completed immediately following the return home from a deployment (CAOETPSD, 2012). This document is compared to the first document in order to determine any change from baseline. Because PTSD progresses overtime, many of the symptoms the veteran will exhibit post-combat could still be sub-clinical at this point. A concern with this method is that once a veteran returns home from a combat deployment there is little thought given to his or her health because he or she is now seeing friends and family for the first time in over a year. Many veterans might forego seeking help because they would rather decompress and relax after the stresses of the training routine and deployment. This can be more of an issue if the veteran does not have a strong support group at home and symptoms that are present could go unnoticed (CAOETPSD, 2012)

The DD-2900 Post Deployment Re-Assessment (PDHRA) is the third document and is completed 90-180 days after the veteran's return from a deployment (CAOETPSD, 2012). This document covers much of the same content as the DD-2976 and is used to determine further deviation from the veteran's baseline. A common issue with this and other documents, aside from the DD-2795, is that the medical examiner has little to no ability to intervene if there is a problem with the veteran. The examiner is only able to write referrals and give the veteran recommendations to seek help. Unless the veteran states that he/she may harm him, herself, or others, there is no immediate action taken to prevent possible problems (CAOETPSD, 2012).

The last document is the DD 2978 Deployed Mental Health Assessment (DMHA). This document is filled out twice, post-deployment between 181-545 days and between 545-910 days. A concern with this document is that it is aimed at veterans that

deploy less frequently and are present to complete the form. Most combat-arms veterans deploy at a higher frequency than this document allows time for. It is not uncommon for combat arms veterans to deploy 3-4 times within a 5-6 year period, even during peacetime operations. This renders the document ineffective at assessing the mental state of veterans that may be exhibiting PTSD symptoms from multiple deployments within a short time frame (CAOETPSD, 2012).

If the combat veteran is diagnosed with PTSD while he or she is still active duty, the typical pipeline treatment plan is to have the person meet with a therapist as regularly as possible (CAOETPSD, 2012). As stated above, this is unlikely, as this means either the individual will no longer be training with his or her unit since the training regime is time consuming or they will forego the treatment plan. This can compound the issues for the veteran.

If the combat veteran is no longer active duty and has a diagnosis of PTSD, the treatment plan is manageable. Typically, upon discharge from active duty, the veteran will have a series of tests run for any complaints about injuries he or she may have sustained during his or her time in service. The issue here is that the veteran does not always recognize that there is an issue to be examined in terms of PTSD. Many times symptoms can go unnoticed for an extended period. If the veteran makes a complaint of symptoms related to PTSD, then a full evaluation is conducted and the process of therapy and/or medication can begin.

Complicating the diagnosis of PTSD, is the similarity it shares with traumatic brain injury (TBI), which is a common injury for combat veterans. Like PTSD, TBI has varying levels of severity (McKee &Robinson, 2014). The most common injury is a mild

TBI (mTBI; McKee &Robinson 2014). A mTBI is defined by the VA as any external force that results in the loss of consciousness, any loss or decrease in mental function as a result of the force, and/or any loss of memory immediately before or after the onset of said force. The National Center for PTSD (2015) estimates that approximately 22% of Afghanistan combat casualties have a mTBI, while combat casualties from the same injury during the Vietnam War were only 12%. The National Center for PTSD also estimates that between 60-80% of veterans from the Afghanistan War with other blast injuries may also have a mTBI that is undiagnosed (PTSD: National Center for PTSD, 2015).

The symptoms of mTBI are similar to the symptoms of PTSD and may be indistinguishable; however, the treatment plans for these injuries are different from one another (Bass, & Golding, 2012). Currently, the VA has no testing procedure to differentiate between the two injuries and the VA will many times classify the veteran's condition as "PTSD with TBI symptoms." This blanket diagnosis can cause issues with the treatment plan as each issue has its own unique treatment pipeline (Bass & Golding, 2012). Because there are no current methods for diagnosing and treating a veteran with PTSD and mTBI symptoms, there is a need for a universal treatment plan that can benefit veterans with either of these conditions. In recent years, exercise and physical activity have been shown to be a viable avenue of approach for treating both of these conditions, as they relate to mental illness.

Current Literature in Treating PTSD with Physical activity and Exercise

Physical activity has been shown to have positive effects in those experiencing PTSD (Diaz & Motta, 2008). Diaz and Motta conducted a nonrandomized study with 12

female adolescents with varying levels of PTSD symptoms. This pilot study showed 91% of the adolescents had reduced PTSD symptomology following a basic walking program at a moderate intensity. Rosenbaum et al (2011) also demonstrated positive effects of exercise on PTSD symptoms. The study involved 81 patients who were exhibiting PTSD symptoms and undergoing usual care consisting of therapy sessions and pharmaceutical interventions. The researchers separated the 81 patients by groups of usual care with no exercise and usual care with exercise. After a 12 week resistance training and walking program, the patients performing the exercise program showed significant improvements in depressive symptoms, sleep quality, and reduced PTSD symptoms (Rosenbaum et al., 2011).

The American Association of Suicidology, analyzed the effects of anaerobic and aerobic exercise on suicidal ideations. Exercise had a clear effect on self-efficacy and improvement of overall well-being, which could affect the major comorbidities associated with suicide, i.e.; major depressive disorder, PTSD, and sleep quality (Davidson et al., 2013). Another study conducted by De Moor in 2006 showed those that exercised at 4 METs or more for at least 60 minutes per week were on average less depressed, neurotic, and anxious than non-exercisers (De Moor et al., 2006). Depression, neuroticism, and anxiety were all measured using the short version of the Beck's Depression Inventory. These conditions have been demonstrated to be directly associated with those who suffer from PTSD, which, as stated earlier, is the leading comorbidity associated with suicidal ideations.

One study conducted by Manger and Motta in 2005 looked into the effects of an aerobic exercise program on 26 participants who, at the very least, had mild PTSD

symptoms. This protocol had participant warm-up for 5 minutes on a stationary bicycle followed by a 5 minute stretching protocol. The exercise protocol was 30 minutes of jogging on a treadmill at moderate intensity with a 10 minute cool down immediately after. Each participant underwent 2-3 sessions per week for 10 weeks. Assessment measures for their PTSD symptoms were taken at the beginning baseline, end of baseline, end of exercise intervention, and follow-up. The Posttraumatic Diagnostic Scale (PDS) showed a significant reduction in PTSD symptomology between beginning baseline scores and end of exercise intervention scores. There was also a significant decrease in PTSD symptomology when comparing beginning baseline score and the 1 month follow-up score (Manger, & Motta, 2005). This study shows a prolonged period of benefits for a civilian population exhibiting PTSD even after the discontinuation of exercise. The study also utilized local YMCAs in order to administer the exercise protocol. This ease of administration is an important factor when considering those suffering from PTSD, as it is both cost and time efficient.

An important quality of physical activity programs is that it requires little to no cost to the facility administering the protocol and it is easy for individuals to conduct on their own. Whereas medication and therapy sessions can be difficult to adhere to for time and cost reasons, physical activity can be given in 30 minute bouts that has been shown to have positive effects on PTSD symptoms (Rosenbaum, Sherrington, & Tiedemann, 2015). This possible avenue for rehabilitation is still underdeveloped and needs further validation within a veteran specific population (Davidson et al., 2013).

Overall Summary.

The current literature shows that PTSD is an ever-present mental health issue within the USA. Veteran populations have been shown to have an increased risk for exposure to PTSD symptoms within their lifetimes. The veterans at greatest risk for this mental health disorder are those exposed to combat situations. As stated earlier, PTSD is one of the leading comorbidities found in attempted and completed suicides. This increased likelihood for suicidal ideations is not just a problem for the veteran and their families, but also an economic burden for the USA. As demonstrated by the VA, the current treatment options for PTSD lack a strong enough effect to decrease symptomology of PTSD and thereby decrease suicide rates. Current literature in the field of exercise as a means of prevention shows great promise; however, the area of study is in a nascent stage. Therefore, the purpose of this study is to explore the association between physical activity and PTSD symptomology in veterans.

CHAPTER III
METHODS

Participants

Military veterans were included in the study (males = 74, females = 4; mean age = 31.8, SD = 7.8). Participants qualified for inclusion in the study if they served in the military, active or reserve, for a period of at least one complete contract (2-8 years). This study was approved by the university Institutional Review Board (see Appendix A). Participants were informed of the benefits and risks of the investigation prior to accepting the informed consent document.

Instrumentation

Participants completed a 31-question survey, which included a demographics section, a PCL-5 section, and the IPAQ.

Questionnaires

The demographics section included 4 questions including age, sex, branch of service, and whether or not the individual was active or inactive duty. The demographic questions were screened by co-investigators, for readability and content. This section was used strictly for descriptive purposes.

The PCL-5 was used to quantify PTSD symptoms currently being experienced due to military service. The use of the PCL-5 with veterans in diagnosing PTSD symptoms has been validated by the Journal of Traumatic Stress (Blevins, Weathers, Davis, Witte, & Domino, 2015). This questionnaire consisted of 20 items on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). A total PTSD score was the sum

of ratings for each item (Blevins et al., 2015). A higher score on the PCL-5 indicated a higher level of PTSD whereas a lower score would indicate a lower level of PTSD.

The final section was the IPAQ (short form), which has been validated and recommended as a cost-effective means to determine physical activity in a large population (Lee, Macfarlane, Lam, & Stewart, 2011). The IPAQ determined, on a weekly basis, the participants total METs, type of physical activity/exercise, frequency of physical activity/exercise, intensity of physical activity/exercise, and level of sedentariness. Scores were calculated using the IPAQ excel spreadsheet. Individual item scores were used to determine a participant's quantity of vigorous physical activity, moderate physical activity, and sedentary time per week.

Groups were formed depending on their level of activity. Low intensity participants were grouped together as well as moderate to high intensity participants were grouped together. These designations are based on the algorithms used within the IPAQ survey.

Procedures

Recruitment of veterans was accomplished via word of mouth and Facebook. Potential participants who were recruited via word of mouth received a link via email, which contained a brief statement on the purpose of the study, eligibility requirements to participate, and the potential benefits for themselves and other veterans. The email also contained a link directing the participant to a secure website (Qualtrics, Provo, Utah). If the participant was recruited via social media, a brief statement was given in the message posted and eligibility requirements for participation in the study followed by the link to the website. Once the participant reached the secure website, they were provided with an

informed consent, which included the purpose of the study, and potential risks and benefits to the study. Data collection occurred from 6/4/18 – 6/6/18. At the end of the data collection period, the Qualtrics survey was closed.

Statistical Analysis

The International Business Machines Corporation Statistical Packages of the Social Sciences (version 23.0; SPSS Inc., Chicago IL) software was utilized to conduct data analysis. A one-way between subjects analysis of covariance (ANCOVA) was calculated to examine the effect of low intensity activity and moderate to high intensity activity on symptoms of PTSD while controlling for sedentary time. A Pearson's Correlation coefficients was calculated to explore the relationship between PTSD symptoms and MET×min/week. A multiple linear regression was used to predict the intensity of PTSD symptoms (as determined by the PCL-5 value) in relation to the amount of moderate and vigorous physical activity when controlling for sedentary time. The α level was set at .05 for all analyses.

CHAPTER IV

RESULTS

A mean value for PCL-5 and physical activity can be found in Table 2. A one-way between subjects ANCOVA was calculated to examine the effect of low intensity activity and moderate to high intensity activity on symptoms of PTSD while controlling for sedentary time. The main effect for both low intensity activity to moderate to high intensity activity was not significant, when covarying for the effect of sedentary time $F(2,65) = .86$, $p = .43$. This indicates that low intensity activity and moderate to high intensity activity has no significant effect on the symptoms of PTSD when controlling for sedentary time (See Figure 2).

A correlation coefficient was calculated to explore the relationship between PTSD symptoms and MET×min/week. There was a moderate inverse relationship that was significant ($r = -.26$, $p = .02$) (See Figure 3). This suggests that as METS per week increase, symptoms of PTSD decrease. The coefficient of determination ($R^2 = .09$), implying that 9% of the variation in PTSD symptoms can be accounted for by variation in MET×min/week.

A multiple linear regression was calculated predicting participants' PTSD symptoms based on MET×min/week when engaging in low intensity activity and moderate to high intensity activity when controlling for sedentary time. The regression equation was not significant ($R = .27$, $p = .094$). Neither low intensity activity nor moderate to high intensity activity were a significant predictor of PTSD symptoms when controlling for sedentary time.

Table 2

Descriptive Statistics

		N	Mean	*SD*
PCL-5 Score	Moderate and High Intensity Group	58	31	20
	Low Intensity Group	20	40	17
Level of Physical Activity (METxMin/week)	Moderate and High Intensity Group	58	5325	3375
	Low Intensity Group	20	517	929

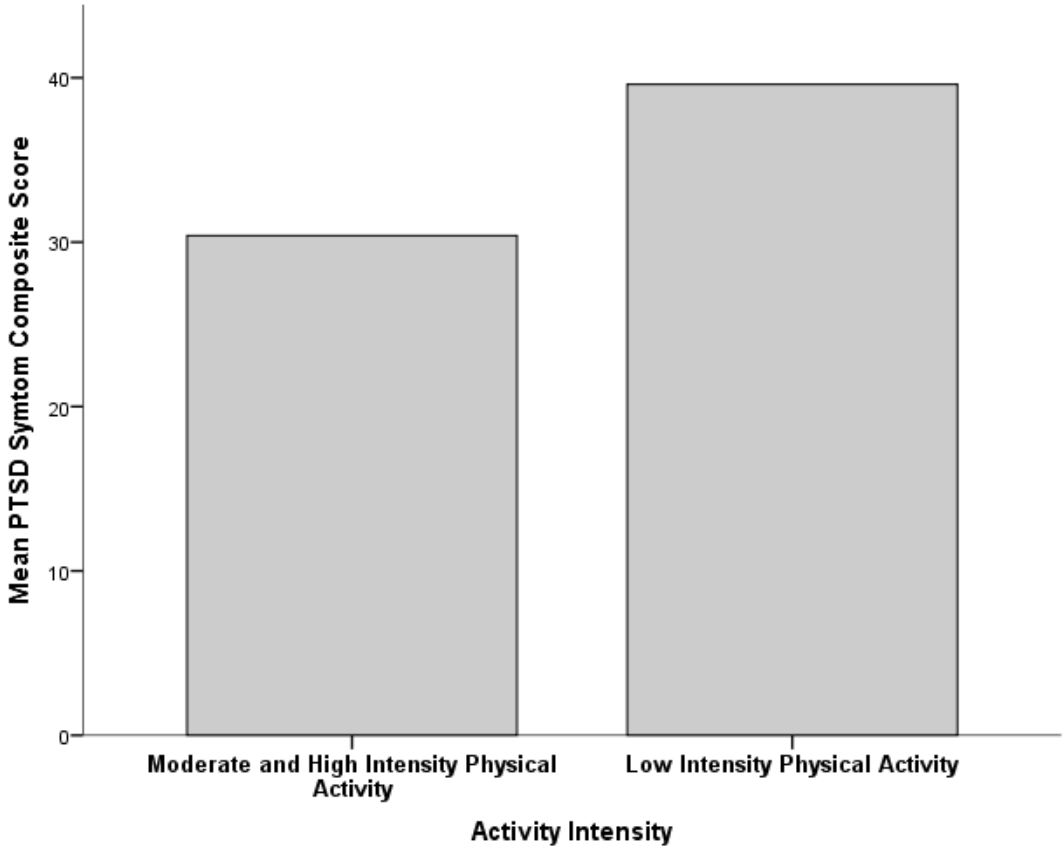

Figure 2. Type of intensity when compared to total composite PTSD score.

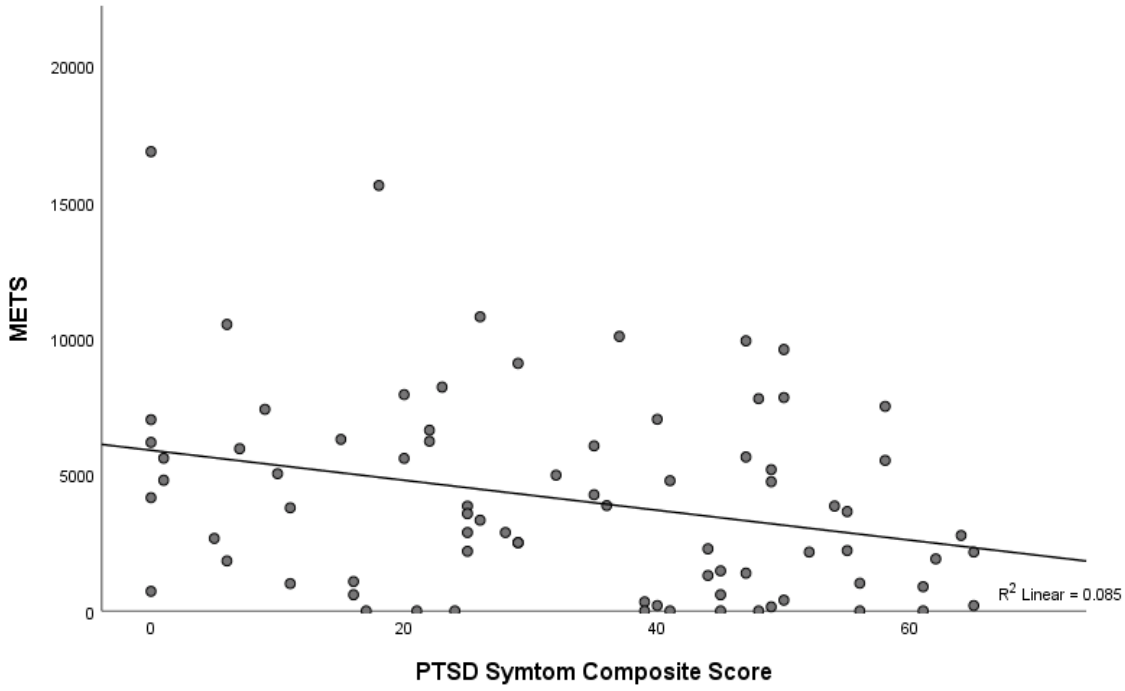

Figure 3. The relationship between physical activity (METxmin/week) when compared to PTSD symptoms

CHAPTER V

DISCUSSION

The purpose of this study was to explore the association between physical activity and PTSD symptomology in veterans. It was hypothesized that a higher level of physical activity would be associated with lower PTSD symptomology when controlling for sedentary time. In addition, it was hypothesized that when controlling for sedentary time, moderate and vigorous physical activity would be associated with less PTSD symptoms. However, data yielded no significant findings, indicating neither hypotheses were supported. However, when calculating the correlation coefficient assessing the relationship between PTSD symptomology and physical activity (MET × min⁄week), there was a statistically significant relationship (r = -.26, p = *.02)*. In addition, 9% of the variation in PTSD symptomology was explained by variation in the amount of physical activity (R^2 = .09). This 9% variation translates to 5.6 points on the PCL-5. This is important to note as the VA has determined that a 5 point deviation from baseline is an indicator of the minimum amount necessary to determine that there was a change caused by treatment for the PTSD symptoms (PTSD: National Center for PTSD, 2017). This finding is also notable in that it highlights a potential drug-free means to reduce symptoms related to PTSD.

While many current treatment options are available, few have been tested for their effectiveness. Both Zoloft and Paxil are approved by the Federal Drug Administration for the use in treating combat related PTSD; however, neither of these two drugs have been shown to be effective in treating these particular ailments (Castro, 2014). While a 9% difference through physical activity may seem to be a modest change in the baseline for

PTSD symptoms, it could be the difference in clinical and subclinical levels of PTSD in veterans. It would also be another possible way to avoid overprescribing to those veterans already on multiple medications due to the comorbidities associated with PTSD.

The primary strength of this study was that it investigated previously unexplored relationships. Due to its novelty, this research provides a strong starting point for future intervention studies in physical activity and veterans who have PTSD symptoms. Unfortunately, its strength can also be viewed as one of its weaknesses. Due to the lack of prior research, there were no set methods for measuring physical activity in this population. Using the IPAQ allowed for potential participant reporting error. The METxmin/week range reported for the data was inconsistent with typically observed METxmin/week in most populations. A separate issue was the lack of variability among the participants. Over 90% of participants were Marine Corps veterans who deployed 2-3 times. Marine Corps veterans make up less than 10% of the total veteran population (National Center for Veterans Analysis and Statistics, 2017). This indicates that there was an unintentional targeting of a subgroup of the veteran population. Also, only 4 females participated in the study. Out of the veteran population, 10% are made up of female veterans (National Center for Veterans Analysis and Statistics, 2017). This underrepresentation of female veterans in the study could also have skewed the results.

While multiple wars are waged in various theaters across the globe, the obligation for tending to the wounds sustained by these wars, both physical and mental, falls on the American citizens. While numbers of PTSD cases within the veteran population rise, research in this field has been proportionately stagnant. The need for new and effective means to treat these veterans of foreign wars cannot be overstated. This study represents

a possible avenue to explore in order to afford every opportunity to the veterans of foreign wars and conflicts.

REFERENCES

Bass, E., & Golding, H. (2012). The Veterans Health Administration's treatment of PTSD and traumatic brain injury among recent combat veterans. [electronic resource]. [Washington, DC]: Congress of the United States, Congressional Budget Office, [2012].

Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5): development and initial psychometric evaluation. *Journal of Traumatic Stress, 28(6),* 489-498. doi:10.1002/jts.22059

Castro, C.A. (2014). The US framework for understanding, preventing, and caring for the mental health needs of service members who served in combat in Afghanistan and Iraq: A brief review of the issues and the research. *European Journal of Psychotraumatology, 5*, 1-12 doi:10.3402/ ejpt.v5.24713

Committee of the Assessment of Ongoing Efforts in the Treatment of Posttraumatic Stress Disorder Treatment for posttraumatic stress disorder in military and veteran populations. [electronic resource] : initial assessment. (2012). Washington, D.C.: National Academies Press, c2012.

Davidson, C. L., Babson, K. A., Bonn-Miller, M. O., Souter, T., & Vannoy, S. (2013). The impact of exercise on suicide risk: Examining pathways through depression, PTSD, and sleep in an inpatient sample of veterans. *Suicide and Life-Threatening Behavior*, *43*(3), 279-289. doi:10.1111/sltb.12014

De Moor, M. H., Beem, A. L., Stubbe, J. H., Boomsma, D. I., & De Geus, E. J. (2006). Regular exercise, anxiety, depression and personality: A population-based study. *Preventative Medicine*, *4*, 273.

Diaz, A., & Motta, R. (2008). The effects of an aerobic exercise program on posttraumatic stress disorder symptom severity in adolescents. *International Journal of Emergency Mental Health*, *1*, 49.

Hudenko W., Homaifar B., & Wortzel H. (2018, January 29). The relationship between PTSD and suicide. Retrieved from https://www.ptsd.va.gov/professional/co-occurring/ptsd-suicide.asp

Jakupcak M, Cook J, Imel Z, Fontana A, Rosenheck R, McFall M. Posttraumatic Stress Disorder as a risk factor for suicidal ideation in Iraq and Afghanistan War Veterans. *Journal of Traumatic Stress*, *22*, 303–306

Kilpatrick, D. G., Resnick, H. S., Milanak, M. E., Miller, M. W., Keyes, K. M. & Friedman, M. J. (2013). National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. *Journal of Traumatic Stress*, *26*, 537–547. doi:10.1002/jts.21848

Lapierre, C. B., Schwegler, A. F. & LaBauve, B. J. (2007). Posttraumatic stress and depression symptoms in soldiers returning from combat operations in Iraq and Afghanistan. *J. Traum. Stress*, *20*, 933–943. doi:10.1002/jts.20278

Lee, P. H., Macfarlane, D. J., Lam, T. H., & Stewart, S. M. (2011). Validity of the International Physical Activity Questionnaire Short Form (IPAQ-SF): A systematic review. *The International Journal of Behavioral Nutrition and Physical Activity*, *8*, 115. doi:10.1186/1479-5868-8-115

Lurigio, A. J. (2015). DSM-5. Salem Press Encyclopedia Of Health

Manger, T. A., & Motta, R. W. (2005). The impact of an exercise program on posttraumatic stress disorder, anxiety, and depression. *International Journal of Emergency Mental Health, 7(1),* 49-57.

McKee, A. C., & Robinson, M. E. (2014). Military-related traumatic brain injury and neurodegeneration. Alzheimer's & Dementia: *The Journal of the Alzheimer's Association, 10(3),* 242–S253.

Molinaro, K. (2010, September). Infantry leaders sharpen training tactics to meet battlefield demands. *The Bayonet.* Retrieved from https://www.army.mil/article /45200/infantry_leaders_sharpen_training_tactics_to_meet_battlefield_demands

National Center for Veterans Analysis and Statistics. (2017, July 20). Retrieved from www.va.gov/VETDATA/docs/SurveysAndStudies/MILITARY.

Priebe, S., Matanov, A., Gavrilović, J. J., Mccrone, P., Ljubotina, D., Knežević, G., & Schützwohl, M. (2009). Consequences of untreated posttraumatic stress disorder following war in former Yugoslavia: Morbidity, subjective quality of life, and care costs. *Croatian Medical Journal, 50(5),* 465-475. doi:10.3325/ cmj.2009.50.465

PTSD: National Center for PTSD. (2015, August 13). Traumatic Brain Injury and PTSD. Washington, D.C.: National Academies Press, c2012.

PTSD: National Center for PTSD. (2010, July 27). Negative Coping and PTSD - PTSD: National Center for PTSD. Retrieved from www.ptsd.va.gov/professional/treatment/overview/overview-treatment-research.asp.

PTSD: National Center for PTSD. (2017, May 11). Negative Coping and PTSD - PTSD: National Center for PTSD. Retrieved from www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp.

Reisman, M. (2016). PTSD treatment for veterans: What's working, what's new, and what's next. *P & T, 41(10),* 623-634.

Rosenbaum, S., Nguyen, D., Lenehan, T., Tiedemann, A., van der Ploeg, H. P., & Sherrington, C. (2011). Exercise augmentation compared to usual care for post-traumatic stress disorder: A randomized controlled trial (the REAP study: Randomized Exercise Augmentation for PTSD). *BMC Psychiatry, 11*, 115. doi:10.1186/1471-244X-11-115

Rosenbaum, S., Vancampfort, D., Steel, Z., Newby, J., Ward, P. B., & Stubbs, B. (2015). Physical activity in the treatment of post-traumatic stress disorder: A systematic review and meta-analysis. *Psychiatry Research, 230,* 130-136. doi:10.1016/ j.psychres.2015.10.017

Shepard D. S., Gurewich D., Lwin A. K., Reed G. J., & Silverman M. M. (2016). Suicide and suicidal attempts in the United States: costs and policy implications. *Suicide & Life-Threatening Behavior, 46(3),* 352-362. doi:10.1111/sltb.12225

Shiffer C. O., Maury R. V., Sonethavilay H., Hurwitz J. L., Lee H. C., Linsner R. K., & Mehta M. S. (2017). Military family lifestyle survey. Retrieved from https://ivmf.syracuse.edu/wpcontent/uploads/2018/03/Womens_History_Infographic.pdf

U.S. Department of Veterans Affairs Office of Mental Health and Suicide Prevention. (2017, August). Facts about veteran suicide: August 2017. Retrieved from U.S.

Department of Veteran's Affairs online. https://www.mentalhealth.va.gov/docs/VA-Suicide-Prevention-Fact-Sheet.pdf

Appendix A

IRB Approval

IRB

INSTITUTIONAL REVIEW BOARD

Office of Research
Compliance, 010A
Sam Ingram Building,
2269 Middle
Tennessee Blvd
Murfreesboro, TN
37129

IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Monday, June 04, 2018

Principal Investigator	**Corbitt Huseth** (Student)
Faculty Advisor	Sandra Stevens
Co-Investigators	Jenn Caputo and Dana Fuller
Investigator Email(s)	*rch4t@mtmail.mtsu.edu; sandra.stevens@mtsu.edu*
Department	Health and Human Performance
Protocol Title	***The relationship between physical activity and symptoms of post- traumatic stress disorder in veterans***
Protocol ID	**18-2258**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXPEDITED** mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category *(7) Research on individual or group characteristics or behavior* A summary of the IRB action and other particulars in regard to this protocol application is tabulated below:

IRB Action	APPROVED for one year from the date of this notification
Date of expiration	**6/30/2019**
Sample Size	300 (THREE HUNDRED)
Participant Pool	**General Adults (18 years or older) - active/inactive military personnel**
Exceptions	Online consent is permitted
Restrictions	**1. Mandatory active informed consent; the PI must provide each participant with a copy of the informed consent signed by the PI.** **2. Implementation of the proposed inclusion/exclusion criteria is mandatory** **3. No identifiable information must be stored after data analysis.**
Comments	NONE

This protocol can be continued for up to THREE years (**6/30/2021**) by obtaining a continuation approval prior to **6/30/2019**. Refer to the following schedule to plan your annual project reports and be aware that you may not receive a separate reminder to complete your continuing reviews. Failure in obtaining an approval for continuation will automatically result in cancellation of this protocol. Moreover, the completion of this study MUST be notified to the Office of Compliance by filing a final report in order to close-out the protocol.

Continuing Review Schedule:

Reporting Period	Requisition Deadline	IRB Comments
First year report	5/31/2019	NOT COMPLETED
Second year report	5/31/2020	NOT COMPLETED
Final report	5/31/2021	NOT COMPLETED

Post-approval Protocol Amendments:

Only two procedural amendment requests will be entertained per year in addition to changes allowed during continuing review. This amendment restriction does not apply to minor changes such as language usage and addition/removal of research personnel.

Date	Amendment(s)	IRB Comments
NONE	NONE.	NONE

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions imposed with this approval. Refer to the post-approval guidelines posted in the MTSU IRB's website. Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. Amendments to this protocol must be approved by the IRB. Inclusion of new researchers must also be approved by the Office of Compliance before they begin to work on the project.

All of the research-related records, which include signed consent forms, investigator information and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Appendix B
IPAQ

Q01
During the last 7 days, on how many days did you do ***vigorous*** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

Q02
How much time did you usually spend doing ***vigorous*** physical activities on one of those days?

Q03
During the last 7 days, on how many days did you do moderate physical activities like carrying
light loads, bicycling at a regular pace, or doubles tennis?
Do not include walking.

Q04
How much time did you usually spend doing ***moderate*** physical activities on one of those days?

Q05
During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

Q06 How much time did you usually spend walking on one of those days?

Q07 During the last 7 days, how much time did you spend sitting on a week day?

Appendix C

PCL-5

Q01 Repeated, disturbing, and unwanted memories of the stressful experience?

Q02 Repeated, disturbing dreams of the stressful experience?

Q03 Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?

Q04 Feeling very upset when something reminded you of the stressful experience?

Q05 Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?

Q06 Avoiding memories, thoughts, or feelings related to the stressful experience?

Q07 Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?

Q08 Trouble remembering important parts of the stressful experience?

Q09 Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

Q10 Blaming yourself or someone else for the stressful experience or what happened after it?

Q11 Having strong negative feelings such as fear, horror, anger, guilt, or shame?

Q12 Loss of interest in activities that you used to enjoy?

Q13 Feeling distant or cut off from other people?

Q14 Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?

Q15 Irritable behavior, angry outbursts, or acting aggressively?

Q16 Taking too many risks or doing things that could cause you harm?

Q17 Being “superalert” or watchful or on guard?

Q18 Feeling jumpy or easily startled?

Q19 Having difficulty concentrating?

Q20 Trouble falling or staying asleep?