

THE RELATIONSHIP BETWEEN POST TRAUMATIC STRESS AND PHYSICAL
FITNESS AND THE IMPACT OF ARMY FITNESS POLICY ON POST
TRAUMATIC STRESS PREVENTION

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ALLEN D. LETH, JR., MAJOR, USA
M.S., Texas A&M University, College Station, Texas, 2006

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Thesis Title: The Relationship Between Post Traumatic Stress and Physical Fitness and
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Approved by:

_____, Thesis Committee Chair
Ted A. Thomas, Ph.D.

_____, Member
LTC Brian P. Freidhoff, M.S.

_____, Member
MAJ (Chaplain) Steven J. Roberts, MDIV

Accepted this 12th day of June 2009 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

THE RELATIONSHIP BETWEEN POST TRAUMATIC STRESS AND PHYSICAL FITNESS AND THE IMPACT OF ARMY FITNESS POLICY ON POST TRAUMATIC STRESS PREVENTION, by MAJ Allen D. Leth, Jr., 76 pages.

Increases in operation tempo since September 11, 2001 have resulted in elevated rates of post traumatic stress (PTS) and reduced levels of physical fitness across the U.S. Army. This thesis sought to identify a relationship between the elevated PTS and decreased physical fitness as well as determine methods to invert both levels experienced by deployed Soldiers. Soldiers experience PTS symptoms when stress levels are not adequately managed resulting in anxiety. Physical training and exercise provide the parasympathetic response needed following stressful situations and increase Soldier resiliency through physical and mental hardiness. Soldiers located at company and battalion level operating bases are often denied the facilities, time, and training necessary to sustain the physical fitness levels developed in the garrison environment. This situation is compounded by U.S. Army policies that reduce the emphasis on physical training during and after deployments. These decisions by senior U.S. Army leadership have served to, directly or indirectly, reduce the potential for physical training and lowered fitness levels of deployed Soldiers. This thesis recommends modifications to U.S. Army policy, establishment of unit level fitness experts, and increased support to the small unit level operating bases in the form of equipment and funding.

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ACRONYMS

ACSM	American College of Sports Medicine
AER	Academic Efficiency Report
ALARACT	All Army Action Message
APFRI	Army Physical Fitness Readiness Institute
APFT	Army Physical Fitness Test
AR	Army Regulation
CBT	Cognitive Behavioral Therapy
C-METL	Core Mission Essential Task List
COP	Company Outpost
D-METL	Directed Mission Essential Task List
DoD	Department of Defense
EMDR	Eye Movement Desensitization and Reprocessing
FM	Field Manual
FOB	Forward Operating Base
HQDA	Headquarters, Department of the Army
HRR	Heart Rate Reserve
IED	Improvised Explosive Device
MHR	Maximum Heart Rate
MFT	Master Fitness Trainer
MWR	Morale, Welfare, and Recreation
NCOES	Non-Commissioned Officer Education School
OEF	Operation Enduring Freedom
OES	Officer Education School

OIF	Operation Iraqi Freedom
OPTEMPO	Operational Tempo
PTS	Post Traumatic Stress
PTSD	Post Traumatic Stress Disorder
RHR	Resting Heart Rate
RPG	Rocket Propelled Grenade
TRX	Total Resistance Exercise
USAPFS	U.S. Army Physical Fitness School
USASMA	U.S. Army Sergeants Major Academy
VO _{2max}	Maximal Aerobic Capacity
WOES	Warrant Officer Education School

CHAPTER 1

INTRODUCTION

I have been the target of improvised explosive devices (IEDs), small arms, and rocket propelled grenade (RPG) ambushes. Enemy forces have posted bounties on my head and have detonated bombs in buildings with the intent of killing me. I have witnessed the killing of numerous enemy combatants and I have seen U.S. Soldiers wounded and killed. My Soldiers have killed enemy combatants and have been severely wounded all as a result of my orders. Those same Soldiers have been wounded and seen their peers and close friends killed. We have fought through extreme heat for hours on end, carried our wounded to evacuation vehicles only to return and fight for hours more. We have experienced all of these traumatic events in hell-like conditions and have persevered. These circumstances are not uncommon; they are, in fact, the norm for units positioned at battalion forward operating bases (FOBs) and company outposts (COPs) which are becoming more and more common throughout Afghanistan and Iraq. These scenarios are also precisely the events that trigger post traumatic stress. The U.S. Army has identified this fact and has devoted numerous hours of manpower and millions of dollars to resolve these symptoms upon redeployment by deployed combat units. Unfortunately, limited effort has been consciously devoted to the prevention of these symptoms.

The U.S. Army averages 11 percent and 18 percent of all returning Soldiers from Afghanistan and Iraq respectively with post traumatic stress symptoms (Litz 2007, 1). Why is the focus on these symptoms delayed until Soldiers are returning from exposure to the experiences that trigger these symptoms? What efforts can be made prior to

deployment that may enable Soldiers to endure the challenges of combat without the additional suffering of symptoms associated with post traumatic stress? This thesis will search for these answers by analyzing the most readily available stress reliever accessible to Soldiers during their deployments: regular physical exercise.

The company described in the previous setting, Bravo Company, 1st Battalion 27th Infantry Regiment, placed great amounts of command emphasis on physical training (PT) at the squad level throughout its deployment in support of Operation Iraqi Freedom (OIF). Every day that Bravo Company Soldiers had access to FOB facilities, they were required to conduct a minimum of 45 minutes of PT. The command of Bravo Company coordinated for one day during each month of their 13 month deployment that the company could come together as a unit and conduct some type of athletic competition. This company did not see reductions in fitness levels, rather, many of the Soldiers improved fitness levels during the deployment as measured through the Army Physical Fitness Test (APFT).

Compare the policies of Bravo Company with U.S. Army official policy regarding physical training and physical training assessments during and following deployments in support of OIF. Army doctrine identifies the need for high levels of fitness prior to deployment in order for Soldiers to better acclimate to challenging conditions on the battlefield and recognizes performance gaps seen between Soldiers at higher physical fitness levels compared to those at lower fitness levels (FM 21-20 1998, 12-5; FM 6-22 2006). However, the specific guidance provided to deployed and recently deployed leaders and Soldiers does not support this apparent understanding of kinesiology and the human body. Current U.S. Army PT guidance to deployed units is

provided in ALARACT Message 2003. It states that Army units “should conduct physical training and testing when conditions permit.” The specific guidance given to Professional Military Education (PME) schools and returning units presumes Soldiers will be in worse condition upon redeployment as compared to their deployment levels and guarantees a minimum of 90 days after redeployment before Soldiers are required to take a record APFT (ALARACT 2003).

Does this lack of emphasis by Army policy to conduct PT while deployed cater to the reduced fitness levels of redeploying Soldiers or are the reduced fitness levels inevitable and Army policy merely addresses a condition that cannot be avoided? Do fitness levels have a correlation to the Army rate of Post Traumatic Stress (PTS)? When a Soldier sustains a high level of physical fitness or improves his fitness level during deployment, is he more able to cope with the traumatic situations faced on the battlefield than his peer who started the deployment with a reduced level of physical fitness or was permitted to let that level degrade through the course of the deployment?

This thesis will address all of these questions by analyzing the symptoms, causes, and physical exercise oriented treatments for post traumatic stress; the physical and psychological impacts of physical exercise on the human body; U.S. Army doctrine and policy as it pertains to physical training during and after deployments; and, ultimately, the impact U.S. Army doctrine and policy changes have had on the prevalence of PTS symptoms in returning Soldiers. If elevated Soldier fitness levels and the number and severity of PTS symptoms are inversely related, the U.S. military can begin preventing the symptoms associated with PTS symptoms by placing the appropriate command emphasis on physical training throughout pre-deployment activities and deployment

operations, providing necessary facilities to both expeditionary and follow-on forces, and developing PT programs that are compatible with the high operational tempo (OPTEMPO) routinely encountered in a deployed environment.

The primary research question for this thesis is: How have reduced physical fitness levels experienced during deployments impacted the elevated rates of PTS symptoms experienced by recent veterans of OIF and OEF? The primary research question will be supported by the secondary research question: How have changes in Army physical fitness policy and doctrine impacted deployed physical fitness levels?

This thesis is limited by the amount of controlled data available directly related to the topic of physical fitness during deployments. Many recently deployed Soldiers and commanders have personal stories and anecdotal evidence related to pre- and post-deployment fitness levels, unit PT plans during deployment, and the available PT resources at their respective bases and outposts. There are numerous military focused studies related to the general benefits of physical fitness. However, there are limited controlled studies observing the impacts of deployments on Soldier and unit fitness levels. To date, there has been one study that has measured the pre- and post-deployment fitness levels of a ground based company sized units deployed for the duration currently experienced during deployments to Afghanistan and Iraq. The lack of controlled data may impact the conclusions drawn by this thesis.

PTSD is a complicated ailment to diagnose. Ultimately, the individual's perception of the incident, environment, or threat will determine the level of anxiety experienced and the likelihood of developing PTSD and its associated symptoms. Diagnosis of PTSD requires that symptoms persist for a minimum of one month and that

the symptoms cause a disturbance in the affected person's normal daily activities. Cases in which symptoms are resolved within three months are considered *acute* PTSD; cases enduring longer than three months are considered *chronic* (Schiraldi 1999, 11). For an individual to be recognized as suffering from PTSD, he must receive a clinical diagnosis of the disorder. Individuals do not always have access to or feel the need to see a qualified doctor following a traumatic event. Likewise, the individual might not deem his PTS symptoms worthy of a visit to the doctor. This diagnosis is problematic in identifying all personnel who suffer from the symptoms associated with PTS. Regardless of PTSD diagnosis, some people suffer symptoms associated with PTSD following a traumatic event. Therefore, this thesis will focus on PTS symptoms and reduction of PTS symptoms rather than the reduction of PTSD.

The U.S. Army recognizes physical fitness as a way to reduce physical stressors and the U.S. Marine Corps considers being physically fit a resiliency factor to controlling stress (FM 22-51; FM 6-22.5 2000, 23). Beyond these references, there is little information regarding the prevention of PTS symptoms and methods to reduce vulnerability. Instead, research focuses on methods to minimize the psychological impact of traumatic events after they occur. This thesis will not challenge the current methods of treatment of PTSD or its symptoms but will investigate methods to reduce their occurrence. The stress relieving benefits, both physical and psychological, of PT and physical fitness will be assessed to determine their efficacy in reducing the occurrence of PTS symptoms.

The following chapter will describe current research applicable to the problem statement. Chapter 2 will provide a general discussion of exercise physiology as it may

apply to the associated research questions. The thesis will explain the human physical and psychological reactions to exercise and reductions in exercise, the trained and untrained body's reaction to extreme environments and situations, and the advantages and disadvantages associated with exercise. Chapter 2 will also explain current research in the area of post traumatic stress. This explanation will include the causes, symptoms, physical exercise related treatments, and potential preventive measures associated with post traumatic stress. Finally, the following chapter will investigate current Army policies, regulations, and guidance associated with physical training and fitness assessment.

CHAPTER 2

LITERATURE REVIEW

How have reduced physical fitness levels experienced during deployments impacted the elevated rates of PTS symptoms experienced by recent veterans of OIF and OEF? How have changes in Army physical fitness policy and doctrine impacted deployed physical fitness levels? This chapter will investigate these questions by analyzing the symptoms, causes, and some recommended exercise related treatments of post traumatic stress; the physical and psychological impacts of physical exercise on the human body; U.S. Army doctrine and policy as it pertains to physical training during and after deployments; and the impact of deployments on physical fitness levels. Many research studies have identified a correlation between depression and exercise withdrawal (Berlin et al. 2006; Chan and Grossman 1988). Some health providers use fitness programs in the treatment of depression, PTSD, and other related psychological disorders (Strohle 2008; Berlin 2006). These references use primarily civilian research subjects. There is a large amount of data identifying Soldier psychological disorders following deployments (Adler et al. 2008; Brailey et al. 2007). The U.S. Army expects a reduction in Soldier fitness levels upon redeployment as compared to pre-deployment levels and has adjusted the physical training doctrine and guidance thus catering to the perceived physical fitness levels (ALARACT 2003, ALARACT 2007, FM 21-20 1998).

Physical Fitness

The short term and long term physiological and psychological benefits of physical fitness and exercise are well documented. Likewise, the negative impacts of low fitness

levels and reductions in physical activity are equally well documented. This section will define the components of physical fitness and review current research across all of these components.

Physical fitness is divided into three components: health-related, skill-related, and physiologic components. The health related components of physical fitness are cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. The physiologic components of fitness are metabolic fitness, morphologic fitness, and bone integrity. The skill related components of physical fitness are speed, power, agility, coordination, balance, and reaction time (Whaley 2006, 3). These definitions of the physical fitness components come from the American College of Sports Medicine (ACSM), the largest sports medicine and exercise science organization in the world and widely accepted as the standard for information and reference in sports medicine. Crossfit.com is an on-line fitness community that has become extremely popular for its daily workouts based on a concept of functional movements that are constantly varied and performed at high intensity. Crossfit emphasizes the importance of functional fitness and has modified the ACSM definitions of skill and health related components of fitness to arrive at the components of functional fitness: cardiovascular endurance, stamina, strength, flexibility, power, speed, coordination, accuracy, agility, and balance. The Crossfit information was obtained during a two-day certification course conducted at Ft. Leavenworth, KS in December 2008 and is also available at www.crossfit.com.

A sustained physical fitness program has many long term benefits. Regular physical activity results in a stronger heart muscle than a sedentary lifestyle. A stronger

heart is capable of a greater stroke volume which means with each beat of the heart, more oxygen carrying blood reaches the body (Corbin 2008, 65). A higher stroke volume reduces the number of beats per minute (bpm) required by the heart. A person with a high stroke volume will, therefore, have a lower resting heart rate (RHR). An individual's maximum heart rate (MHR) is largely dependent on his age which can roughly be determined with the equation: $220 - \text{age} = \text{MHR}$. The difference between an individual's RHR and MHR is considered the heart rate reserve (HRR). The HRR is an indicator of an individual's capacity for work (Fahey 2007, 73). An individual's work capacity is further determined by his maximal oxygen consumption ($\text{VO}_{2\text{max}}$). $\text{VO}_{2\text{max}}$ is a measure of the endurance capacity of the cardiovascular system and the muscular system and is influenced by genetics, gender, fitness status, and age (Powers 2006, 89; Fahey 2007, 64). The increased blood flow caused by increased fitness levels can also increase blood and oxygen flow to the brain increasing mental capacity. Increased blood flow to the skin increases the amount of sweat produced and reduces the time before onset of sweating thus reducing core body temperature. Increases in total blood flow increases endothelium function resulting in better control of blood pressure and increases in nitric oxide secretion (Johnson 1980, 817). The increase in nitric oxide secretion positively affects energy levels (Fahey 2007, 65).

In addition to the physiological advantages of exercise, individuals can experience many psychological and emotional benefits from physical training. A large (n=5,061) cross-sectional study of 16 year olds conducted in the United Kingdom indicated that vigorous exercise and physical activity relates to lower emotional stress and levels of depression (Steptoe 1996). A larger study conducted across 15 nations in the European

Union (n=16,230) determined the existence of a dose-response relationship between exercise and mental health (Abu-Omar 2004). The stress, anxiety, and depression relieving effects of exercise as well as the longevity of these results are directly related to the duration of the exercise program. Nine and twelve week programs have shown statistically significant improvements in anxiety and stress levels as compared to control groups who conducted no formal exercise program; the research program involving the 12-week program conducted follow-up surveys at 12-months and determined the mental health benefits of exercise were sustained for one year following the study (Craft 1998; Craft 2004). This research also indicates the duration of an exercise program is statistically significant in the amount of anxiety, stress, and depression reducing benefits. All of these studies either controlled for the effects of sex, sociodemographic status, and physical illness or these factors were determined to be insignificant.

Those who have experienced the long term benefits of physical fitness may also experience withdrawal symptoms if their ability to exercise is reduced or eliminated. In a study of 246 subjects that supports the stress relieving effects of exercise, Thirlaway and Benton (1992) also determined that physically fit individuals who were prevented from exercising experienced poorer mental health as compared to individuals who did not regularly exercise. The subjects in this study were both fit and unfit. The study determined that fit individuals experienced mood elevations following bouts of exercise. The study also indicated that unfit individuals did not necessarily experience changes in mood. This study was unique in that it did not focus entirely on cardiovascular exercise as is common amongst studies of this type. Rather, the same results were identified with all types of physical activity and fitness types. Other studies have focused entirely on the

withdrawal effects amongst physically fit individuals. The Berlin (2006) study observed 40 subjects between the ages of 18 and 45 years old for 2 weeks. All subjects were screened and determined to be physically and mentally healthy and participated in aerobic exercise for at least 30 minutes a day, 3 or more days per week, for at least the previous 30 days. The ages, exercise levels, and health of this study's subjects are reasonably similar to those of RA Soldiers making this an appropriate study for comparison purposes. The Berlin study identified the withdrawal group (no exercise for two weeks) displayed a significant increase in negative mood and depression symptoms and the control group (continuation of normal exercise program) displayed a decrease in negative mood (Berlin 2006, 226). This study also identified a reduction in fitness levels amongst some of the withdrawal group. Those subjects who experienced reductions in fitness levels had the most significant reductions in mood and increases in fatigue levels (Berlin 2006, 227).

Soldier Fitness During Deployment

Much of the information available about physical fitness and physical training in deployed environments is anecdotal evidence from recently deployed leaders and Soldiers. In a garrison environment, commanders are likely to maintain historical records of PT programs and Soldier performance on APFTs and other physical endeavors. However, in a deployed environment, units are less likely to have regularly scheduled physical training and are not required to conduct record APFTs. Soldiers face high operation tempo (OPTEMPO) during deployments. Infantry Soldiers can expect to work constantly when positioned at company outposts. When an Infantry company is assigned to company fixed sites, it can expect to have 50 percent of its combat power relegated to

fixed site security (Coffey 2008). The company is then required to conduct all company missions and recovery with the remaining 50 percent of the company. A typical Infantry company will conduct engagements in the local community, develop local security forces with joint patrols and training events, and combat operations. All of these requirements significantly degrade any opportunity Infantry Soldiers have for physical training.

When Soldiers have the opportunity to conduct training, their facilities are not the quality they may have become accustomed to at their home station but are sufficient to sustain pre-deployment fitness levels. Company and battalion level FOBs predominately contain strength training equipment. The lack of cardiovascular training equipment is attributable to several factors. Versatility of strength training equipment, required space for cardio equipment, and throughput of users on equipment are a few of the reasons for the disproportionate amount of strength training equipment. Additionally, the Army Morale, Welfare, and Recreation (MWR) typically provides fitness packages and equipment for units but is only authorized to supply units with MWR personnel at the brigade level and higher (FM 12-6 1994, 7-1 to 7-10; Pettoni 2008). At one time, unit commanders were authorized a soldier trained specifically in implementing MWR assets but this MOS (03C) was discontinued (Pettoni 2008).

A recent article (2008) in *Medicine and Science in Sports and Exercise* more scientifically explains the physical fitness reductions suffered by Regular Army (RA) Soldiers while deployed. The Sharp (2008) study assessed 110 Soldiers from 2nd Battalion, 4th Infantry Regiment, 10th Mountain Division before and after a 9-month deployment to Afghanistan and identified a significant reduction in VO₂ Max, fat free mass, total body mass, and some measures of muscular power (Sharp 2008, 1689). The

study observed no change in its measure of muscular strength and a statistically insignificant increase in vertical jump height (Sharp 2008, 1689). This study is the first to monitor the effects of long term land-based deployments on Soldier fitness levels. These results were seen after only 9 months as compared to most U.S. Army Soldiers whose deployments are currently in excess of 12 months. These results are not uncommon and not limited to RA Soldiers. While long deployments may result in greater reductions in fitness levels, research shows that detraining effects are observable in a few weeks. A 33-day study of Sea, Air, Land (SEAL) members, the U.S. Navy's Special Operations Forces, indicates that all Soldiers are susceptible to the effects of detraining that occur in a deployed environment. Two SEAL teams were monitored during the 33-day period; one team was deployed on a submarine and one team was not deployed. This study identified a statistically significant reduction in running performance and statistically significant increase in heart rate recovery time of the deployed team as compared to the non-deployed team. However, this study also identified performance improvements in some of the deployed team members as well as performance reductions in some of the non-deployed team members. All SEAL team members were able to conduct some form of physical training during the study period but the deployed team members were limited to one third of the available exercise time as the non-deployed members due to mission requirements. This study did not identify the type of exercise performed by the deployed team members but it can be assumed that cardiovascular training was limited by the close confines of the submarine environment (Fothergill 2004).

Army Emphasis on Physical Training
During and After Deployments

There is no doubt Army leadership understands the importance of physical fitness on Soldier performance and general health. Army regulations have advocated the benefits of a quality physical training program for decades. AR350-41, *Training in Units*, was published in 1993 and indicates that high levels of physical fitness will result in, among other things, unit cohesion, self-discipline, and an ability to cope with psychological stress (AR 350-41 1993, 9-3). FM 22-51, *Leaders Manual for Combat Stress Control*, recognizes the physical and mental benefits of strenuous physical training on Soldiers performance and ability to tolerate battlefield stressors (1994, 2-1 to 2-6). This same manual considers it a primary responsibility of the unit Master Fitness Trainer to ensure Soldiers can cope with physical stressors during their physical training (FM22-51 1994, 2-4). On 27 October 2008, the Chief of Staff of the Army (CSA), General George W. Casey, signed a memorandum of agreement with Secretary of the Army Pete Geren, and Thomas R. Insel, Director, National Institute of Mental Health (NIMH), stating the NIMH will conduct a research study for the Army that will focus on the mental and behavioral health of Soldiers, with particular focus on the multiple determinants of suicidal behavior. The CSA also announced in his top 10 list for the week of October 21, 2008 that Comprehensive Soldier Fitness is one of the U.S. Army's top priorities (Gilberti 2008). Comprehensive Soldier Fitness is a new Army initiative that began in October 2008 intending to identify at risk Soldiers prior to development of PTS symptoms. Currently (as of 13 February 2009) in a trial phase, this program intends to develop resiliency in at risk Soldiers. One component of Comprehensive Soldier Fitness is physical fitness.

Army Field Manual (FM) 6-22 (Army Leadership) states, “If not physically fit before deployment, the effects of additional stress compromise mental and emotional fitness as well (FM 6-22 2006, 5-2).” Army literature also states that fit Soldiers “can acclimatize in 8 to 14 days’ in hot environments such as those experienced in Iraq which is ‘much faster than sedentary Soldiers (FM 21-20 1998, 12-1).” Additionally, “heat stress is less for the Soldier who is in better physical condition and his performance is likely to be better’ (FM 21-20 1998, 12-1).” Army policy is less prescriptive of PT during deployments stating only that “units should [emphasis added] conduct physical training and testing, if the mission and conditions permit (ALARACT 2003).” However, Army policy and official actions expect reduced fitness levels in re-deploying Soldiers. APFTs are waived for at least 90 days following deployments (ALARACT 2003). APFT requirements are waived for Soldiers reporting directly to a Professional Military Education (PME) course shorter than 30 days and Soldiers must take an APFT prior to graduation for courses longer than 30 day (ALARACT 2003). The justification for this period between arrival and physical assessment is to allow those Soldiers returning from deployment the opportunity to recondition prior to a physical evaluation via the APFT.

Failure to reach the minimum standards of an APFT can, according to U.S. Army doctrine, result in a number of negative repercussions to include: loss of privileges, bar to reenlist, removal from PME courses, or separation from the Army (AR600-9; AR 600-8-2; AR 350-1 2007). However, more current policy states that Soldiers who “meet academic requirements, but fail to meet the physical fitness and height/weight standards will not be removed from the course, nor will they be required to re-attend the course if all other course requirements are met. Instead, Soldiers will complete training and their

DA Form 1059 will be annotated to reflect their performance (ALARACT 2007).” The DA Form 1059 is the U.S. Army’s academic evaluation report (AER). If a Soldier fails to meet the physical or height/weight standard, his AER will indicate that the Soldier marginally met course standards. Recent Army guidance states deployed “units should conduct physical training and testing, if the mission and conditions permit (ALARACT 2003).” While it is difficult to argue with the discretion shown to returning Soldiers, the APFT was designed with the intent of administering the APFT at any place with no necessary equipment (FM 21-20 1998).

Post Traumatic Stress Disorder

Diagnosis of PTSD requires that symptoms persist for a minimum of one month and that the symptoms cause a disturbance in the affected person’s normal daily activities. Cases in which symptoms are resolved within three months are considered *acute* PTSD; cases enduring longer than three months are considered “chronic” (Schiraldi 1999, 11). Dr. Jonathan Shay, a staff psychiatrist for the Department of Veterans Affairs specializing in Vietnam veterans with post-traumatic stress disorder, chooses to categorize PTSD behaviorally rather than chronologically. According to Dr. Shay, those individuals who carry necessary survival adaptations into civilian life have “simple” PTSD while those who have lost the capacity for social trust in addition to the qualities of simple PTSD suffer from “complex” PTSD (Shay 2002, 4). Schiraldi’s definitions seem more applicable to any post traumatic event while Shay’s are specific to individuals whose experiences occurred in combat such as his Vietnam veteran patients. For the purposes of this thesis, PTSD will not be further classified.

PTSD is an anxiety disorder that occurs following an event in which the individual affected perceives his life or another's is in danger (National Center for PTSD Fact Sheet). Symptoms of PTS include nightmares, headaches, flashbacks, sadness, anxiety, anger, guilt, avoidance, fatigue, and emotional numbness (Schiraldi 1999, 1). Symptoms of anxiety and anxiety disorders are an exaggerated response to stress and are reduced as the nervous system is retrained to be calm (Schiraldi 1999, 13). The American Psychiatric Association provides a similar description of PTSD: persistence of valid adaptations to danger into a time of safety afterward (Shay 2002, 149). Various stress relieving methods may be helpful in sustaining low pre-incident levels of stress and are common measures used immediately after traumatic event exposure or as a method of treatment after diagnosis of PTSD. These measures will be discussed in more detail later. An individual is diagnosed with PTSD if the anxiety symptoms last for more than one month and cause significant distress or impairment in the affected person's life (Schiraldi 1999, 6). Some complications that may affect individuals suffering from PTS are drinking and drug problems, feelings of depression and depression related behavior, and relationship difficulties such as divorce or domestic violence (National Center for PTSD Fact Sheet). Some factors that contribute to an individual's likelihood of developing PTSD are: intensity and duration of the trauma, proximity to the event, emotional and physical reaction to the event, the emotional attachment to the person physically effected by the event, the individual's sense of control over the event, and the help and support given to the individual after the event (National Center for PTSD Fact Sheet). All of these factors are likely contributors to the vulnerability of deployed Soldiers.

Causes of Post Traumatic Stress Disorder during Combat Deployments

Years of data collected from deployments to Iraq and Afghanistan have identified that 18 percent of Iraq War veterans and 11 percent of Afghanistan War veterans suffer symptoms of PTS (Litz 2007, 1). According to the U.S. Army Assistant Surgeon General for Force Projection, Brigadier General (BG) Rhonda Cornum, 20 percent of recently deployed Soldiers report multiple symptoms of PTS (Kruzel 2008). The Joint Staff surgeon, Rear Admiral David Smith, estimates that 5 percent to 20 percent of all Soldiers, Airmen, and Marines who have served in Iraq and Afghanistan will have some symptoms of combat stress (Brook 2008, 1). These numbers are similar to other individuals regularly exposed to traumatic events such as prisoners of war (POWs) and firefighters. BG Cornum stated in a recent Army Times interview that 20 percent of POWs have PTSD (Kennedy 2008, 38). PTSD rates in firefighters are 22.2 percent among American firefighters, 17.3 percent among Canadian firefighters, and 18.2 percent among German firefighters (Heinrichs et al. 2005, 2277).

The leading causes of PTS are exposure to a stressor that can potentially result in death or serious harm to the individual or another and involves a feeling of “fear, helplessness, or horror (Schiraldi 1999, 6).” Considering the factors that contribute to an individual’s likelihood of developing PTS discussed previously, it can be concluded that deployed Soldiers have increased vulnerability. The intensity of the traumatic events experienced by deployed Soldiers such as IED attacks, RPG ambushes, sniper fire, and direct fire engagements are unlikely to be replicated in any other environment. While some of these individual events are completed in a matter of seconds, Soldiers may

endure hours or days of contact with the enemy and are in a hostile environment with the threat of attack extending throughout the deployment, often longer than twelve months.

A bond exists among Soldiers created through shared hardship, extended periods of time together, and working together towards a common goal. Witnessing a serious injury or death to a fellow Soldier is comparable to such tragedy happening to an immediate family member. Soldiers typically experience years of training prior to deployment to best prepare them for every situation encountered in combat, however, despite this training the Soldier has no control over a surprise ambush or IED attack. This lack of control and perceived unpreparedness serve to increase the stresses associated with the event. Finally, Soldiers are often reluctant to seek support following a traumatic event or are not able to receive support for extended periods of time. General (GEN) Carter Ham, the commanding general of U.S. Army Europe and 7th Army, has received screening for his PTSD symptoms resulting from his deployment to Iraq and received counseling from U.S. Army chaplains. GEN Ham experienced firsthand Soldier reluctance to speak about stressful experiences or seek professional support for possible PTSD symptoms. While participating in a senior leader combat stress session developed by Lieutenant General (LTG) James Dubik, former head of Multi-National Security Transition Command-Iraq, GEN Ham was surrounded by senior commissioned and non-commissioned combat veterans who made comments such as “I don’t need this” and “just get on with life.” GEN Ham himself admits that, “there is clearly a part of Army culture that says, ‘tough it out.’ That is clearly where I was” (Brook 2008, 4).

Post Traumatic Stress Prevention

Dr. Charles Morgan, III, a leading scientist in the field of PTSD, has identified a lack of information in the area of preventing PTSD and has plans to conduct research in this area as well as several planned studies to determine methods of prevention for PTSD (National Center for PTSD). Other researchers have identified a predisposition in some individuals for PTSD. Characteristics such as youth, low self efficacy and hostility as well as a comprehensive situational awareness are prevalent in individuals diagnosed with PTSD prior to the display of PTS symptoms (Heinrichs 2005, 2276; Litz 2007, 4). Situational awareness in this context refers to the Soldier's political, cultural, and strategic level knowledge of his environment and can be considered a double-edged sword as it pertains to Soldier vulnerability. In some ways, elevated awareness gives the Soldier a sense of preparedness which serves to alleviate vulnerability to PTSD. Education of Soldiers about the area of operations is a common component of pre-deployment training with the intent of improving Soldier performance and confidence through operational and cultural knowledge. On the other hand, information about dire situations or impending attacks can serve to elevate Soldier stress levels, reducing performance and increasing the likelihood of PTS symptoms. History gives many examples of psychological operations with the intent of increasing enemy combatant stress levels through valid or fictional information regarding future attacks.

American psychologist Martin Seligman developed the theory of "Learned Helplessness." Dr. Seligman's research involved shocking groups of dogs in different manners. One group of dogs (Group A) was given no opportunity to escape the shock treatment while another (Group B) was, after an initial period with no escape, afforded a

method to escape or turn off the source of pain. Following this period of conditioning, both groups of dogs were given the opportunity to easily escape their shock treatments. Group A remained in a depressed, lethargic state giving no effort to escape their predicament while Group B, never having developed “learned helplessness,” retains the ability to confront their challenges (Grossman 1995, 81). Dr. Seligman’s research identifies this same phenomenon in individuals as well as groups of humans. Dave Grossman associates the concept of “learned helplessness” with U.S. Army basic training and combative training in his book *On Killing*. He claims that weekend passes provide basic training recruits with an escape from the stresses of boot camp which increase trainee resilience to the stresses of combat (Grossman 1995, 81-82). Likewise, combative training gives future Soldiers the confidence and knowledge that they can overcome hostile situations which also inoculates them against the stresses of combat (Grossman 1995, 82). Grossman continues by saying the Army does not understand the described effects associated with these “escapes” nor does the Army recognize the need for inoculation training (Grossman 1995, 82). Some components of the Army do understand these benefits and can be seen in programs such as the United States Military Academy’s mandatory combatives instruction for all graduates. Grossman further explains that the depression suffered in combat is often a result of physical and emotional exhaustion; exhaustion “is not just a reaction to fear, but rather a reaction to a host of stressors that suck the will and life out of a man and leave him clinically depressed (Grossman 1995, 84).” The effects of exhaustion are as applicable to entire units as they are to individuals for “when the individuals are drained to a dry husk, the whole is nothing more than an aggregate of exhausted men (Grossman 1995, 85).”

Post Traumatic Stress Treatment

There are currently many methods used in the treatment of PTSD such as: cognitive-behavioral therapy (CBT), eye movement desensitization and reprocessing (EMDR), hypnosis, healing imagery, relaxation training, and medication (National Center for PTSD Fact Sheet, 3; Schiraldi 1999, 105, 150, 213, 226, 251, 381). This section will focus on those treatments related to exercise and physical activity.

According to Fahey, Insel, and Roth, stress is the “collective physiological and emotional responses to any [stressor] that disturbs an individual’s homeostasis (Fahey 2007, 312).” Stress will trigger a stress response that results in a series of physiological changes: acute hearing and vision, accelerated heart rate, increased blood glucose levels for more energy, elevated perspiration, and increased pain relieving endorphins (Fahey 2007, 313). The intensity of these changes will vary from person to person and depend on the surrounding environment, individual’s pre-stressor level of stress, and intensity of the stressor.

As mentioned previously, PTSD is an anxiety disorder (Center for PTSD Fact Sheet, 1). Physical activity is a method to reduce anxiety and lower stress levels by expending energy that accompanies stress (Schiraldi 1999, 94). Exercise is also considered a method of relaxation and can be used as a method of “desensitizing your nervous system (Schiraldi 1999, 107).” In addition to returning the body to homeostasis via energy expenditure or relaxation, physiological adaptations of the body will help in reducing stress levels prior to the stressor or acquiring additional stress after the incident. Heat induced stress levels will be reduced in a physically fit Soldier because his body will adapt by sweating earlier and at a more controlled rate thus better regulating the

Soldier's body temperature and controlling cardiac output (Rowell 1969, 676-677; Johnson 1980, 817). Physically fit Soldiers in a cold weather environment will have reduced stress levels because their bodies will function at lower core body temperatures and shivering will begin at lower temperatures. These adaptations also give the trained Soldier a larger blood reserve to carry oxygen because the blood consuming action of shivering is postponed. Lastly, physically fit Soldiers will acclimate faster to altitudes over 5000 feet and have greater levels of red blood cells than their unfit counterparts. These traits will allow the trained Soldier to function longer and more effectively with the reduced partial pressure of oxygen that exists at higher altitudes.

Recent U.S. Army Physical Fitness Policy and Doctrine Changes

The Army is a learning organization that continually adjusts to meet the current and future challenges facing the security of the United States. This thesis will identify those changes that involve the conduct of physical training, methods and requirements for physical training assessment, the minimum and maximum standards of the Army Physical Fitness Test (APFT), and the general guidance given by the U.S. Army leadership to individual units.

The Army developed the current APFT during the 1980's with the assigned goal of creating a fitness test capable of measuring the baseline fitness of Soldiers administrable anywhere with no equipment (Tomasi 1995, 4). The scoring standards for the APFT have been modified multiple times since creation with the most recent adjustments to APFT standards occurring with the release of the 1998 edition of FM 21-20, Physical Fitness Training (FM 21-20 1998, 14-3 to 14-8.2, 14-21 to 14-22). These

adjustments resulted from an Army wide study conducted by the U.S. Army Physical Fitness School (USAPFS) from September 1994 through March 1995 (Tomasi 1995, 5). Generally, these changes reduced the raw score necessary to earn the maximum APFT score. The minimum scores remained generally constant for the push-up and 2-mile run events. The minimum standard for the sit-ups was moderately increased for males and significantly increased for females with the 1998 edition.

Prior to 1991, the U.S. Army certified Master Fitness Trainers (MFTs) at the United States Army Physical Fitness School (USAPFS), the United States Military Academy (USMA), and the United States Army Sergeants Major Academy (USASMA). MFTs were intended as special staff assistants to unit commanders with an in depth knowledge of fitness. Specifically, MFTs were capable of “assess[ing] the physical fitness levels of individuals and units, analyz[ing] the unit’s mission-related tasks and develop[ing] sound fitness training programs to support those tasks, train[ing] other trainers to conduct sound, safe physical training, and understand[ing] the structure and function of the human body, especially as it relates to exercise (FM 21-20 1998, 1-3).” MFTs were also responsible for monitoring physical work stressors and ensuring stress levels remained in the positive or eustress range (FM22-51 1994, 2-4) In July 1991, Army Training and Doctrine Command (TRADOC) directed the USAPFS no longer conduct MFT certification and the course was deleted from the Army Training Requirements and Resources System (ATRRS). This action terminated all scheduling of the MFT certification course at the USAPFS. The Army Formal Schools Catalog (DA Pam 351-4 1995) deleted the MFT certification and additional skill identifier (ASI) in the 31 October 1995 edition of the pamphlet. By eliminating the ASI, no Soldier could be

officially identified as a MFT. Information regarding the MFT certification and ASI was obtained through direct e-mail correspondence with the director of the USAPFS, Frank A. Palkoska (Palkoska 2009).

The 2007 edition of AR 350-1, Army Training and Leader Development, reduces the required number of APFTs per year for U.S. Army Reserve Troop Program Units from at least twice per year to at least once per year (AR 350-1 2007, 12). This edition requires that Soldiers age 55-59 take either the APFT or APFT with alternate event (AR350-1 2007, 12).

The U.S. Army has modified its requirements for Soldiers attending PME courses that result in the Soldiers receiving an AER. Previously, Soldiers were required to meet Army height/weight standards and APFT standards in order to successfully graduate. As of April 1, 2007, Soldiers who “meet academic requirements, but fail to meet the physical fitness and height/weight standards will not be removed from the course, nor will they be required to re-attend the course if all other course requirements are met.” Instead, Soldiers will complete training and their DA Form 1059 will be annotated to reflect their performance (ALARACT 2007). The DA Form 1059 is the U.S. Army is an AER. If a Soldier fails to meet the physical or height/weight standard, his AER will indicate that the Soldier marginally met course standards. Recent Army guidance to deployed units is to “conduct physical training and testing, if the mission and conditions should permit” (ALARACT 2003).

Army FM 7-0, Training for Full Spectrum Operations, describes developmental methods for creating mission-essential task lists (METL). According to FM 7-0, a “mission essential task is a collective task a unit must be able to perform successfully to

accomplish its doctrinal or directed mission” and the “METL is a compilation of mission-essential tasks that an organization must perform successfully to perform its doctrinal or directed mission” (FM 7-0 2008, 4-5). Within the Army, units develop core METLs (CMETL) and directed METLs (DMETL). A CMETL is a list of a unit’s core and general mission-essential tasks based on doctrine and the organization’s mission according to doctrine (FM 7-0 2008, 4-6). The CMETL is a standardized list of tasks similar for like units composed of mission-essential tasks that have been approved by Headquarters, Department of the Army. Standardization facilitates the Army’s ability to rapidly assemble forces (similar capabilities across like units) and minimizes additional training necessary for directed missions (assign appropriate missions to appropriate units). When the Army assigns a unit a specific mission, the unit commander and the next higher commander develop and decide when to transition to a DMETL. The DMETL is developed from the commander’s analysis of the directed mission and is not impacted by resource availability (FM 7-0 2008, 4-11). “Training does not stop while a unit is deployed’ (FM 7-0 2008, 2-7). Throughout a deployment, commanders should review the DMETL to ensure unit proficiency and, considering the 12-15 month duration of missions, to maintain relevancy to the assigned mission over time.

The Army has initiated an Army force generation (ARFORGEN) model designed to prepare campaign capable, expeditionary forces with the intention of fully implementing the model in FY11 (Casey 2008; FM 7-0 2008, 4-1). The ARFORGEN model is composed of three phases: Reset, Trained/Ready, and Available. The reset phase is intended to last 6 months of a unit’s 24 months of dwell time (Casey 2008). By design, units will conduct individual and collective training during the reset phase as well

as provide Soldiers a local opportunity to attend PME courses taught by military training teams (FM 7-0 2008, 4-1; Casey 2008).

U.S. Army and DoD Fitness Initiatives

The need for increased access to fitness equipment by deployed Soldiers is well known. The U.S. Army has made several attempts to provide deployed Soldiers and units with exercise equipment that is easily transported and accessible to all Soldiers regardless of his location. In 2004, Army Morale, Welfare, and Recreation (MWR) developed an individual exercise package called Army Fitness Deployed, a resistance exercise kit made of predominately surgical tubing (Hipps 2006, 1). The Army Fitness Deployed System relies on the Thera-Band® system of progressive resistance for muscular strength and muscular endurance benefits. However, after purchasing more than 680,000 of these kits, much of the feedback received from Soldiers indicated the surgical tubing was being used for field expedient remedies for everything from sunglass straps to windshield washer fluid line repairs (Hipps 2006, 2). This led MWR to seek a better individual fitness package that Soldiers would use for its intended purpose. MWR's latest effort to provide Soldiers with easily transportable exercise equipment is the TRX Suspension Trainer (Hipps 2008, 1). The TRX system is composed of adjustable nylon straps and handles that rely on the user's bodyweight to create resistance for training ("Fitness Anywhere"). The system was developed by a former U.S. Navy SEAL and has been demonstrated for units at Fort Jackson, South Carolina; Fort Leonard Wood, Missouri; Fort Riley, Kansas; Fort Benning, Georgia; Schofield Barracks, Hawaii; Fort Richardson, Alaska; and West Point, New York (Hipps 2008, 2). As of June 16, 2008, the U.S. Army had purchased 3,205 TRX systems (Hipps 2008, 1). Joe Pettoni, a

MWR Mobilization and Contingency Operations Specialist, is directly responsible for creating and shipping MWR equipment to deployed units and has provided detailed information about the process involved in getting fitness and recreation equipment to deployed Soldiers. Mr. Pettoni indicated in a 14 November 2008 e-mail that funding is the primary obstacle preventing every Soldier from having access to a TRX system (Pettoni 2008).

In addition to individual fitness initiatives, MWR provides a “Small Unit Fitness Kit” to units that request it. The kit contains traditional weightlifting equipment such as free-weights, benches, dumbbells, and weight bars (Pettoni 2008). Unfortunately, this equipment is not easily transportable and is only provided to units with 500 Soldiers or more. The typical infantry company is approximately 125 Soldiers and not eligible for this package.

These initiatives indicate an attempt by the U.S. Army and its subordinate organizations to provide deployed Soldiers with fitness equipment to sustain or improve fitness levels throughout deployments. These efforts do not, however, support the units that need them most as with the Small Unit Fitness Kit or have not been adequately funded to reach all individual Soldiers as with the TRX system.

CHAPTER 3

RESEARCH METHODOLOGY

The purpose of this thesis is to identify the impact of reduced Soldier fitness levels incurred during deployments on the rates of PTSD in recently deployed U.S. Army Soldiers. This thesis will attempt to answer the primary research question: How have reduced physical fitness levels experienced during deployments impacted the elevated rates of PTSD symptoms experienced by recent veterans of OIF and OEF? This potential relationship may be further promoted by recent changes in U.S. Army physical fitness doctrine and policy. Given this information, the secondary research question is: How have changes in Army physical fitness policy and doctrine impacted deployed physical fitness levels?

To answer the primary research question, this thesis will follow a model created by Dr. Jonathan Shay in his book *Odysseus in America: Combat Trauma and the Trials of the Homecoming*. Dr. Shay's book uses Odysseus' ten year journey home from battle in Troy, as told in Homer's epic *The Odyssey*, as a metaphor to the real life experiences of Vietnam veterans challenged by life after war while suffering from PTSD. Dr. Shay is a staff psychiatrist for the Department of Veterans Affairs specializing in Vietnam veterans with post-traumatic stress disorder who has decades of experience studying and treating the symptoms and causes of PTSD. While the circumstances and situations of Vietnam and those of today's wars in Afghanistan and Iraq differ, many of the physical and psychological challenges faced by returning combat veterans from Vietnam are as similar to those of today's most recent veterans as they are to the experiences described by Homer several millennia past. The return to family, memories of wartime events, and

transition from a warrior lifestyle to that of a civilian were as challenging to Odysseus as they are to any Soldier returning home in the 21st century.

The military of today has taken great strides to avoid the atrocious events and activities such as the war crimes committed at Mi Lai and wide spread drug abuse Soldiers experienced during Vietnam that are described throughout Dr. Shay's writing. However, similar events have been documented in today's conflicts, among them the Abu Ghraib prisoner abuses and high profile drug overdose deaths, indicating Dr. Shay's approaches to prevention are as applicable to Afghanistan and Iraq as they are to Vietnam.

Dr. Shay outlines three protective factors--cohesion, leadership, and training--necessary for the reduction of PTSD in combat veterans. He classifies these factors as the combat strength multipliers necessary to quickly win in battle (2002, 205). According to Shay, psychiatric and physical casualties rise and fall together on the battlefield; rapid victory on the battlefield will result in fewer physical injuries and fewer physical injuries will result in fewer psychological injuries. The focus of this thesis is, ultimately, reducing the rates of PTSD in re-deploying Soldiers. While Dr. Shay's emphasis on quick victory is valid, his combat strength multipliers will be applied as methods to reduce Soldier stress levels and the prevalence of PTSD symptoms regardless of the impact on a rapid victory. Shay's descriptions of cohesion, leadership, and training all involve a connection to reducing Soldier stress levels and will be applied to the physical fitness aspects of battle. His concept of cohesion, leadership, and training as the method to defeat PTSD will serve as the model for this thesis.

This thesis will answer the primary research question by first defining all components of the problem: the psychological and physical impacts of physical fitness on the individual Soldier and unit formation; the causes of reduced physical fitness on the individual Soldier and unit formation; PTSD causes, symptoms, and treatments; and recent adjustments to U.S. Army physical fitness policy, doctrine, and command emphasis. Dr. Shay has identified how cohesion, leadership, and training can aid in the prevention of PTSD. This thesis will correlate the identified physical fitness effects and associated military doctrine and guidance of the PTSD problem with Dr. Shay's combat strength multipliers.

Cohesion is an overlooked contributor to unit function and combat effectiveness which results in greater success on the battlefield. In *Odysseus in America*, Dr. Shay claims "the human brain codes social recognition, support, and attachments as physical safety" (Shay 2002, 210). This "perception of safety" reduces the psychological impact of traumatic situations on Soldiers and the likelihood Soldiers will revisit these situations in the form of PTSD symptoms. Unit PT is one method to create and sustain these cohesion requirements outlined by Dr. Shay and will be further explored in the following chapter.

According to Dr. Shay, training serves to "engage the whole person: mind, body, emotions, character, and spirit" (2002, 223). The benefits of physical training and fitness span an equally wide range of categories in the affected person. The physiological and psychological benefits or detriments have substantial impacts on the Soldier before, during, and after traumatic exposures. Chapter 4 will elaborate on the potential benefits this training will provide in preventing PTSD.

Dr. Shay places the bulk of responsibility on the shoulders of military and civilian leaders. His experiences and counseling with Vietnam veterans has identified lost trust in society, stemming from a lack of trust in leadership of all levels, as a predictor to the worst cases of PTSD. Soldiers must trust that their leaders are acting truthfully and of their own volition rather than in blind obedience to the leadership of their superiors. Chapter 4 will evaluate whether current physical training policy enables the small unit leader with the ability to earn his Soldiers' trust.

This thesis will analyze the causes, symptoms, and treatments for PTSD. The methods used for PTSD analysis will include review of civilian and military research, multi-national military and first responder PTSD data, and analysis by experts in the field of PTSD. U.S. Army PTSD rates as reported by multiple credible military and civilian sources and senior U.S. Army leadership emphasis on additional PTSD and psychological disorder research will serve to identify the existence of a PTSD problem in the U. S. Army. Given the existence of a U.S. Army PTSD problem and the identified causes, symptoms, and treatments for PTSD in general, this thesis will attempt to demonstrate U.S. Army Soldiers and units are exposed to the causes and experience the symptoms of PTSD, and are deserving of treatments and preventive measures associated with PTSD.

CHAPTER 4

ANALYSIS

In the Great War Soldiers suffered from shell shock, in World War II it was battle fatigue, and in Vietnam similar symptoms were described as PTSD. In all of these conflicts, U.S. service members also suffered the physical fitness degrading impacts of extended deployments and combat operations. The U.S. Army is again learning the psychological and physical costs of conducting protracted war. The prevalence of PTSD and PTS symptoms in the Soldiers who return from fighting the wars in Afghanistan and Iraq is a sobering reminder of the psychological impact of war. These same wars have U.S. service members redeploying in significantly lower levels of physical fitness than when they deployed. The reduced fitness levels contribute to elevated stress levels during combat and are an indicator that stress levels are not being relieved through physical exercise. These two force distracters, elevated PTSD levels and reduced physical fitness levels, are not mutually exclusive.

The U.S. Army is making efforts to independently address both of these issues. There may be reason for the U.S. Army to combine its efforts to combat PTSD and elevate physical fitness emphasis during deployments. This thesis will identify a relationship between both causes and effects of reduced physical fitness and the elevated rates of PTSD among recently deployed Soldiers from the War on Terror through the use of a model for PTSD prevention developed by Dr. Shay and explained in his book *Odysseus in America*. In this model, Dr. Shay identifies the combat strength multipliers cohesion, training, and leadership as essential factors in the prevention of PTSD.

Physical fitness levels during deployments and the potential impact on PTS symptoms

and disorder will be assessed as contributing elements of cohesion, training, and leadership. Ultimately, this thesis will recommend necessary changes in Army physical fitness policy and doctrine, components of the combat strength multiplier Leadership, to improve deployed physical fitness levels and reduce PTS symptoms in recent combat veterans.

Cohesion

This thesis will evaluate cohesion as the first of Dr. Shay's combat strength multipliers. Cohesion in military organizations is a combination of social cohesion and task cohesion. Social cohesion refers to the emotional bonds shared between group members. A group sharing friendship, a desire to spend time together, and an emotional bond are said to have social cohesion. Task cohesion occurs among group members who share a common goal requiring input from all members in order to achieve the goal. A group with high task cohesion displays high motivation across the group to achieve their goals and experience regular success (Salo 2005). The U.S. Army recognizes unit cohesion in the forms of loyalty and esprit de corps as positive combat stress behaviors which improve unit performance on the battlefield and increase Soldier resiliency to combat stress (FM 22-51 1994, 2-12). Physical training and physical fitness have the potential to develop both social and task cohesion in military units. Conversely, some reductions in standards can negatively impact unit cohesion. This section will analyze how increased unit fitness levels resulting from a sustained physical training program can increase unit cohesion. This section will also analyze how recent modifications to U.S. Army fitness standards, such as ALARACT 2007, can serve to degrade cohesion.

The U.S. Army is an organization that places tremendous emphasis on physical readiness in the garrison, non-deployed, environment. This Army-wide emphasis is evident from the daily physical training sessions conducted by Soldiers across all military occupational specialties (MOSs) at virtually every military post. Senior leaders often rely on unit runs and other large scale physical activities to develop and demonstrate unit esprit de corps. These units and installations have multi-million dollar physical training facilities, outdoor tracks and exercise apparatuses at their disposal indicating the financial value the Army places on physical fitness. Additionally, the Army requires Soldiers complete an APFT twice per year, the results of which may be used to distinguish Soldiers for promotion and formal recognition or result in punitive actions such as barring from favorable actions or preventing re-enlistment. The APFT indicates the professional merit associated by the Army on physical fitness.

Benefits of Physical Fitness

Army leadership is completely justified in placing this much emphasis on fitness in garrison. The short term and long term physiological benefits of physical fitness and exercise are well documented. Regular physical activity results in a stronger heart capable of a greater stroke volume which means with each beat of the heart, more oxygen carrying blood reaches the body (Corbin 2008, 65). A higher stroke volume reduces the number of beats per minute (bpm) required by the heart which results in a lower resting heart rate (RHR). Because an individual's maximum heart rate (MHR) is largely dependent on his age, a lower RHR creates a greater heart rate reserve (HRR) and the HRR is an indicator of an individual's capacity for work (Fahey 2007, 73). Increased work capacity is invaluable to deployed Soldiers and Army units. This work capacity

allows Soldiers to conduct longer patrols or execute patrols with greater efficiency. Additionally, increased work capacity gives Soldiers the potential to perform better during unanticipated events, such as ambushes or extended missions, than unfit Soldiers. Both of these work capacity benefits serve to reduce the physical stress levels experienced by Soldiers during combat operations.

The increased blood flow caused by increased fitness levels described in the previous paragraph can also increase blood and oxygen flow to the brain increasing mental capacity. Increased blood flow to the skin increases the amount of sweat produced and reduces the time before onset of sweating thus reducing core body temperature. Increases in total blood flow increases endothelium function resulting in better control of blood pressure and increases in nitric oxide secretion resulting in greater individual energy levels (Johnson 1980, 817; Fahey 2007, 65). The importance of potential elevated blood flow effects throughout the body benefits is elevated exponentially on the battlefield. Soldiers with more mental capacity will better and more quickly analyze battlefield situations. This reduced confusion lowers psychological stress levels. Leaders with greater mental capacity make better and quicker decisions which increases Soldier confidence in their leadership and increases unit performance; these effects reduce psychological and physical stress levels. Lastly, the Soldier's resiliency to higher temperatures reduces heat injuries thereby increasing available combat power, reducing demands necessary to treat and evacuate heat casualties, and reducing the burden of each member of a given mission.

The benefits from physical fitness described above lead to improved performance in assigned tasks and greater likelihood of success during missions. As mentioned

previously, task cohesion occurs in units who demonstrate a shared motivation to accomplish a common goal and regularly succeed in meeting that goal. All units share common goals; the physically fit unit will experience greater success in achieving these goals as a result of the performance benefits associated with elevated fitness levels and are likely to achieve increased task cohesion.

The U.S. Army dedication to physical fitness in the garrison environment is not reflected in the adjusted standards to physical training and assessment doctrine implemented for deployed units. ALARACT 2003 reduces the requirements of deployed Soldiers to take APFTs during deployments and dilutes the guidance for units to conduct regular physical training through the statement “should conduct physical training and testing when conditions permit” (ALARACT 2003). Fitness regulations were further reduced in 2007 with the release of ALARACT 2007. This modification allows those Soldiers incapable of meeting the Army body composition standards or the minimum APFT requirements while at PME courses to graduate the course and receive a “marginally met course requirements” annotation on their DA Form 1059 (ALARACT 2007). Cohesion has a positive correlation to group performance (Salo 2005). By reducing standards on Soldiers, deployed or not, poor performance is ignored and has a potentially negative impact on cohesion.

Training

The benefits associated with physical fitness identified in Chapter 2 and in the Cohesion analysis of this chapter are developed through an effective physical training program and will not endure extended deployments without sustained physical training.

This section will analyze the research presented in Chapter 2 as it applies to training, the second of Dr. Shay's combat strength multipliers.

The physical benefits already described are further enhanced by the psychological benefits of exercise. Individual exercise can release excess energy resulting from the sympathetic nervous system response to an unexpected situation, serve as a relaxation method, and provide mental distraction from the boredom or stimulations associated with deployment and combat operations. These benefits are commonly understood throughout the Army and are captured in Army publications such as FM 6-22, *Leadership*, FM 21-20, *Physical Fitness Training*, and the soon to be published FM 3-22.20, *Army Physical Readiness Training*. FM 6-22 states, "If not physically fit before deployment, the effects of additional stress compromise mental and emotional fitness as well (FM 6-22 2006, 5-2)." Army literature also states that fit Soldiers "can acclimatize in 8 to 14 days' in hot environments such as those experienced in Iraq which is "much faster than sedentary Soldiers" (FM 21-20 1998, 12-1). Additionally, "heat stress is less for the Soldier who is in better physical condition and his performance is likely to be better" (FM 21-20 1998, 12-1). Similar statements as those in FM 21-20 are captured in unofficial drafts of FM 3-22.20.

Physical activity is widely believed to reduce anxiety and lower stress levels by expending energy (Schiraldi 1999, 94). Exercise is also considered a method of relaxation and can be used as a method of "desensitizing your nervous system (Schiraldi 1999, 107)." These statements are supported by several large scale studies (n=5,061 and n=16,230) that indicate vigorous exercise and physical activity relates to lower emotional stress and levels of depression (Stephoe 1996; Abu-Omar 2004). Dr. Kristen Vickers-

Douglas, a psychologist at the Mayo Clinic, further describes the psychological benefits of exercise when she says, “Physical Activity can help shift attention away from unpleasant or unhelpful thoughts and instead direct attention toward neutral or pleasant thoughts and activities (www.e-gracenotes.org/article.php?id=1480).” In combat, the stress, anxiety, and depression relieving benefits of exercise allows Soldiers to sooth themselves following physically demanding or stressful situations. This is an example of the parasympathetic nervous system countering the sympathetic nervous system thereby returning the body to homeostasis. LTC Grossman’s application of Seligman’s “Learned Helplessness” theory further supports the escape exercise provides for the individual and military unit. Prolonged exposure to sympathetic nervous system responses increase the Soldier’s likelihood to experience physical or psychological fatigue. The escape provided by strenuous physical exercise serves to extend or reset the Soldier’s fortitude and resiliency to combat exhaustion. For Soldiers not directly in harm’s way, the anxiety associated with family separation can be reduced in the same way through physical training.

Additionally, multiple studies have identified an inverse relationship between physical fitness levels and the prevalence of PTS symptoms following stressful military situations (Taylor 2008, 741; Dolan 2006, 98). The Taylor study analyzed the relationship of SERE school student fitness levels with their performance on the Impact of Events Scale – Revised (IES-R). The IES-R is a self report scale that measures fourteen of the seventeen symptoms of the Diagnostic and Statistical Manual of Mental Disorders specified PTSD symptoms (Taylor 2008, 739). The IES-R was administered to the students twenty-four hours after completion of their respective schools. This study

found aerobic fitness to be inversely related to student's total IES-R score which indicates that physical fitness may serve as a buffer to stress symptoms in an acute stress environment (Taylor 2008, 740). The Dolan study found that military hardiness, when combined with high deployment stressor levels, was inversely related to post deployment depression (2006, 95). The definition of military hardiness used in the Dolan study was primarily psychologically based. However, physical fitness impacts the categories used by Dolan to assess military hardiness (commitment, challenge, and control) and has been shown to mediate stress levels in other studies referenced in this thesis. Physical fitness is a component of hardiness as defined by Webster's Dictionary which may explain the inverse relationship between PTS symptoms and physical fitness. These studies also support the recent Comprehensive Soldier Fitness program initiated by the U.S. Army in an effort to increase resiliency throughout the force using physical training among other methods.

Detriments of Reduced Physical Training

The tremendous value placed on physical training in the garrison environment is a potential detriment upon deployment. PT has a conditioning effect on Soldiers beyond physical; there is also a psychological conditioning experienced when exercise is conducted on a regular basis. Soldiers subconsciously rely on the stress relieving and mood elevating effects of their unit PT sessions. When the opportunity to conduct PT is reduced or eliminated, as with RSOI and some deployed environments, Soldiers who regularly exercise may experience withdrawal symptoms. Thirlaway and Benton's (1992) study of 246 individuals determined that physically fit individuals who were prevented from exercising experienced poorer mental health than individuals who did not

regularly exercise. The Berlin (2006) study indicated physically trained subjects who were denied physical exercise for two weeks displayed a significant increase in negative mood and depression symptoms as compared to the control group (Berlin 2006, 226). The reduction in attitude and mental health will impact the performance, morale, and cohesion of the whole unit in addition to the actions of the individual Soldier.

Leadership

The final combat strength multiplier assessed in this thesis is Leadership. Leadership will be analyzed by the emphasis placed on physical training in a controlled environment such as garrison, physical training emphasis while deployed, and Army policy changes since the start of combat operations in Afghanistan and Iraq.

Deployed Command Emphasis

Despite the proven physical and psychological benefits of exercise and enormous application value of physical training in a deployed environment, the financial support and command emphasis displayed in garrison has not transferred to our combat theaters for all Soldiers. The reduction of emphasis on the APFT is seen in ALARACT 2003 which could conceivably eliminate any required fitness assessment for two years after a single deployment. ALARACT 2003 intends to safeguard deployed Soldiers with little to no opportunity for physical training from a physical evaluation that has potentially harmful consequences on the Soldier's career. However, this policy failed to recognize that many Soldiers have more time and better facilities for physical training during deployments and ignored the harmful physical and psychological results of reduced fitness.

While not new as a result of the war on terror, Army Morale, Welfare, and Recreation (MWR) restrictions to provide trained personnel for units at or above the Brigade level is another example of low importance placed by senior leaders on supporting junior Soldier fitness levels in a deployed environment (FM 12-6 1994, 7-8; Pettoni 2008). The Soldiers at the battalion level and lower are typically those who need support the most. According to COL Craig Currey, director of the U.S. Army Basic Combat Training Center of Excellence, 80 percent of new Soldiers deploy to a combat zone less than twelve months after entering the Army (Kennedy 2008, 38). This early combat exposure to Soldiers who, according to BG Cornum, are on the low end of the “resiliency scale” is a primary reason for the current high levels of PTSD symptoms (Kennedy 2008, 38). These Soldiers are the primary occupants of company and battalion level FOBs and are in the greatest need of the escape mechanisms outlined by Seligman’s theory of “learned helplessness” (Grossman 1995, 81). ALARACT 2003 and FM 12-6 were created at the Organizational and Strategic levels of leadership with drastic effects on direct level leaders (FM 6-22 2006, 3-6).

As a result of Army level leadership, platoon, company and battalion level leaders have had their authority diminished. The decisions of the strategic leaders have reduced the ability of direct level leaders to conduct physical training and mitigated the professional necessity for Soldiers to prepare for physical assessments.

Complacency in the School House

In addition to the reduced emphasis on exercise in the combat theater, U.S. Army leadership has carried this trend to its Professional Military Education (PME) courses. The APFT exceptions authorized by ALARACT 2003 are compounded by ALARACT

2007. The latest fitness related ALARACT allows Soldiers who fail to meet the U.S. Army fitness or height weight standards while attending PME courses the opportunity to graduate. As of 1 April 2007, Soldiers who “meet academic requirements, but fail to meet the physical fitness and height/weight standards will not be removed from the course, nor will they be required to re-attend the course if all other course requirements are met (ALARACT 2007).” Instead, Soldiers will complete training and their DA Form 1059, or Academic Efficiency Report (AER), will be annotated to reflect their performance (ALARACT 2007). The Soldier’s AER will indicate that the Soldier marginally met course standards. Justifications for this ALARACT range from financial to personnel retention reasons. Regardless of monetary and personnel benefits this policy change may provide across the force, the negative impact it has on Soldier fitness is evident in small samples of pre- and post-PME course APFT scores viewed by the author. While some may consider this sample anecdotal evidence, it is difficult to imagine any positive impact on physical fitness this policy can have on the force. U.S. Army leadership created this policy and is responsible for all of its effects.

Conclusion

This chapter applied research provided in Chapter 2 to the current circumstances of the U.S. Army using a model created by Dr. Jonathan Shay with the aim of preventing PTSD sustained in combat zones. Dr. Shay’s model emphasizes efforts in the combat strength multipliers cohesion, training, and leadership. This chapter identified numerous associations between cohesion, training, and leadership as they apply to physical training and fitness and the prevalence of PTSD symptoms in recently deployed Soldiers.

Cohesion, both task cohesion and social cohesion, suffers in the combat zone and the

garrison environment as a result of reduced emphasis on physical fitness and physical training. This reduction began with the increase of U.S. Army OPTEMPO occurring after 11 September 2001. During the analysis of training, this chapter identified an increased physiological and psychological benefit of elevated physical fitness during deployment and greater risks associated with reductions in physical training while in a combat environment. Reductions in physical training were incurred as a result of high deployed OPTEMPO, reduced command emphasis on PT during deployments, and limited access to fitness facilities on company and battalion level FOBs. Leadership was evaluated by reviewing recent policy adjustments and current U.S. Army doctrine. Doctrine unwaveringly supports high levels of personal fitness and leader developed physical training programs. These documents recognize the benefits to combat readiness provided by a quality fitness program through unit cohesion, physical strength and stamina, and increased resiliency. Unfortunately, recent adjustments to policy have reduced the emphasis placed on physical training during deployments and immediately following.

In conclusion, this thesis has identified a potential inverse relationship between the amount of exercise a Soldier is able to conduct during deployments and that Soldier's vulnerability to post traumatic stress. Furthermore, this thesis has identified several U.S. Army decisions and regulations that minimize Soldier and unit capacity to conduct exercise while deployed thereby increasing Soldier risk of post traumatic stress. The next responsible action is to correct these decisions and regulations through a series of recommended modifications.

The following chapter will make recommendations to increase command emphasis on physical training, create access for all Soldiers to fitness resources while deployed, and highlight current U.S. Army initiatives aimed at reducing the prevalence of PTS symptoms. Ultimately, this thesis must reach the eyes and ears of U.S. Army leaders with the confidence to accept honest evaluation, the ability to institute change, and the patience to see these changes through.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This thesis was written to determine if reduced physical fitness levels experienced during deployments impact the rates of PTS symptoms experienced by recent veterans of OIF and OEF. Additionally, the research sought to determine how changes in Army physical fitness policy and doctrine have impacted deployed physical fitness levels. Chapter 5 will provide conclusions and recommendations for the research conducted in this thesis. The conclusions and recommendations will be presented in the same categories they were presented in Chapter 4: Training, Cohesion, and Leadership.

Training

The U.S. Army relies on specialized training and trainers for virtually all aspects of preparing for military operations. Master gunners are a company and battalion level asset providing expertise in developing ranges and crews in armor and mechanized infantry units. Unit movement officers receive specialized training which enables them to facilitate the planning and execution of deployment activities. The U.S. Army extends this model of unit level experts to the equal opportunity (EO) representative who advises the commander on matters related to discrimination, sexual harassment, and the EO climate within the unit.

Despite this pattern of unit level subject matter experts and the abundance of research and doctrine supporting the physical and psychological benefits of physical fitness, the Army discontinued the Master Fitness Trainer (MFT) program and the MFT additional skill identifier (ASI) in 1992. As of March 2009, the program and ASI were

not reinstated and the U.S. Army Physical Fitness School, the former home of the MFT program, was at 56 percent strength with all effort focused on re-writing current Army fitness doctrine rather than creating unit-level subject matter experts.

Under the now discontinued program, MFT graduates were capable of assessing unit and individual fitness levels, developing fitness programs to support unit METLs, assessing physical stress levels, and training other trainers to perform MFT functions. MFTs performed all of these duties with a clear understanding of exercise physiology (FM 21-20 1998, 1-3; FM 22-51 1994, 2-4). Commanders no longer have a formally trained advisor capable of these functions. Physical training programs are largely a product of individual experiences that may or may not be based on legitimate kinesiology or capable of meeting predetermined Army fitness goals.

The Army needs some form of regular formal fitness training for its leaders or must return to the previous model of providing leaders with fitness expert advisors. This training should emphasize the components of fitness deemed essential for optimal performance during military operations. Evaluation of the health, skill, and functional components of fitness identified in chapter 2 is a starting point for establishing an Army wide focus for physical training. Furthermore, the fitness advisor to the commander must have the skills necessary to modify physical training based on specific unit mission requirements and available training resources.

Many military posts and units have identified this short coming and are seeking training informally through civilian providers such as Crossfit, TRX, and other similar organizations. This thesis does not intend to promote any specific organization. Rather, Army senior leadership should recognize the potential dangers in having its unit

commanders and supporting organizations such as MWR seek a civilian alternative to resources not available in the Army.

Just as the Army does not want individual Soldiers choosing clothing they deem appropriate for certain missions with no regard to AR 670-1 or units selecting their preferred civilian weapon system to take on deployments, Army leadership should be wary of units outsourcing training to non-approved organizations. The Army should identify what components of fitness are imperative to mission success then review these different civilian programs to ensure they meet the intended fitness goals of the Army. After this review and approval, the Army should formally support this training. This support can come through establishing a new MFT program modeling these civilian organizations or establishing a contract or formal unit funding to train Soldiers at these organizations.

When the appropriate program is identified, the implementation of this program should occur during the Reset Phase of ARFORGEN. CSA GEN Casey directed that training during this portion of ARFORGEN focus on, among other things, physical training, individual training and qualifications, and critical function training (Casey 2008). A new MFT program meets all three of these directives.

The creation of fitness experts at the small unit level does not entirely resolve the current physical training dilemma facing the Army in a deployed environment. The prevalence of battalion-sized and smaller operating bases and the previously discussed limitations on funding for exercise equipment at this level result in a physical training resource shortage for the units deployed to these smaller operating bases. This thesis does not purport that expensive or elaborate equipment is necessary to develop physical

fitness. However, the primitive nature of some small operating bases, the extreme weather and terrain conditions of current operational environments, and the durations spent in these situations restrict the fitness opportunities for Soldiers in these environments.

The Army's MWR program has made multiple efforts to provide Soldiers with physical training equipment for use during deployments. Some examples of these initiatives include Small Fitness Equipment Kit intended to support 500 Soldiers, the TRX Suspension Trainer, and the Army Fitness Deployed package. Additionally, MWR provides civilian advisors to the brigade level and higher; unfortunately, the MWR MOS was discontinued and units below the brigade level have no one formally trained on the resources available from MWR.

The Small Fitness Equipment Kit is composed of traditional, bulky equipment and entertainment products that are not conducive to the confined spaces associated with some company out-posts and is not provided for units smaller than the battalion level. A lighter, less space consuming package should be developed with the isolated company in mind. The Army Fitness Deployed package has been replaced by the TRX Suspension Trainer. The TRX system is lightweight, compact and capable of providing a challenging workout given the appropriate training. These are ideal characteristics for equipment intended for use at small out-posts. The Army should make greater efforts to reach all Soldiers with these types of packages. Unfortunately, relatively few numbers of these particular systems have been provided to deployed Soldiers largely due to funding problems (Palkoska 2008).

Commanders up to at least the battalion level receive no formal guidance on how to appropriate such resources for their Soldiers. Formal MWR advisors are retained at the brigade level. The Army must adjust its regulations to support the company and battalion commanders with fitness resources and educate those commanders on the availability of equipment and how to take advantage of these regulation modifications. Given the current personnel limitations in U.S. Army, regenerating the MWR MOS is not a viable option. However, providing instruction at OES, NCOES, and pre-command courses would require limited personnel or monetary cost. Additionally, establishing an additional skill identifier would provide the knowledge without drawing from unit manning.

Cohesion

As discussed previously, cohesion is a combination of social cohesion and task cohesion. Whether developed from time spent together or a shared sense of accomplishment after achieving a common goal, cohesion is a vital component of successful military organizations. The Army decisions impacting physical training during deployments and reducing physical assessment requirements during and after deployments have the potential to reduce cohesion within units and amongst peers. For these reasons, Army leadership should consider the recommended changes presented in this section.

Current Army policy prohibits Soldiers flagged for failing to meet Army height/weight standards or physical fitness standards from attending institutional training courses (ALARACT 2007). However, Soldiers are permitted to graduate from these courses should they fail to meet these same standards while attending. If the Soldier was

required to arrive in a physical condition consistent with U.S. Army standards, the degradation in physical fitness and body composition of the Soldier who fails to meet the Army standards while attending institutional training must have occurred following arrival at the institutional training site.

This situation is problematic in two primary ways. First, the Soldier has a reduced need to maintain his physical fitness and body composition levels regardless of the availability of time and resources at an institutional training course (compared to those previously discussed resources available in a deployed environment). Secondly, the institutional training course has a reduced requirement to organize a formal physical training program if fitness and body composition levels have no bearing on the success or failure of the attending Soldiers. If the respective course's retention rates were adversely impacted by Soldiers who failed to meet minimum Army standards for fitness and body composition, the course administrators would have a vested interest in maintaining the fitness and body composition levels of its attending Soldiers. Rather than allow Soldier fitness and body composition levels to degrade during institutional training with relative impunity, require Soldiers to sustain the same minimum physical fitness levels required to attend the course in order to graduate DoD funded schools. This standard should apply not only to OES, WOES, NCOES, and functional courses as identified in ALARACT 2007 but be extended to classroom based and civilian schooling. Exceptions should be granted to schooling that degrades individual fitness levels as a component of the course design such as Ranger School and SERE Training. While at the course, if the Soldier is deemed unfit, he should be removed from the course. This will increase individual

responsibility, emphasis on physical training at the school house, and cohesion amongst attending Soldiers by maintaining equality of standards.

Leadership

Modifications should be made to ALARACT 2003. Currently there is minimal guidance given to deployed units regarding physical training during the deployment merely stating that Army units “should” conduct physical training and testing if the mission and conditions permit. The first recommended adjustment to this ALARACT is changing “should” to “will.” This may seem an issue of semantics but an Army that places much emphasis on precise terminology must correctly state their expectations of deployed units and commanders. This new requirement, rather than the current recommendation, to conduct physical training and testing during deployments must directly correlate to the commander’s DMETL. This chapter will further address this correlation with later recommendations.

Additionally, ALARACT 2003 provides an Army wide waiver for returning Soldiers regarding APFTs. Do not mandate physical assessment excusal with an ALARACT. In many deployment scenarios, Soldiers return from deployments in better physical condition than when they deployed. Brigade-sized and larger FOBs often have better physical training facilities than at home station and Soldiers may find fewer distractions while deployed such as limited access to alcohol, partying, and non-work related requirements. There is no reason Soldiers in these situations should receive physical assessment waivers. Commanders and their senior NCO advisors are more than capable of making this assessment. Give the tactical level commander the responsibility to assess his Soldiers’ fitness levels and opportunities to conduct fitness during

deployments. If necessary, the tactical level commander can preclude the Soldier from record fitness assessment for the necessary amount of time required to regain previous fitness levels. Leaders must be authorized to determine if their Soldiers need excusal from APFTs – deployed and post deployment. If Soldiers have access to necessary facilities and are not constantly in the line of fire, commanders should determine that no excusal is necessary. When an excusal is necessary, the commander signs a memorandum for record precluding the Soldier from a physical assessment for the necessary time period.

While the intent of this thesis was not to evaluate the merit of the Army Physical Fitness Test, some consideration must be given to the appropriateness of an identical fitness assessment for units with entirely different C-METLs and D-METLs. Headquarters, Department of the Army (HQDA) should develop an elaborate list of general and core capability physical evaluation events much the same way HQDA approves general and core capability mission essential tasks for units. The current APFT is the same for all units, regardless of the unit's most probable directed mission. From the HQDA approved physical evaluation events, commanders would then be authorized to adjust their unit's physical training and physical assessments to compliment their C-METL. This type of PT is currently encouraged in the Army and is called battle focused training. Unfortunately, Soldiers are evaluated only on their ability to perform push-ups, sit-ups, and a 2-mile run. As a result, units continue to train for the APFT events due to the impact of APFT results on unit statistics and Soldier evaluation reports. Furthermore, upon receipt of a directed mission and agreement between the commander and next higher commander on a transition to a D-METL, unit commanders will continue to

modify the physical evaluation events to support the D-METL. Just as FM 7-0 provides direction for developing C-METLs and D-METLs, HQDA must capture guidance for physical training development in FMs such as the soon to be released FM 3-22.20 and direct evaluations through Army Regulations.

Current Army Initiatives

The Army initiated its Comprehensive Soldier Fitness program in October 2008. Directed by CSA GEN Casey and headed by BG Cornum, the program is currently conducting a pilot program that will evaluate the effectiveness of the program by analyzing its effects on approximately 10,000 Soldiers. The primary intent of the program is to elevate Soldier resiliency in an effort to reduce the number of Soldiers who suffer from PTS symptoms. The Comprehensive Soldier Fitness program will analyze and attempt to develop Soldier resiliency in what it has labeled the 5 Dimensions of Strength: physical, emotional, social, spiritual, and family. This program's goals address many of the issues identified throughout this thesis and in Dr. Shay's research. It is an example of leaders identifying and addressing the needs of Soldiers. The program provides training in a variety of areas to include physical training, nutritional education, and psychological instruction and treatment as necessary. The social and family strength components of the program have the potential to increase cohesion.

While this initiative is precisely where the U.S. Army must place emphasis, this thesis cautions the developers of the Comprehensive Fitness Program on making false assumptions about the Army's physical dimension of strength. The Comprehensive Fitness Program recognizes physical strength as one of the 5 Dimensions of Strength but seems to ignore the impact physical training has on not only physical strength but

emotional and social strength as well. Likewise, the program relies on routine physical assessments as a condition for focusing efforts on the other strength dimensions. As identified in previous chapters of this thesis, physical assessments are not occurring at the assumed biannual rate while Soldiers are deployed. The Comprehensive Soldier Fitness program intends to develop resiliency in Soldiers in order to support them during and after deployments, precisely the periods that they are not assessed physically. This thesis encourages the further development of the Comprehensive Soldier Fitness program to include the physical dimension of strength.

For Further Study

This thesis focused on Soldiers located at battalion sized FOBs or smaller in an effort to eliminate some of the additional distracters found on larger bases and to maximize the potential for traumatic experiences encountered by the Soldiers observed. This method does not consider the benefits of life on a larger base. These bases have more distraction which could serve to relieve Soldiers of traumatic mental images or merely minimize the stresses associated with family separation, high OPTEMPO, and the numerous other non-life threatening stresses encountered during a deployment.

Additionally, this thesis placed all attention on physical fitness and exercise. There are times during operations and deployments that physical training is not feasible or appropriate. Soldiers may need sleep more than exercise during periods of excessively high OPTEMPO; Soldiers conducting reconnaissance operations may find that minimal movement is necessary for success and survivability. In these situations, alternate methods of stress relief such as controlled breathing, meditation, or yoga may provide similar or better results than the methods focused on this thesis.

Finally, this thesis did not address Soldier diet. Refined sugars have been shown to increase arousal and anxiety levels. PTSD treatment programs focus attention on patient diets with an emphasis on fresh and minimally processed foods (Schiraldi 1999, 79). Soldiers are exposed predominately to foods with extended shelf lives, sugar filled care packages from loved ones, and unlimited supplies of high calorie processed flour products at the contracted dining facilities on large bases. Future research should examine the connection between Soldier diet and Soldier mental health.

A Different Approach

In the interest of time, this thesis did not seek to generate original data. As was identified during the literature review, minimal long-term observations of deployed military organizations have occurred. Given additional time, this thesis should have generated original data from recently and currently deployed units. While some of the data necessary for comprehensive analysis is of a sensitive nature, with the appropriate level of Army and DoD support, individual Soldier confidentiality could be maintained. In an effort to develop this support, future theses could establish a working relationship between the organizations identified in the research: APFRI, MWR, USAPFS, and the Comprehensive Soldier Fitness program.

Summary

This thesis has identified a positive physical and psychological impact of physical fitness on Soldier performance. Physical training has been demonstrated beneficial in coping with physical stressors and reducing stress levels following traumatic exposures. As a result, this thesis concludes physical training and physical fitness have an inverse

relationship with a Soldier's likelihood of experiencing PTS symptoms. This thesis has also identified several U.S. Army policies that negatively impact the emphasis on physical training across the Army and, as a result, detract from the company and field grade leader's ability to sustain physical fitness levels in their respective units. These policy findings combined with the identified benefits of physical training and fitness indicate that U.S. Army leadership has unintentionally increased Soldier risk to PTS through its policy changes. As a result, this thesis has made several recommended adjustments to U.S. Army policy and doctrine that will increase emphasis on physical training and fitness across the Army and increase Soldier access to fitness equipment and facilities during deployments.

Final Comments

As a final note, to those men and women fighting and winning the War on Terror, on the frontier of freedom, and in austere conditions: Thank you. You are all heroes who reflect daily everything right in this world: honor, courage, sacrifice, and selfless service. God's speed and may you all find yourselves home with loved ones soon. To those who have served and struggle with the memories created while deployed, I hope the research and ideas expressed in this thesis may somehow aid you in your recovery process. Finally, to the leaders, both military and civilian, responsible for the policy and doctrine evaluated in this thesis, do not take offense to the ideas presented. Rather, consider revising deployed guidance that does not support everything military leaders emphasize before and after deployments. There are some images and experiences no human being should be expected to encounter. Unfortunately, Soldiers must in the conduct of war. The ideas developed and supported by this thesis will not eliminate the existence of

PTSD or its symptoms. The suggested remedies do have the potential to reduce the prevalence of PTS symptoms in some scenarios. That point combined with the overwhelming amount of benefit associated with physical exercise is reason enough to provide Soldiers with the opportunity to sustain or improve fitness levels during deployments through regular physical training. Give our deployed men and women every benefit possible to succeed in battle without further sacrifice at home.

GLOSSARY

Bone Integrity – the status of bone mineral density

Endothelium – a layer of cells that lines the inside of some body cavities

Exercise – planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness

Health related components of fitness – Muscular strength, muscular endurance, cardiorespiratory endurance, body composition, and flexibility

Heart Rate Recovery – the time required for return to a resting heart rate following physical activity

Heart Rate Reserve – the difference in beats per minute between an individual's maximum heart rate and resting heart rate

Malaise – a vague feeling of heaviness, fatigue, pain, and a lack of energy commonly associated with the onset of depression

Metabolic Fitness – the status of metabolic systems and variables predictive of the risk for diabetes and cardiovascular disease

Morphologic Fitness – the status of body compositional factors such as body circumference, body fat content and regional body fat distribution

Physical Activity – bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure

Physical Fitness – a multidimensional concept that has been defined as a set of attributes that people possess or achieve that relates to the ability to perform physical activity and is comprised of skill-related, health-related, and physiologic components

Resting Heart Rate – the heart rate of an individual at rest

Skill related components of fitness – speed, power, agility, balance, coordination, and reaction time

VO₂ Max – the maximum amount of oxygen used by an individual performing at peak intensity

REFERENCE LIST

- Abu-Omar, K., A. Rutten, and V. Lehtinen. "Mental Health and Physical Activity in the European Union." *Sozial- Und Praventivmedizin* 49, no. 5 (2004): 301-309.
- Adler, Amy B., Kathleen M. Wright, Paul D. Bliese, Rachel Eckford, and Charles W. Hoge. "A2 Diagnostic Criterion for Combat-Related Posttraumatic Stress Disorder." *Journal of Traumatic Stress* 21, no. 3 (June 2008): 301-308.
- Berlin, Ali A., Willem. J. Kop, and Patricia. A. Deuster. "Depressive Mood Symptoms and Fatigue After Exercise Withdrawal: The Potential Role of Decreased Fitness." *Psychosomatic Medicine* 68, no. 2 (March-April 2006): 224-230.
- Bounds, Laura, Dottie Dee Agnor, Gayden S. Darnell, and Kirstin B. Shea. *Health and Fitness: A Guide to a Healthy Lifestyle*. 2nd ed. Dubuque, IA: Kendall/Hunt Publishing, 2003.
- Brailey, Kevin, Jennifer J. Vasterling, Susan P. Proctor, Joseph I. Constans, and Matthes J. Friedman. "PTSD Symptoms, Life Events, and Unit Cohesion in U.S. Soldiers: Baseline Findings from the Neurocognition Deployment Health Study." *Journal of Traumatic Stress* 20, no. 4 (Aug 2007): 495-503.
- Brook, Tom Vanden, "General's Story Puts Focus on Stress from Combat," *USA Today*, 25 November 2008.
- Brown, Todd S. *Battleground Iraq: Journal of a Company Commander*. Washington, DC: Government Printing Office, 2007.
- Browne, Tess, Lisa Hull, Oden Horn, Margaret Jones, Dominic Murphy, Nicola T. Fear, Neil Greenberg, Claire French, Roberto J. Rona, Simon Wessely, and Matthew Hotopf. "Explanations for the Increase in Mental Health Problems in UK Reserve Forces Who have Served in Iraq." *The British Journal of Psychiatry: The Journal of Mental Science* 190 (June 2007): 484-489.
- Casey, George. Memorandum For All General Officers, Senior Executive Service, and their Command Sergeants Major, "Army Training and Leader Development Guidance." 13 August 2008.
- Chan, C. S., and H. Y. Grossman. "Psychological Effects of Running Loss on Consistent Runners." *Perceptual and Motor Skills* 66, no. 3 (June 1988): 875-883.
- Charney, Dennis S. "Psychobiological Mechanisms of Resilience and Vulnerability: Implications for Successful Adaptation to Extreme Stress." *The American Journal of Psychiatry* 161, no. 2 (February 2004): 195-216.
- Coffey, Ross M. Electronic correspondence with author, 25 September 2008.

- Corbin, Charles B., William R. Corbin, Gregory J. Welk, and Karen Welk. *Concepts of Fitness and Wellness*. 7th ed. New York, NY: McGraw Hill, 2008.
- Craft, Lynette L., and Daniel M. Landers. "The Effects of Exercise on Clinical Depression." *Journal of Sports Exercise Psychology* 20 (1998): 339-357.
- Craft, Lynette L., and Frank M. Perna. "The Benefits of Exercise for the Clinically Depressed." *Primary Care Companion to the Journal of Clinical Psychiatry* 6, no. 3 (2004): 104-111.
- Das, R. R. "Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq." *The New England Journal of Medicine* 358, no. 20 (15 May 2008): 2177-9.
- Department of the Army. All Army Action (ALARACT) Message 17 December 2003, Subject: Army Physical Fitness Test Requirements for OER/NCOER and PME for Soldiers Deployed in Support of OIF, OEF and GWOT. 2003.
- . All Army Action (ALARACT) Message 17 April 2007, Subject: Physical Fitness and Height and Weight Requirements for Institutional Training. 2007.
- . Army Regulation (AR) 350-1, *Army Training and Leader Development*. Washington, DC: Government Printing Office, 2007.
- . Army Regulation (AR) 350-41, *Army Training in Units*. Washington, DC: Government Printing Office, 1993.
- . Department of the Army Pamphlet (DA Pam) 351-4, *U.S. Army Formal Schools Manual*. Washington, DC: Government Printing Office, 1995.
- . Field Manual (FM) 6-22, *Army Leadership*. Washington, DC: Government Printing Office, 2006.
- . Field Manual (FM) 6-22.5, *Combat Stress*. Washington, DC: Government Printing Office, 2000.
- . Field Manual (FM) 7-0, *Training for Full Spectrum Operations*. Washington, DC: Government Printing Office, 2008.
- . Field Manual (FM) 21-20, *Physical Fitness Training*. Washington, DC: Government Printing Office, 1998.
- . Field Manual (FM) 22-51, *Leaders Manual for Combat Stress Control*. Washington, DC: Government Printing Office, 1994.
- Department of Defense. "Update: Pre- and Post-Deployment Health Assessments, January 2003-January 2007." *Medical Surveillance Monthly Report* 13, no. 2 (February/March 2007): 18-22.

- Dohrenwend, Bruce P., J. Blake Turner, Nicholas A. Turse, Roberto Lewis-Fernandez, and Thomas J. Yager. "War-Related Posttraumatic Stress Disorder in Black, Hispanic, and Majority White Vietnam Veterans: The Roles of Exposure and Vulnerability." *Journal of Traumatic Stress* 21, no. 2 (April 2008): 133-141.
- Dolan, Carol A., and Amy B. Adler. "Military Hardiness as a Buffer of Psychological Health on Return from Deployment." *Military Medicine* 171, no. 2 (February 2006): 93-98.
- Dunn, Andrea L., Madhukar H. Trivedi, and Heather A. O'Neal. "Physical Activity Dose-Response Effects on Outcomes of Depression and Anxiety." *Medicine and Science in Sports and Exercise* 33, no. 6 Suppl (Jun 2001): S587-97; discussion 609-10.
- Fahey, Thomas D., Paul M. Insel, and Walton T. Roth. *Fit and Well: Core Concepts and Labs in Physical Fitness and Wellness*. 7th ed. New York: McGraw Hill, 2007.
- Farmer, M. E., B. Z. Locke, E. K. Moscicki, A. L. Dannenberg, D. B. Larson, and L. S. Radloff. "Physical Activity and Depressive Symptoms: The NHANES I Epidemiologic Follow-Up Study." *American Journal of Epidemiology* 128, no. 6 (Dec 1988): 1340-1351.
- Fitnessanywhere.com. "TRX Force Kit for the Military." <http://www.fitnessanywhere.com/military/index.php> (accessed 24 October 2008).
- Fothergill, D. M., and J. R. Sims. "Aerobic Performance of Special Operations Forces Personnel After a Prolonged Submarine Deployment." *Ergonomics* 43, no. 10 (Oct 2000): 1489-1500.
- Glass, Jennifer M., Angela K. Lyden, Frank Petzke, Phyllis Stein, Gail Whalen, Kirsten Ambrose, George Chrousos, and Daniel J. Clauw. "The Effect of Brief Exercise Cessation on Pain, Fatigue, and Mood Symptom Development in Healthy, Fit Individuals." *Journal of Psychosomatic Research* 57, no. 4 (Oct 2004): 391-398.
- Grossman, Dave. *On Killing*. New York: Backbay Books, 1995.
- Heinrichs, Marcus, Dieter Wagner, Walter Schoch, Leila M. Soravia, Dirk H. Hellhammer, and Ulrike Ehlert. "Predicting Posttraumatic Stress Symptoms from Pretraumatic Risk Factors: A 2-Year Prospective Follow-Up Study in Firefighters." *The American Journal of Psychiatry* 162, no. 12 (Dec 2005): 2276-2286.
- Hipps, Tim. "Army Fitness Deployed Offers Pocket-Sized Gym." April 19, 2005. Available from http://www4.army.mil/ocpa/read.php?story_id_key=7188.

- Hipps, Tim. "Fitness Anywhere Kits for Deployed Soldiers." June 16, 2008 Available from <http://www.military.com/military-fitness/army-fitness/fitness-anywhere-kits-for-deployed-soldiers>.
- Hoge, Charles W., Carl A. Castro, Stephen C. Messer, Dennis McGurk, D. I. Cotting, and R. L. Koffman. "Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care." *The New England Journal of Medicine* 351, no. 1 (Jul 1 2004): 13-22.
- Johnson, John M., and Myung K. Park. "Effect of Upright Exercise on Threshold for Cutaneous Vasodilation and Sweating." *Journal of Applied Physiology* vol. 50, no. 4 (November 21, 1980): 814-818.
- Kennedy, Kelly. "Army Leaders Aim to Stop PTSD before it Starts." *Army Times*, October 30, 2008.
- Kirkland, Faris R. *Unit Manning System Field Evaluation: Technical Report no. 5*. Washington, D.C.: Walter Reed Army Institute of Research, 1987.
- Kolkow, T. T., J. L. Spira, J. S. Morse, and T. A. Grieger. "Post-Traumatic Stress Disorder and Depression in Health Care Providers Returning from Deployment to Iraq and Afghanistan." *Military Medicine* 172, no. 5 (May 2007): 451-455.
- Kop, W. J., A. A. Weinstein, P. A. Deuster, K. S. Whittaker, and R. P. Tracy. "Inflammatory Markers and Negative Mood Symptoms Following Exercise Withdrawal." *Brain, Behavior, and Immunity* (Jul 9 2008).
- Kruzel, John J. "Army to Assess Soldiers' Emotional, Mental Fitness." (October 14, 2008). Available from <http://www.army.com/news/item/4392>.
- Litz, Brett T. "The Unique Circumstances and Mental Health Impact of the Wars in Afghanistan and Iraq." (May 22, 2007). Journal on-line. Available from http://www.ncptsd.va.gov/ncmain/ncdocs/fact_shts/fs_iraqafghanistan_wars.html?opm=1&rr=rr46&srt=d&echorr=true.
- Maguen, S., D. M. Turcotte, A. L. Peterson, T. L. Dremsa, H. N. Garb, R. J. McNally, and Brett T. Litz. "Description of Risk and Resilience Factors among Military Medical Personnel before Deployment to Iraq." *Military Medicine* 173, no. 1 (Jan 2008): 1-9.
- Mondin, G. W., W. P. Morgan, P. N. Piering, A. J. Stegner, C. L. Stotesbery, M. R. Trine, and M. Y. Wu. "Psychological Consequences of Exercise Deprivation in Habitual Exercisers." *Medicine and Science in Sports and Exercise* 28, no. 9 (Sep 1996): 1199-1203.

- Morris, Maria, Hannah Steinberg, Elizabeth A. Sykes, and Peter Salmon. "Effects of Temporary Withdrawal from Regular Running." *Journal of Psychosomatic Research* 34, no. 5 (1990): 493-500.
- Palkoska, Frank A. Electronic correspondence with author, 03 March 2009.
- Pettoni, Joseph R. Electronic correspondence with author, 14 November 2008.
- Petruzzello, Steven J., D. M. Landers, B. D. Hatfield, K. A. Kubitz, and W. Salazar. "A Meta-Analysis on the Anxiety-Reducing Effects of Acute and Chronic Exercise. Outcomes and Mechanisms." *Sports Medicine (Auckland, N.Z.)* 11, no. 3 (Mar 1991): 143-182.
- Powers, Scott K., Stephen L. Dodd, Virginia J. Noland. *Total Fitness and Wellness, 4th Edition*. 4th ed. San Fransisco: Pearson Benjamin Cummings, 2006.
- Reeves, R. R. "Diagnosis and Management of Posttraumatic Stress Disorder in Returning Veterans." *The Journal of the American Osteopathic Association* 107, no. 5 (May 2007): 181-189.
- Richardson, John D., James A. Naifeh, and Jon D. Elhai. "Posttraumatic Stress Disorder and Associated Risk Factors in Canadian Peacekeeping Veterans with Health-Related Disabilities." *Canadian Journal of Psychiatry.Revue Canadienne De Psychiatrie* 52, no. 8 (Aug 2007): 510-518.
- Rowell, Loring B., George L. Brengelmann, and John A. Murray. "Cardiovascular Responses to Sustained High Skin Temperature in Resting Man." *Journal of Applied Physiology* 27, no. 5 (Nov 1969): 673-680.
- Rumyantseva, G. M., and A. L. Stepanov. "Post-Traumatic Stress Disorder in Different Types of Stress (Clinical Features and Treatment)." *Neuroscience and Behavioral Physiology* 38, no. 1 (Jan 2008): 55-61.
- Salo, Mikael, and Guy L. Siebold. "Cohesion Components as Predictors of Performance and Attitudinal Criteria." *International Military Testing Agency*.
<http://www.internationalmta.org/Documents/2005/2005102P.pdf>. 2005.
- Schiraldi, Glenn R. The Post Traumatic Stress Disorder Sourcebook. New York: McGraw Hill. 1999.
- Scully, Deirdre, John Kremer, M. M. Meade, R. Graham, and K. Dudgeon. "Physical Exercise and Psychological Well being: A Critical Review." *British Journal of Sports Medicine* 32, no. 2 (Jun 1998): 111-120.
- Sharp, Marilyn A., Joseph J. Knapik, Leila A. Walker, Lolita Burrell, Peter N. Frykman, Salima S. Darakjy, Mark E. Lester, and Roberto E. Marin. "Physical Fitness and

- Body Composition After a 9-Month Deployment to Afghanistan.” *Medicine and Science in Sports and Exercise* (Aug 5 2008).
- Shay, Jonathan. *Odysseus in America: Combating Trauma and the Trials of Homecoming*. New York: Scribner, 2002.
- Smith, Tyler C., Margaret A. Ryan, Deborah L. Wingard, Donald J. Slymen, J. F. Sallis, Donn Kritz-Silverstein, and Millennium Cohort Study Team. “New Onset and Persistent Symptoms of Post-Traumatic Stress Disorder Self Reported After Deployment and Combat Exposures: Prospective Population Based US Military Cohort Study.” *BMJ (Clinical Research Ed.)* 336, no. 7640 (Feb 16 2008): 366-371.
- Stander, Valerie A., Lex L. Merrill, Cynthia J. Thomsen, and Joel S. Milner. “Posttraumatic Stress Symptoms in Navy Personnel: Prevalence Rates among Recruits in Basic Training.” *Journal of Anxiety Disorders* 21, no. 6 (2007): 860-870.
- Steptoe, Andrew, and Neville Butler. “Sports Participation and Emotional Wellbeing in Adolescents.” *Lancet* 347, no. 9018 (Jun 29 1996): 1789-1792.
- Stonesifer, Larry D. “Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq.” *The New England Journal of Medicine* 358, no. 20 (May 15 2008): 2178; author reply 2179.
- Strohle, Andreas. “Physical Activity, Exercise, Depression and Anxiety Disorders.” *Journal of Neural Transmission (Vienna, Austria : 1996)* (Aug 23 2008).
- Taylor, Markus K., Amanda E. Markham, Jared P. Reis, Genie Leah A. Padilla, Eric G. Poterat, Drummond, Sean P. A., and Lilianne R. Mujica-Parodi. “Physical Fitness Influences Stress Reactions to Extreme Military Training.” *Military Medicine* 173 (August 008 2008): 738-742.
- Thirlaway, K., and D. Benton. “Participation in Physical Activity and Cardiovascular Fitness have Different Effects on Mental Health and Mood.” *Journal of Psychosomatic Research* 36, no. 7 (Oct 1992): 657-665.
- Tomasi, Louis F., Gene Fober, Matthew Christenson. “1995 Army Physical Fitness Update Survey.” U.S. Army Physical Fitness School. Fort Benning, GA (1995).
- VA Medical Center. “National Center for PTSD Fact Sheet.” http://www.mentalealth.va.gov/mentalhealth/ptsd/fs_what_is_ptsd0ddb.asp (accessed 23 September 2008).
- Weinstein, Ali A., Patricia A. Deuster, and Willem J. Kop. “Heart Rate Variability as a Predictor of Negative Mood Symptoms Induced by Exercise Withdrawal.” *Medicine and Science in Sports and Exercise* 39, no. 4 (Apr 2007): 735-741.

Whaley, Mitchell H. ed., *ACSM's Guidelines for Exercise Testing and Prescription*.
Baltimore, MD: Lippincott, Williams, and Wilkins, 2006.

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USACGSC
100 Stimson Avenue
Fort Leavenworth, KS 66027-2301

LTC Brian P. Freidhoff
DCL
USACGSC
100 Stimson Avenue
Fort Leavenworth, KS 66027-2301

MAJ (Chaplain) Steven J. Roberts
USACGSC
100 Stimson Avenue
Fort Leavenworth, KS 66027-2301