INCREASING ARMY READINESS THROUGH THE IMPLEMENTATION OF A PHYSICAL TRAINING CORPS

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14. ABSTRACT

Physical fitness is a key component in evaluating both unit and individual Soldier readiness. Looking forward to the potential challenges faced by operating in an increasingly complex environment, commanders must ensure that their units are physically ready to deploy, and accomplish the full range of military operations on short notice. While the Army currently utilizes FM 7-22, Army Physical Readiness Training to plan and conduct physical training, there is currently no overarching Army doctrine that focuses specifically on individual or collective physical fitness as it relates to the Army's new Holistic Health and Fitness (H2F) program. As a result, commanders and staffs are often unable to implement effective training strategies that maximize physical fitness for a given environment, nor ensure that injured Soldiers recover quickly and efficiently. This study identifies an increased emphasis on physical readiness without a corresponding methodology to ensure its success. AR 350-1 states that physical readiness is an integral part of ground combat readiness, but the lack of a uniform physical training practice creates significant policy and training gaps in readiness attainment between individual Soldiers, units, and major commands. This study recommends changes to doctrine, organization, training, leadership and education, and personnel based on an applied professional case study of the British Army; who share most of the physical readiness challenges faced by the U.S. Army. However, the British Army differs from the U.S. Army in the fact that it possesses a physical training corps that overseas and implements and conducts physical training and injury recovery policy and training. The changes proposed by this study require leadership from the service secretary to the battalion level and will require additional oversight and assistance from a number of stakeholders.

15. SUBJECT TERMS

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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

INCREASING ARMY READINESS THROUGH THE IMPLEMENTATION OF A PHYSICAL TRAINING CORPS by MAJ R. Scott Emmons, 159 pages.

Physical fitness is a key component in evaluating both unit and individual Soldier readiness. Looking forward to the potential challenges faced by operating in an increasingly complex environment, commanders must ensure that their units are physically ready to deploy, and accomplish the full range of military operations on short notice. While the Army currently utilizes FM 7-22, Army Physical Readiness Training to plan and conduct physical training, there is currently no overarching Army doctrine that focuses specifically on individual or collective physical fitness as it relates to the Army's new Holistic Health and Fitness (H2F) program. As a result, commanders and staffs are often unable to implement effective training strategies that maximize physical fitness for a given environment, nor ensure that injured Soldiers recover quickly and efficiently.

This study identifies an increased emphasis on physical readiness without a corresponding methodology to ensure its success. AR 350-1 states that physical readiness is an integral part of ground combat readiness, but the lack of a uniform physical training practice creates significant policy and training gaps in readiness attainment between individual Soldiers, units, and major commands.

This study recommends changes to doctrine, organization, training, leadership, and personnel based on an applied professional case study of the British Army; who share most of the physical readiness challenges faced by the U.S. Army. However, the British Army differs from the U.S. Army in the fact that it possesses a physical training corps that overseas and implements and conducts physical training and injury recovery policy and training. The changes proposed by this study require leadership from the service secretary to the battalion level, and will require additional oversight and assistance from a number of stakeholders.

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INTRODUCTION AND BACKGROUND

> Combat is unforgiving. It doesn't matter how old you are. The enemy doesn't care. Before they shoot you, they don't say: 'Hey are you 25 or are you 45?' They don't do that. They just shoot you. And dead is dead. So we want to make sure that our soldiers are in top physical condition to withstand the rigors of ground combat.
>
> —General Mark A. Milley,
> "39th Chief of Staff of the Army Initial Message to the Army"

Topic

The formation of an Army Physical Training Corps and associated Military Occupational Specialties are necessary to improve Soldier physical readiness.

Introduction

The purpose of this thesis is to determine the requirements of the U.S. Army's physical training and injury recovery programs in order to increase physical readiness. Using the Capability Based Assessment (CBA) process to assess current capabilities, identify capability gaps, and propose solutions, this study will conduct an in-depth review of the U.S. Army's current Holistic Health and Fitness (H2F) programs and initiatives. Once current gaps have been identified, recommended changes will be presented using the Doctrine, Organization, Training, Material, Leadership, Personnel, Facilities, and Policy (DOTMLPF-P) framework. This framework is used by the U.S. Department of Defense (DOD) Joint Capabilities Integration and Development System (JCIDS), which

defines acquisition requirements and evaluation criteria for future defense programs.[1] The results of this study will propose solutions that the U.S. Army should undertake to increase physical readiness.

The Problem

A 2008 study published by the U.S. Army Public Health Center noted that each year roughly 25% of all active duty military personnel will suffer an injury related to physical training.[2] Another study, which focused on comparing rates of injury between the U.S. Army and British Army during Infantry Basic Training, found that injury rates were as high as 223 injuries per 100 Soldier-years during some rotations.[3] If the Army fails to change the way it educates and trains Soldiers in physical fitness, it risks losing much needed manpower, loss of critical skillsets, and deploying units at reduced readiness levels.

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[1] U.S. Joint Chiefs of Staff (JCS), *Manual for the Operation of the Joint Capabilities Integration and Development System (JCIDS)* (Washington, DC: Government Press, 2018).

[2] Kelly Loringer, Sheryl Bedno, Keith Hauret, Bruce H. Jones, Tzu-Cheg Kao, and Timothy Mallon, Injury Prevention Report No. 12-HF-0DPT-08, *Injuries from Participation in Sports, Exercise, and Recreational Activities among Active Duty Service Members—Analysis of the April 2008 Status of Forces Survey of Active Duty Members* (Aberdeen Proving Ground, MD: U.S. Army Public Health Command, September 13, 2011), http://handle.dtic.mil/100.2/ADA560733.

[3] David M. Wilkinson, Sam D. Blacker, Victoria L. Richmond, Fleur E. Horner, Mark P. Rayson, Anita Spiess, and Joseph J. Knapik, "Injuries and injury risk factors among British army infantry soldiers during predeployment training," *Injury Prevention* 17 (2011): 381-387, accessed August 15, 2018, https://injuryprevention.bmj.com/content/17/6/381DM.

Background

Ensuring the physical readiness of Soldiers can be traced back to antiquity. The city-state of Sparta was known to start physical training for military service in boys as young as seven, with thirteen years of continuous physical preparation before a Soldier joined the Army at 20.[4] However, in the United States, the Army has traditionally struggled with developing and implementing programs that improve overall physical readiness. During the Revolutionary War, there was no organized effort to use physical training to improve physical readiness, and in most cases, men were assigned to tasks based on existing fitness levels.[5] It was not until the formation of the United States Military Academy in 1802 that physical readiness was addressed as part of officer education. Even then, the academy did not formally start to teach physical readiness skills until the appointment of West Point's first fencing instructor, Pierre Thomas in 1816.[6] The rest of the Army lagged behind even further, with the first physical training classes being implemented for regular Army recruits in 1836.[7]

The roots of the current U.S. Army's physical readiness approach can be traced back to 1980. The U.S. Army was still adjusting to an all-volunteer force model that saw women and men integrated more than ever before. The Vietnam war had ended, and the

[4] Whitfield B. East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment* (Fort Leavenworth, KS: Combat Studies Institute Press, 2013) 14-15.

[5] Ibid., 21-23.

[6] Ibid., 24.

[7] Ibid., 26.

focus for the U.S. Army was shifting. This shift brought about a number of changes, the two most important of which were the creation of the U.S. Army Soldier Physical Fitness School (USASPFS), and the three event Army Physical Fitness Test (APFT). The USASPFS was established to develop and implement physical fitness doctrine and training for Soldiers, with the primary goal of "preparing [Soldiers] to meet the physical demands of war."[8] The USASPFS became responsible for all doctrine as it relates to physical readiness and physical fitness training. In line with their new mission, the USASPFS was responsible for creating the standards for the APFT which consisted of two minutes of push-ups, two minutes of sit-ups, and a timed 2-mile run. One of the USASPFS's first publications was FM 350-15, *Army Physical Fitness Program*, published in 1985, which stated that "Physical fitness testing will not form the foundation of unit or individual fitness programs. . . Fitness testing is designed to ensure the maintenance of a base level of physical fitness essential for every Soldier in the Army."[9] However, Dr East notes "Exacerbated by the problems with an all-volunteer force comprised of an ever-increasing number of women, it seemed prudent to change the Army PRT focus from ground combat readiness to physical fitness and health."[10] At the same time, the APFT became the standard test of record required to graduate any

[8] U.S. Army Physical Fitness School (USAPFS), "History," accessed August 15, 2018, https://usacimt.tradoc.army.mil/ltb/PFS/history.html.

[9] Headquarters, Department of the Army (HQDA), Field Manual (FM) 350-15, *Army Physical Fitness Program (*Washington, DC: Government Printing Office, 1985), 5.

[10] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment,* 150.

advanced military school or program, a standard that still exists today. Though never the intent, this test became the basis of the Army's physical readiness program.

The USASPFS's initial organization was short lived. At its inception, the USAPFS was charged with studying physical readiness requirements, implement physical training programs, and train leaders through its Master Fitness Trainer (MFT) school. The USASPFS consisted of mobile training teams (MTTs) responsible for training Army units in new fitness techniques and procedures.[11] The USASPFS changed its name to the United States Army Physical Fitness School (USAPFS) in 1990, and faced with a multitude of challenges including budgets, authorities, and headquarters alignment, the MTTs and MFT were eliminated in 1992.[12] This severely limited U.S. Army units from receiving training on Physical Readiness doctrine, and prevented improvements in training, techniques, and technology from being fielded to the force.

In 2003, the USAPFS was officially aligned under U.S. Army Training and Doctrine Command (TRADOC) as part of the TRADOC transformation initiative. It was also at this time that Lieutenant General John Van Alstyne, Deputy Commanding General for Initial Entry Training, TRADOC, asked the USAPFS to propose a new physical readiness test to replace the APFT. This request was due in large part to feedback from Soldiers and units who had deployed to Afghanistan and Iraq in the previous 2 years.[13]

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[11] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment,* 176-184.

[12] USAPFS, "History."

[13] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment,* 183-185.

As part of the request, the USAPFS was tasked to focus on physical readiness in the Initial Military Training (IMT) environment.[14] As a result of this request, a new six event APFT was proposed. This APFT consisted of a "standing long jump (2 trials), power squats (max repetitions in 1-min), heel hook (max repetitions in 1-min), agility run (12x25 yards), push-up (max repetitions in 1-min—no rest), and a 1-mile run.[15]

While it was agreed that the current APFT, and associated training plans did not properly prepare Soldiers for the Army's physical readiness requirements, the new proposed APFT was met with fierce opposition from across the Army. The backlash was so severe that the forthcoming new Physical Readiness Training (PRT) manual, FM 3-25.20, was never published.[16]

In 2005, with no revision to PRT forthcoming, the leaders of the 75th Ranger Regiment decided to develop their own PRT program in consultation with physical and occupational therapists, a dietician, and an exercise physiologist. This resulted in the "Ranger-Athlete-Warrior" program, better known by its acronym "RAW." The intent of this program was to "control PRT injuries, improve physical performance, and consolidate PRT efforts into a single program of instruction."[17] The RAW program used four metrics to determine Ranger Physical Readiness; functional fitness, performance

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[14] USAPFS, "History."

[15] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment,* 184.

[16] Ibid.

[17] Ibid., 185.

nutrition, sports medicine, and mental toughness.[18] The resulting test consisted of 10 tasks designed to test a Soldiers strength, endurance and mobility.

These tasks included; the Illinois Agility test, 4kg medicine ball toss, Metronome Push-up, Pull-up, 300m Shuttle Run, BEEP test, Heel Clap, 185-pound bench press, 254-pound Dead Lift, and the Ranger Physical Assessment Test (RPAT) consisting of a 3-mile run, and a combat focused obstacle course.[19]

Figure 1. Components of RAW

Source: Headquarters, Department of the Army, *RAW PT v4.0 Handbook: Further Faster, Harder* (Washington, DC: Government Printing Office, 2013), 4.

[18] Headquarters, Department of the Army (HQDA), *RAW PT v4.0 Handbook: Further Faster, Harder* (Washington, DC: Government Printing Office, 2013), 4.

[19] Ibid., 1.

At the same time, the wider U.S. Army had not adopted any changes to its PRT program. The increased tempo of combat operations in Iraq and Afghanistan, resulted in more recruits of marginal fitness being assessed into the U.S. Army. These Soldiers carried with them higher risks of injury, and delayed recovery.[20] In 2006, one study noted that the typical injury rate at the two-week Air Assault course held at Fort Campbell, Kentucky was about 53%.[21] Another study in 2008 found that roughly 25% of all active duty military personnel will suffer an injury related to physical training in a given year.[22] As a result of the Air Assault course study, the 101st Airborne Division, in similar fashion to the 75th Ranger Regiment, instituted its own PRT program. This program, titled the Eagle Tactical Athlete Program, was developed using the same mix of expertise as the 75th Ranger Regiment RAW program, and was successful in reducing the rate of injuries experienced during the Air Assault course, as well as enhancing overall graduation rates.[23]

In 2009, U.S. Special Operations Command (USSOCOM) authorized U.S. Army Special Operations Command (USASOC) to establish the Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning (THOR3) program. The goal of this program

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[20] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment*, 187.

[21] Allison M. Heinrichs, "University of Pittsburgh Strengthens Army Training," *Tribune-Review*, 23 August 2009.

[22] Loringer et al., *Injuries from Participation in Sports, Exercise, and Recreational Activities among Active Duty Service Members—Analysis of the April 2008 Status of Forces Survey of Active Duty Members.*

[23] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment,* 188.

was to increase the physical and mental capabilities of Special Operations Forces (SOF) Soldiers, help them rapidly recover from injuries, and promote overall general health, thus extending the useful contribution of each SOF Soldier.[24] Following the 10 event assessment program created by the 75th Ranger Regiment RAW program, the THOR3 program sought to achieve three goals; optimized human performance, rapid recovery and reconditioning, and SOF-specific occupational health and safety capabilities. [25]

USSOCOM Priority Capabilities	Description	Parameters	Threshold (% improvement)
Optimized human performance	Enhance physiological, psychological, and intellectual performance; resist disease, stress, or injury caused by sustained operations in extreme environments	Mobility, speed, strength, power, physical endurance, resilience, agility, resistance to combat stress and disease; enhance observation and cognitive skills, mental toughness, intellectual ability, creativity, and cultural adaptability	20
Rapid recovery and reconditioning	Rapid repair and reconditioning capability	Accelerate the recovery and reconditioning to full mission capability from hostilities or occupational or environmental injury	20
SOF-specific occupational health and safety capabilities	Medical aspects of surveillance, training, and protective equipment for SOF-peculiar activities	Reduce the likelihood and severity of physical and psychological injury or disease from enemy, occupational, or environmental hazards	20

Figure 2. USSOCOM's Warrior Rehabilitation Performance Center ICD Capability Descriptions

Source: United States Special Operations Command (USSOCOM), "USSOCOM Warrior Rehabilitation Performance Center ICD," 2009.

[24] Terrence K. Kelly, Ralph Masi, Britian A. Walker, Steven A. Knapp, and Kristin J. Leuschner, *An Assessment of the Army's Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning Program* (Santa Monica, CA: RAND Corporation, 2013), ii.

[25] Ibid., 50.

The program, like the ones described above produced immediate successes in not only physical performance but injury recovery as well, and proved superior in all aspects to tradition Physical Readiness programs.[26]

Due to the success of these separate programs, but still faced with some institutional reluctance to publish a new Army Regulation (AR) or Field Manual (FM), a Training Circular, TC 3-22.20, *Physical Readiness Training* was approved for publishing in 2007, and officially endorsed in 2010.[27] The difference here is important. An Army Regulation or Field Manual, is a document that directs, while a Training Circular is a document that suggests, but does not have the enforcement authority that an Army Regulation or Field Manual has.[28] Thus, while the Army has had a PRT program since 2007, it did not become a regulation until the publishing of FM 7-22, *Army Physical Readiness Training* in 2012.

The publication of TC 3-22.20 cannot be overlooked in significance however. For the first time in a generation, the Army had officially stated the importance of preparing Soldiers, leaders, and units for the physical challenges of fighting in the full spectrum of operations. "Combat readiness is the Army's primary focus as it transitions to a more

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[26] Tyson Grier, Morgan Anderson, Patrick Depenbrock, Robert Eiserman, Bradley Nindl, and Bruce H. Jones, Technical Report No. WS.0030636.3, *Evaluation of the Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning Program (THOR3)*, (Aberdeen Proving Ground, MD: U.S. Army Public Health Center, October 2016), 1-4.

[27] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment*, 188.

[28] Headquarters, Department of the Army (HQDA), Army Regulation (AR) 25-30, *Army Publishing Program* (Washington, DC: Government Printing Office, 2018), 14, 15, 65, 68.

agile, versatile, lethal and survivable force.[29] It also proved to be the correct methodology for training and injury prevention, as a 2009 study reports that "injuries were 1.5–1.8 times higher in groups of soldiers performing traditional military physical training programs when compared with groups using a PRT program."[30]

Shortly after the publication of TC 3-20.22, the USAPFS began work on developing a new APFT, one that was modeled on RAW and encompassed the now Army physical readiness fundamentals of strength, endurance, and mobility.[31] In 2012, TC 3-22.20 was replaced by FM 7-22, thus solidifying the focus on Physical Readiness Training.

Current Situation

As of early 2019, U.S. Army Physical Readiness is guided by a number of different documents. AR 350-1, *Army Training and Leadership Development,* last updated in 2017, defines programs and authorities for conducting and evaluating physical readiness training. It states that "Commanders or the senior military supervisors will establish periodized physical training programs consistent with FM 7–22 and the Army

[29] Headquarters, Department of the Army (HQDA), Training Circular (TC) 3-22.20, *Army Physical Readiness Training* (Fort Jackson, SC: Army Physical Fitness School, March 2010), accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/ada531081.pdf, xvii.

[30] Joseph J. Knapik, William Rieger, Frank Palkoska, Steven Van Camp, and Salima Darakjy, "United States Army Physical Readiness Training: Rationale and Evaluation of the Physical Training Doctrine," *Journal of Strength and Conditioning Research* 23, no. 4 (2009): 1353-1362, accessed August 15, 2018, https://www.ncbi.nlm.nih.gov/pubmed/19528858.

[31] East, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment*, 190-193.

Human Dimension Strategy."[32] FM 7-22, *Army Physical Readiness Training,* last updated in 2012, remains the primary resource for planning and conducting PRT. *The Army Human Dimension Strategy*, published in 2015, states that "Through investment in its human capital, the Army can maintain the decisive edge in the human dimension – the cognitive, physical, and social components of the Army's trusted professionals and teams."[33] It goes on to further state that "The physical edge requires investment in holistic health, injury prevention, and total fitness."[34]

There are two further documents that discuss PRT, but are not referenced in AR 350-1. *The U.S. Army Operating Concept: Win in a Complex World, 2020-2040,* (TRADOC Pamphlet 525-3-1), published in 2014, discusses strategies to optimize human performance, through physical fitness, injury prevention, and rapid injury recovery.[35] *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training,* (Army Technical Bulletin, Med 592), published in 2011, is as the name suggests a medical guide for understanding and preventing injuries associated with PRT, and to

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[32] Headquarters, Department of the Army (HQDA), Army Regulation (AR) 350-1, *Army Training and Leadership Development* (Washington, DC: Government Printing Office, 2017), 193.

[33] U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-7, *The U.S. Army Human Dimension Concept* (Fort Eustis, VA: TRADOC, May 2014), accessed August 15, 2018, http://adminpubs.tradoc.army.mil/pamphlets/TP525-3-7.pdf, 1.

[34] Ibid.

[35] U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-1, *The U.S. Army Operating Concept, Win in a Complex World 2020-2040* (Fort Eustis, VA: TRADOC, October 2014), accessed August 15, 2018, http://adminpubs.tradoc.army.mil/pamphlets/TP525-3-1.pdf, 1.

"Advise commanders on planning, implementing, and evaluating a comprehensive program to reduce musculoskeletal injuries related to PT."[36]

Perhaps the most significant recent change to Army PRT is the introduction of the six-event Army Combat Fitness Test (ACFT). The ACFT is the first Army wide approved change to physical fitness testing in a generation, and is the culmination of the efforts started by the USAPFS in 2003. The new ACFT is currently undergoing a "Field Test period, October 2018 – October 2019, and is governed by the *U.S. Army ACFT Field Testing Manual, Version 1.4*, published in August, 2018. The purpose of the ACFT is to "Better Connect fitness with combat readiness for all soldiers through; improved Soldier and unit readiness, transform the Army's fitness culture, reduce preventable injuries and attrition, and enhance mental toughness and stamina."[37]

[36] Headquarters, Department of the Army (HQDA), Technical Bulletin (TB) 592, *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training* (Washington, DC: Government Printing Office, 2011), 1.

[37] U.S. Army, "Army Combat Fitness Test," accessed August 15, 2018, https://www.army.mil/acft/.

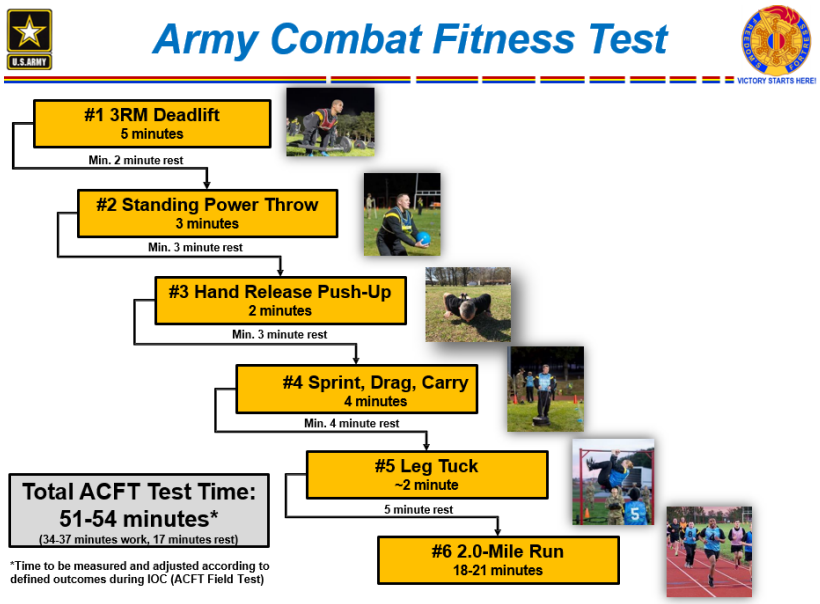

Figure 3. U.S. Army Combat Fitness Test, as of 2019

Source: Headquarters, Department of the Army, *Army Combat Fitness Test: Field Testing Manual* (Washington, DC: Government Printing Office, 2018), 4.

Purpose and Scope

Soldier physical fitness remains a key component to fighting and winning on the battlefield. Currently, physical fitness standards, requirements, testing, and methods of injury recovery are rapidly changing, but have not settled on a common format to maximize results. The methods used to enhance physical performance, and quickly recover from injury as part of the Holistic Health and Fitness concept, and as part of the future operating environment, will increase both in intensity and complexity over the next 20 years. Therefore, it is critical that the U.S. Army becomes an early adopter of new fitness and recovery technology, techniques and practices, as well as study and adapt successful practices from similar organizations.

Maintaining general physical fitness, and ensuring that Soldiers are prepared for the physical rigors of the operating environment remains an enduring challenge at all levels. This study addresses changes to doctrine, organization, training, leadership, and personnel necessary to ensure that the U.S. Army achieves maximum physical readiness. It is based on an applied professional case study of the British Army; who share most of the physical readiness challenges faced by the U.S. Army. However, the British Army possesses a Physical Training Corps that is responsible for the implementation of Physical Readiness strategies, the day to day physical training of Soldiers, and works hand in hand with the medical community in the recovery of individual Soldiers. The study examines physical readiness and injury rates in the U.S. Army due to physical training, and also examines various programs that have either been trialed or currently exist within the U.S. Army to improve readiness, increase fitness, and reduce or recover from injuries. Finally, this study addresses the U.S. Army's new Holistic Health and Fitness (H2F) concept as outlined in *The Army Human Dimension Strategy*, and makes recommendations for its successful implementation.

Researcher's Qualifications

The researcher is a U.S. Army Field Artillery Officer with over eleven years of experience. He is a veteran of Operation Iraqi Freedom, where he served as a satellite provincial reconstruction team platoon leader for 12 months, Operation Enduring Freedom (Afghanistan), where he served as a fire support officer for 7 months, and Operation Enduring Freedom (Jordan), where he served as military training team commander for 6 months. The researcher is also a graduate of the U.S. Army Airborne School, and U.S. Army Ranger School. In 2003, the researcher herniated three disks in

his lower back that was relieved by surgical correction through a microdiscectomy. In the proceeding years, the researcher became interested in holistic fitness, and as a member of both the U.S. Powerlifting Association, and the British Drug-Free Powerlifting Association, and competed successfully in serval powerlifting competitions. Through direct observation as an exchange officer to the British Army from 2015 to 2018, the researcher was able to observe key differences in the way that the British Army developed, implemented, and trained physical readiness tasks, and managed injury recovery. In 2018 the researcher reinjured his back in the same location as his previous injury. Utilizing the British Army's injury recovery methodology, which included extensive physical therapy, and chiropractic services, the researcher was able to recover fully in less time than the original injury, and without surgical intervention. He remained an exchange officer until July 2018 when he was selected to attend the U.S. Army Command and General Staff Officers' Course.

The Research Question

The intended outcome of this study is to examine current gaps in, and propose solutions to increasing physical readiness in U.S. Army Soldiers. In order to focus this research, the primary research question is: Would the introduction of a Physical Training Corps, similar in nature to the one used in the British Army, increase U.S. Soldier physical readiness through increased performance, decreased injury, and accelerated injury recovery times?

Subordinate Questions

The primary question leads to several subordinate questions that must be answered in order to properly make a recommendation. First, what is the difference between the U.S. Army and the British Army's methods of physical training and supervision? What is the difference in the rate of injury between U.S. and British Soldiers? What is the difference in the rate of recovery after injury between U.S. and British Soldiers? What is the difference in the time of recovery after injury between U.S. and British Soldiers? What programs are currently available and in-use to increase and maintain U.S. Army Soldier physical readiness? Finally, what comparisons can be made between the British method and bespoke methods offered to special populations, specifically, the 75th Ranger Regiment, and U.S. Army Special Operations Command?

Each of these questions when answered will validate the need for the U.S. Army to dramatically change the approach in which it trains, educates, and takes care of Soldiers' physical readiness requirements. In answering these questions, a framework has been established that uses assumptions, limitations, and delimitations to define the area of study. This study also requires a thorough understanding of the history surrounding Soldier physical readiness from the establishment of physical requirements and testing to the present, and an understanding of what physical requirements are needed to succeed in the future operating environment.

Assumptions

This study makes three assumptions. The first, is that the Army has already identified a requirement to change the way physical readiness is managed, and is eager to implement change. This assumption is based on the fact that the Army has conducted

numerous studies and trial programs to prevent injury and target increased physical readiness.[38]

> Human performance optimization. Advances in cognitive, behavioral, and learning sciences will improve critical thinking, increase cognitive and physical performance, foster intuition and social empathy, improve health and stamina, facilitate talent management, enhance leader training, and strengthen unit cohesion. Human performance technologies will help the Army develop adaptive leaders, resilient Soldiers, and cohesive teams that thrive in uncertain, dangerous, and chaotic environments. New pre-accessions tools hold promise for matching a recruit's aptitude to specific military occupations and building effective teams with appropriate combinations of abilities. Blended live, virtual, constructive, and gaming training environments replicate complex operating environments and improve leader and team competence and confidence. Cognitive and physical training techniques could reduce time required for mastery of Soldier and leader skills, abilities, and attributes. Advancements in decision sciences will allow faster, better-informed decisions in an increasingly complex environment.[39]

The second assumption is that technology will not replace human Soldiers in any major capacity for the foreseeable future, and thus physical readiness will remain a key component to fight and win the nation's wars. The current Army Operating Concept, *Win in a Complex World 2020-2040,* makes numerous references throughout the document that emphasize he human nature of future conflict and the challenges associated with training future Soldiers.[40]

> The Army must fit machines to Soldiers rather than the other way around. The Army will pursue advances in human sciences for cognitive, social, and physical development and emphasize engineering psychology and human factors engineering in the design of weapons and equipment.[41]

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[38] TRADOC, TRADOC Pamphlet 525-3-7 (2014), iii, 5-6

[39] TRADOC, TRADOC Pamphlet 525-3-1, 37.

[40] Ibid., iii.

[41] Ibid., 34.

The final assumption is that the Army recognizes a need to increase both injury recovery times and positive outcomes. The Army is focused on returning as many Soldiers to full readiness as quickly as possible, and successfully transitioning those who cannot. Looking again to the Army Operating Concept, it states;

> Medical sciences. Advancements in medical sciences benefit not just Soldiers and the military, but the world as well. For example, innovations in prosthetics technology increase the quality of life for Soldiers and civilians, often returning them to pre-injury activity levels. Improved casualty evacuation and treatment at the point of injury increase the number of 'golden hour' survivors to unprecedented levels. Research in preventative medicine moves the world towards cures for viruses previously untreatable. Traumatic brain injury is at the forefront of both military and civilian medical efforts, with both entities sharing research and technological discoveries. Continued investment in the medical sciences allows improved Soldier resiliency, quicker physical and mental healing, smoother integration back into society, and improved quality of life for the Soldier.[42]

Limitations

This study has three primary limitations. The first limitation is scope. This study only focuses on Physical Readiness as it deals with physical fitness, and physical fitness related injuries. This study will not address combat or combat training injuries, nor the recovery from those injuries. The data that this study relies on comes from a variety of sources, but are all linked with physical performance, and related injuries in conducting physical fitness activities. The intent of this limitation is to ensure that the data analyzed and its associated conclusions are narrowly focused to answer the research question.

The second limitation is time. Excluding the history surrounding U.S. Army physical fitness and injury recovery, which starts in 1802, this study will focus on physical fitness and injury recovery data and techniques from 2001 to present. While data

[42] TRADOC, TRADOC Pamphlet 525-3-1, 34.

on physical fitness exists outside this time period, the vast majority of injury recovery studies and data that adhere to modern research standards were all produced post year 2000. This limitation is important because it ensures validity of the data presented, and most accurately reflects the audience to which this study's recommendations apply.

The final limitation is classification. In order to achieve the widest dissemination of this study, its ideas, and recommendations, the data used in this study will come from unclassified sources. Publishing this study at the unclassified level, limits the amount of material and data that this study can draw upon to reach conclusions, as much of the data collected regarding injury recovery in particular, resides at the For Official Use Only, or No Foreign Access level. However, this limitation will not detract from the overall aim of this study, nor prevent accurate and pertinent data from being evaluated.

Delimitations

This study does not address physical fitness and injury recovery in general. While the data provided may mirror similar trends and recommendations to those based on general or sports specific physical fitness and recovery, this paper makes no recommendation for organizations other than the U.S. Army.

The data used in this paper will only focus on and compare two organizations, the U.S. Army and the British Army. This allows for the most direct comparison of organizations with similar tasks, fitness requirements, and injury modalities. While this study does not exclude U.S. Joint studies on the topic, it will not use the data provided by other services to draw conclusions.

This study will only address data and techniques officially endorsed by the U.S. Army or British Army. This study has purposely excluded, except for background and

historical information, individual unit physical fitness and injury recovery initiatives that are not official U.S. Army policy. While there are several of these unofficial programs that exist, and achieve better than average rates of physical performance and injury recovery, they have been excluded due to lack of scientific data available for analysis.

Finally, this study will not address the validity of the new U.S. Army physical fitness test of record, the Army Combat Fitness Test (ACFT). The ACFT, while approved, is currently in its Field Test phase. As such, there is a lack of data that would serve as a basis to analyze its effectiveness, and its ability to bridge any gaps identified by the study. However, the ACFT will be examined in terms of its history, and intent, as part of the overall research scope on U.S. Army Physical Readiness Training.

Initial Personal Recommendation (R1)

The applied professional case study will be used as the basis of this thesis's research. The purpose of the Initial Personal Recommendation (R1) is to identify the author's original view on what areas within the DOTMLPF-P framework require adjustment in order to maximize U.S. Army Physical Readiness. The researcher applied his current knowledge and professional judgement of the existing U.S. Army Physical Readiness program to develop the recommendations presented in the R1. The author's experience was identified above, under the Researcher's Qualification section. Initial Personnel Recommendations are presented for each element of the DOTMLPF-P framework in order to establish a common reference point. Final recommendations will continue to follow the DOTMLPF-P framework, but will include key stakeholders' concerns and additional professional knowledge gained through research and analysis.

Doctrine

FM 7-22, *Army Physical Readiness Training,* was last updated in 2012. It is currently too out of date to be used as a reliable manual for PRT, and does not include provisions to align itself with current H2F doctrine or the ACFT. The new PRT and H2F strategies must be clearly communicated if they are to be implemented correctly. Therefore, all PRT and H2F doctrine should be updated and consolidated under the new U.S. Army manuals publication system. These updated manuals should be controlled by a single decision maker, with regular review and update schedules that include multiple feedback mechanisms.

Table 1. R1: Doctrine Recommendations

Chief Decision Maker	R1: Doctrine Recommendations
Commanding General, USACIMT	Recommendation 1: Establish all PRT and H2F doctrine under ADP 7-0, *Training.* In order to establish continuity.
Commanding General, USACIMT	Recommendation 2: Create ADRP 7-22 *U.S. Army Holistic Health and Fitness.*
Commanding General, USACIMT	Recommendation 3: Update FM 7-22, *Physical Readiness Training*, to align with current doctrine and testing to include injury prevention and recovery strategies.

Source: Created by author.

Organization

The U.S. Army must consolidate authorities to develop, test, implement, track, monitor and assess its H2F and PRT programs. Consolidating these authorities into a single entity ensures continuity, adaptability, and accountability for overall U.S. Army physical readiness. The Commanding General USACIMT is the appropriate single billet

for these authorities. While the U.S. Army Surgeon General would still retain its advisement authorities, aligning all other PRT and H2F authorities into a single command increases oversight, adaptability, and ability to shape the overall force's PRT and H2F strategy and culture.

The U.S. Army must also develop and deploy individuals with the correct skill sets to ensure maximum effectiveness of PRT and H2F doctrine. This would be achieved through expanding the current Brigade Combat Team (BCT) Physical Therapy Section, and by creating a new Military Occupational Specialty (MOS), 68I, *Physical Readiness Training Specialist (PRTS)*. The specifics of this new MOS will be covered in the "Personnel" sub-section of this paragraph in line with the DOTMLPF-P framework. The current BCT Physical Therapy section is aligned under the BCT Surgeon Cell, and consists of one Physical Therapist, MOS 65B, and one Physical Therapy Specialist, MOS 68F.[43] To ensure uniform implementation of PRT and H2F strategies, the BCT Physical Therapy section should be renamed to the BCT Physical Readiness section, and include the following skills and personnel; two Physical Therapist, MOS 65B, and four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven *Physical Readiness Training Specialist, MOS 68I* (one per battalion). This new task organization would be phased in to all active component BCTs, and then expanded to all U.S. Army formations of similar size in both U.S. Army Forces Command (FORCOM) and U.S. Army Training and Doctrine Command (TRADOC).

[43] U.S. Army Office of the Surgeon General, *Physical Therapists in Brigade Combat Teams* (Falls Church, VA: Government Printing Office, 2013), 1-2.

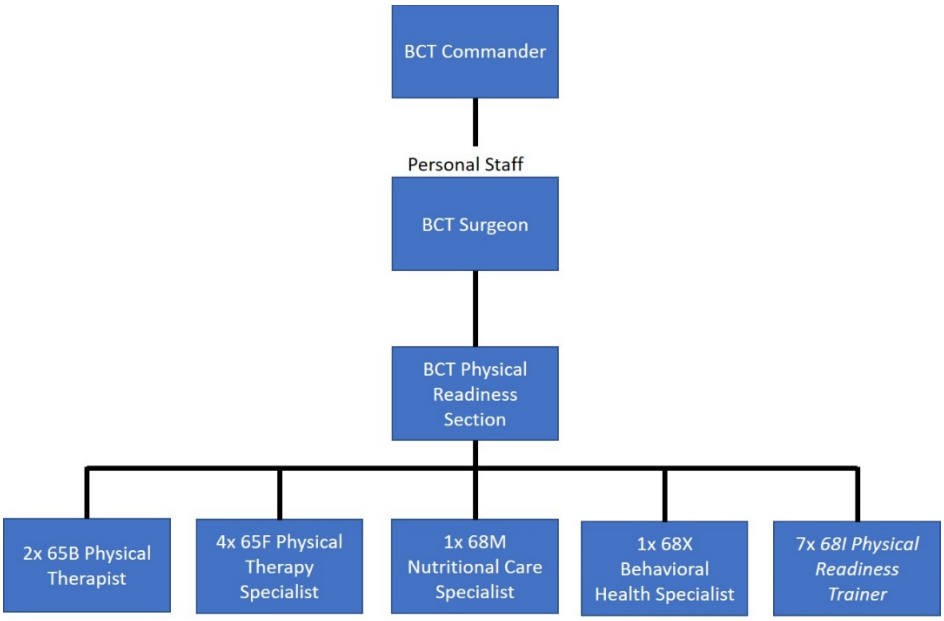

Figure 4. R1: Initial Personal Recommendation Organizational Structure

Source: Created by author using Headquarters, Department of the Army, Headquarters, Field Manual 3-96, *Brigade Combat Team* (Washington, DC: Government Printing Office, 2015).

Table 2. R1: Organization Recommendations

Chief Decision Maker	R1: Organization Recommendations
U.S. Army Chief of Staff G3/5/7	Recommendation 1: Consolidate all authority to develop, test, implement, track, monitor and assess its H2F and PRT programs and initiatives under Commanding General, USACIMT.
U.S. Army Office of the Deputy Chief of Staff for Personnel (ODCSPER)	Recommendation 2: Revise U.S. Army manning guidance to increase authorizations and billets in the Brigade Physical Therapy Section to include: two Physical Therapist, MOS 65B, four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven *Physical Readiness Training Specialist, MOS 68I*
U.S. Army Deputy Chief of Staff G-3	Recommendation 3: Rename the *Brigade Physical Therapy Section* to the *Brigade Physical Readiness Section.*

Source: Created by author.

Training

The U.S. Army has incorporated its PRT and H2F strategies into its Initial Entry Training schools.[44] This training follows the guidance set forth in AR 350-1, FM 7-22, and *The Army Human Dimension Strategy*. This training provides incoming Soldiers with the tools and skills necessary to inculcate and execute the U.S. Army's vision for physical readiness. However, there is currently no training program to indoctrinate currently serving Soldiers into the PRT and H2F strategy. This creates a knowledge gap between new Soldiers, those who have completed IET after 2017, and currently serving Soldiers who are senior in both time in service, and often rank. Therefore, it is critical that all serving Soldiers receive instruction, training, and refreshment when needed on PRT and H2F strategies and techniques. This is most easily accomplished upon arrival to a new duty station or assignment. Incorporating PRT and H2F instruction and training into each unit's in-processing requirements will help close the knowledge gap that currently exists, and ensure that previous PRT and H2F education is refreshed and utilized.

The need for a new MOS for a qualified Physical Readiness Training Specialist described in this chapter will necessitate the formation of a new Advanced Individual Training (AIT) school to train and qualify members of this new MOS. This AIT should be established at Ft Jackson, SC, and fall under the preview of the USAPFS. This school would expand upon the already established Master Fitness Trainer Course (MFTC), and would incorporate H2F and PRT methodology, injury prevention and early intervention, as well as rehabilitation management of physical profiles. While the R1 recommends that

[44] U.S. Army Center for Initial Military Training, "Holistic Health and Fitness (H2F) Concept" (PowerPoint presentation, Fort Jackson, SC, 2018).

the curriculum follows a similar model to that of a Certified Strength and Conditioning Coach through the National Strength and Conditioning Association, the USAPFS is best organization to develop and implement a curriculum, and associated certifications that best enhance physical readiness through the U.S. Army PRT and H2F methodologies.

Table 3. Training Recommendations

Chief Decision Maker	R1: Training Recommendations
U.S. Army Chief of Staff G3/5/7	Recommendation 1: Amend AR 350-1 to mandate PRT and H2F training and education as a component of unit in-processing.
Commanding General, USACIMT	Recommendation 2: Establish an Advanced Individual Training school to accommodate a new Physical Readiness Training Specialist MOS under guidance from the USAPFS.

Source: Created by author.

Materiel

There are currently no materiel changes needed to accomplish the recommendations set forth in the R1. However, materiel recommendations will need to be reviewed once the new ACFT becomes the U.S. Army test of record in 2020.

Leadership and Education

Professional Military Education (PME) is the bedrock for educating U.S. Army leaders at all levels. The U.S. Army defines PME as,

> a progressive education system that prepares leaders for increased responsibilities and successful performance at the next higher level by developing the key knowledge, skills, and attributes they require to operate successfully at

> that level in any environment. PME is linked to promotions, future assignments, career management models, and applies to all officers.[45]

U.S. Army PME Schools currently include: Basic Leader Course (BLC), Advanced Leader Course (ALC), Senior Leader Course (SLC), Sergeant Major Course (SMC), Basic Officer Leader Course (BOLC), Captains Career Course (CCC), Command and General Staff Officer Course (CGSOC), U.S. Army War College (USAWC), Warrant Officer Basic Course (WOBC), Warrant Officer Advanced Course (WOAC), Warrant Officer Intermediate Level Education (WOILE), and Warrant Officer Senior Service Education (WOSSC).[46]

However, there is currently no mandated curriculum in U.S. Army's continuing Professional Military Education (PME) to train leaders on new PRT or H2F concepts. This creates a knowledge gap that hinders adoption and synthesis of the U.S. Army's PRT and H2F vision. It is therefore critical that PME at all levels incorporates PRT and H2F education into its curriculum.

The main challenge associated with incorporating PRT and H2F into all PME courses, is that each PME course's curriculum is developed and validated by the "Commandants, commanders and directors of Army schools, centers, and institutions" of the PME course.[47] Therefore the U.S. Army Deputy Chief of Staff G3/5/7, would have to amend AR 350-1 to mandate that PRT and H2F training are incorporated into each PME course. This change is not without precedent however, as the U. S. Army Deputy Chief of

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[45] HQDA, AR 350-1, 235.

[46] Ibid., 189.

[47] Ibid., 44.

Staff G3/5/7 has mandated that every PME course include "Army Values training; Sexual Harassment, Assault and Response Prevention (SHARP) training in all professional military education courses."[48]

Ensuring that all U.S. Army leaders receive continuing education on PRT and H2F techniques and strategies will help ensure universal adoption of PRT and H2F principles. Continuing PRT and H2F education, tailored to the appropriate level based on rank, responsibilities and skill will have synergistic effects that will allow the U.S. Army to increase Physical Readiness. It will also create a uniform level of strategic execution that will be immune to leader turn-over due to such factors as change-of-command, retirement, injury, reassignment, and permanent change of station (PCS).

Table 4. R1: Leadership and Education Recommendations

Chief Decision Maker	R1: Leadership and Training Recommendations
U.S. Army Chief of Staff G-3/5/7 U.S. Army Commanding General – TRADOC	Recommendation 1: Amend AR 350-1 to mandate all PME courses incorporate PRT and H2F training into its curriculum.

Source: Created by author.

[48] HQDA, AR 350-1, 44.

Personnel

The U.S. Army currently relies on the Master Fitness Trainer Course (MFTC) to provide U.S. Army units with qualified personnel to "be unit advisors on physical readiness issues and monitor unit and individual physical readiness programs."[49] The course of instruction for the MFTC is three weeks long; one week of distance learning (DL) and two weeks of resident instruction at the USAPFS, Ft. Jackson, SC, Warrior Training Brigade, Ft. Benning, GA, or at the student's home station through the use of a Mobile Training Team (MTT). MFTC instruction includes " the science of exercise, physical fitness assessment, exercise training principles, exercise prescription, exercise leadership, and development of individual and unit physical readiness programs in accordance with current Army doctrine and regulations."[50] The MFTC is open to U.S. Army Sergeant (E-5) through Sergeant First Class (E-7) and Second Lieutenant (O-1) through Captain (O-3), and upon graduation are awarded an additional skill identifier (ASI) and are referred to as Master Fitness Trainers.[51] While the MFTC has provided an invaluable service to units, there are two major issues with the current program. The first, is the rank requirement need to attend. While the course is mentally and physically arduous, and therefore requires the maturity consummate with the required rank, it ensures that all MFTC graduates will be assigned to other leadership duties outside the scope of the MFTC. This relegates the Master Fitness Trainer role to an additional duty,

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[49] U.S. Army Physical Fitness School (USAPFS), "Master Fitness Trainer Course," accessed 01 February 2019, http://usacimt.tradoc.army.mil/ltb/pfs/Course.

[50] Ibid.

[51] Ibid.

that the individual may not have time to properly execute. It also severely restricts the pool of available candidates able to attend the course, as many commissioned and non-commissioned leaders are deemed mission critical, and therefore do not have the time available to attend the course. The second major issue with the MFTC is that it does not currently incorporate H2F into the curriculum. As noted, several times throughout this chapter, the lack of H2F education creates misalignment and knowledge gaps throughout the force.

In order to correct the current deficiencies and misalignment of PRT and H2F strategies, the U.S. Army should authorize the creation of a new MOS, 68I, *Physical Readiness Training Specialist (PRTS)*. The PRTS would be responsible for the planning, implementation, and monitoring of the battalion's PRT and H2F program for the battalion commander, on behalf of the BCT commander, and help the battalion achieve its defined PRT and H2F goals. The PRTS would serve as the battalion's fulltime Subject Matter Expert (SME) and Soldier resource on physical readiness, and holistic health and fitness. In addition, the PRTS would also be responsible for implementing and monitoring injury recovery programs, colloquially known as "Profile PT," on behalf of the BCT Surgeon and the BCT's host Military Treatment Facility (MTF). This will create efficiencies in both PRT, H2F, and injury prevention and recovery. The PTRS would also manage the duties of Master Fitness Trainers on behalf of the battalion in order to ensure that maximum value is being obtained from the MFTC skill set. The initial authorized strength of the 68I MOS should be set at no less than 500 personnel. This will ensure that there are sufficient personnel to place one 68I, Physical Readiness Training Specialist in every active duty U.S. Army Battalion assigned to a Brigade Combat Team, separate

Brigade, and Regiment. It will also ensure that there are sufficient personnel that upon validation, the program can be rapidly expanded to include all FORSCOM and TRADOC units Battalion size or larger.

Table 5. R1: Personnel Recommendations

Chief Decision Maker	R1: Personnel Recommendations
U.S. Army Office of the Deputy Chief of Staff for Personnel (ODCSPER)	Recommendation 1: Establish the creation of a new MOS, 68I, Physical Readiness Training Specialist, and associated manning billets.
U.S. Army Chief of Staff G-3/5/7	Recommendation 2: Revise U.S. Army manning priorities and operational mission requirements in the HQDA manning guidance to request placement of MOS 68I, 7 per Brigade Combat Team, Sperate Brigade, and independent Regiment.

Source: Created by author.

Facilities

There are currently no facility changes needed to accomplish the recommendations set forth in the R1. However, facility recommendations will need to be reviewed once the new ACFT becomes the U.S. Army test of record in 2020, and when all other R1 recommendations have been implemented.

Policy

There are currently no policy changes needed to accomplish the recommendations set forth in the R1. However, policy recommendations will need to be reviewed if the

currently proposed consolidation of U.S. Army Medical Personnel under the Department of Defense (DOD) Defense Health Agency.[52] [53]

Definitions of Key Terms

Army Physical Fitness System (APFS): The British Army physical fitness program. It is the equivalent to the U.S. Army's PRT.[54]

Capability: The ability to achieve a desired effect under specified standards and conditions through a combination of means and ways to perform a set of tasks.[55]

Capability-Based Assessment (CBA): The analysis portion of the Joint Capabilities Integration and Development System (JCIDS) process. The CBA provides recommendations to pursue a material or non-material solution to an identified capability gap that meets an established capability need. The analysis contains the Functional Area

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[52] Steve Sternberg, "Pentagon Plans Massive Reorganization of Military Medicine," *U.S. News and World Report*, February 8, 2019, https://www.usnews.com/news/national-news/articles/2019-02-08/pentagon-plans-massive-reorganization-of-military-medicine.

[53] Tom Phillpot, "More Than 17,000 Uniformed Medical Jobs Eyed for Elimination," *Military.com,* January 10, 2019, https://www.military.com/daily-news/2019/01/10/more-17000-uniformed-medical-jobs-eyed-elimination.html.

[54] U.K. Army, *Army General and Administrative Instructions (AGAI), Volume 1, Chapter 7: Physical Training* (London: UK Ministry of Defense, Crown Copyright, 2019), A-2.

[55] U.S. Joint Chiefs of Staff (JCS), Chairman Joint Chiefs of Staff Instruction (CJCSI) 5123.01H, *Charter of the Joint Requirements Oversite Counsel (JROC) and Implementation of the Joint Capabilities Integration and Development System (JCIDS)* (Washington, DC: Government Printing Office, August 2018), GL-7.

Analysis (FAA), Functional Needs Analysis (FNA) and Functional Solution Analysis (FSA).[56]

Capability Gap: The inability to execute a specific course of action. The gap may be the result of a no existing capability, lack of proficiency or sufficiency in an existing capability solution, or the need to replace an existing capability solution to prevent a future gap.[57]

Doctrine: The fundamental principles that guide the employment of the U.S. military forces in coordinated action toward a common objective.[58]

Exercise Rehabilitation Instructor (ERI): The ERI is a [British Army] PTI who has passed a 6-month course in rehabilitation at the Joint Services School of Exercise Rehabilitation Instructors (JSSERI) at the Defence Medical Rehabilitation Centre (DMRC), Headley Court. The ERI's primary treatment responsibility is the creation, implementation and supervision of safe and effective exercise-based rehabilitation programmes, but can include taping/strapping and ice therapy for the First Aid

[56] U.S. Joint Chiefs of Staff (JCS), *Capabilities Based Assessment (CBA) User Guide, Version 3* (Washington, DC: Government Printing Office, 2009).

[57] U.S. Joint Chiefs of Staff (JCS), *Manual for the Operation of the Joint Capabilities Integration and Development System (JCIDS)* (Washington, DC: Government Printing Office, January 2012).

[58] U.S. Air Force (USAF), Office of Aerospace Studies, *Capabilities-Based Assessment (CBA) Handbook; A Practical Guide to the Capabilities-Based Assessment* (Kirtland AFB, NM: Air Force Materiel Command (AFMC) OAS/A5, March 2014), 29.

management of soft tissue injuries. ERIs perform their treatments under medical supervision.[59]

Facilities: Real property consisting of one or more of the following: buildings, structures, utility systems, associated roads and other pavements, and underlying land.[60]

Functional Area Analysis (FAA): The Functional Area Analysis (FAA) identifies the operational tasks, conditions, and standards needed to achieve military objectives. The FAA uses the national strategies (National Military Strategy, National Defense Strategy, National Security Strategy), the Family of Joint Future Concepts, and other assigned missions to arrive at a prioritized list of capabilities and tasks that must be accomplished by all functional areas to achieve these military objectives.[61]

Functional Needs Analysis (FNA): A Functional Needs Analysis (FNA) assesses current and future capabilities to meet the military objectives of the scenarios chosen in the Functional Area Analysis (FAA) and is an output of the CBA.[62]

Functional Solution Analysis (FSA): The operationally based assessment of potential Doctrine, Organization, Training, Materiel, Leadership and Education,

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[59] U.K. Army, *The Unit Fitness Training Officer* (London: UK Ministry of Defense, Crown Copyright, 2011), 13.

[60] USAF, *CBA Handbook,* 30.

[61] U.S. Joint Chiefs of Staff (JCS), Chairman Joint Chiefs of Staff Instruction (CJCSI) 3170.01E, *Joint Capabilities Integration and Development System* (Washington, DC: Government Printing Office, 2005), A-4.

[62] Ibid.

Personnel and Facilities (DOTMLPF) approaches to solving (or mitigating) one or more of the capability gaps identified in the Functional Needs Analysis (FNA).[63]

Health Trainer: A British Army certification held by app RAPTCI and PTI personnel. The goals of the Health Trainer program are to assist British Army Soldiers on smoking cessation, alcohol and substance misuse, stress management and mental health, sexual health, diet and nutrition, dental and oral health, and injury prevention and management.[64]

Holistic Health and Fitness (H2F): [A U.S. Army training methodology that] incorporates both the traditional aspects of physical fitness, along with nutritional, psychological, and sports medicine contributions for optimal physical performance.[65] H2F has been proposed to replace PRT in the future.

Human Performance Optimization: The process of applying knowledge, skills, and emerging technologies to improve and preserve the capabilities of Department of Defense personnel to execute essential tasks.[66]

Initial Capabilities Document (ICD): An Initial Capabilities Document (ICD) documents the need for a materiel approach, or an approach that is a combination of materiel and non-materiel, to satisfy specific capability gap(s).[67]

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[63] JCS, CJCSI 3170.01E, A-4.

[64] U.K. Army, *The Unit Fitness Training Officer*, 12-13.

[65] TRADOC, TRADOC Pamphlet 525-3-7 (2014), 33.

[66] Ibid.

[67] U.S. Department of Defense (DoD), Defense Acquisition University (DAU), "Initial Capabilities Document (ICD)," accessed 15 November 2018,

Joint Capabilities Integration and Development System (JCIDS): The process used by Joint Requirements Oversight Council (JROC) to fulfill its advisory responsibilities to the Chairman of the Joint Chiefs of Staff in identifying, assessing, validating, and prioritizing joint military capability requirements.[68]

Leadership and Education: Professional development of the joint leader is the product of a learning continuum that comprises training, experience, education, and self-improvement.[69]

Materiel: All items necessary to equip, operate, maintain, and support joint military activities without distinction as to their application for administrative or combat purposes.[70]

Non-materiel (Capability Solution): Changes to doctrine, organization, training, (fielded) materiel, leadership and education, personnel, facilities, and/or policy, implemented to satisfy one or more capability requirements (or needs) and reduce or eliminate one or more capability gaps, without the need to develop or purchase new materiel capability solutions.[71]

Organization: The joint unit or element with varied functions and structures.[72]

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https://www.dau.mil/cop/rqmt/Pages/Topics/Initial%20Capabilities%20Document%20ICD.aspx.

[68] JCS, CJCSI 3170.01E.

[69] USAF, *CBA Handbook*, 30.

[70] Ibid.

[71] JCS, CJCSI 5123.01H, GL-10.

[72] USAF, *CBA Handbook*, 29.

Personnel: The personnel component primarily ensures that qualified personnel exist to support joint capability requirements.[73]

Physical Readiness: Physical readiness is the ability to meet the physical demands of any combat or duty position, accomplish the mission, and continue to fight and win.[74]

Physical Training Instructor (PTI): A trained and qualified member of the British Army who's primary or secondary responsibility is the execution of physical training. The PTI works at the company level and below under the guidance of the RAPTCI, and is the company commander's physical training subject matter expert. The PTI may be utilized as a full-time appointment, or in conjunction with other duties.[75]

Physical Readiness Training (PRT): The U.S. Army's physical training program. Physical Readiness Training provides the physical component that contributes to tactical and technical competence, and forms the physical foundation for all training.[76]

Policy: Any DoD, interagency, or international policy issues that may prevent effective implementation of changes in the other seven DOTMLPF-P elemental areas.[77]

Royal Army Physical Training Corps Instructor (RAPTCI): A trained and qualified British Army senior NCO, Warrant Officer, or Officer, who's primary military

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[73] USAF, *CBA Handbook*, 30.

[74] Headquarters, Department of the Army (HQDA), Field Manual (FM) 7-22, *Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2013), 1-1.

[75] U.K. Army, *AGAI*, 1-11, E-2.

[76] HQDA, FM 7-22, 1-1.

[77] USAF, *CBA Handbook,* 30.

job is the advice and instruction of physical training, injury prevention and recovery. RAPTCIs are assigned to battalion and higher formations of the British Army to include all training establishments.[78]

Stakeholders: Any agency, service, or organization with a vested interest (a stake) in the outcome of the pre-acquisition analysis.[79]

Task: A clearly defined action or activity specifically assigned to an individual or organization that must be done as it is imposed by an appropriate authority.[80]

Training: Training of individuals, units, and staffs addresses the use of joint doctrine or joint tactics, techniques, and procedures.[81]

Conclusion

While the U.S. Army has made large strides toward modernizing its Physical Readiness Training and Holistic Health and Fitness approach to increase Physical Readiness, there remains capability gaps in the doctrine, organization, training, leadership and education, and personnel currently fielded to realize this goal. In order to better prepare the U.S. Army and its Soldiers for increasing complex operating environments, the U.S. Army must adopt a series of changes to ensure it can continue to dominate on

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[78] U.K. Army, *AGAI*, 1-11, E-2.

[79] U.S. Air Force (USAF), Office of Aerospace Studies, *Analysis of Alternatives (AoA) Handbook: A Practical Guide to the Analysis of Alternatives* (Kirtland AFB, NM: HQ Air Force/A5R-OAS, July 2016), 13.

[80] U.S. Joint Chiefs of Staff (JCS), Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2016) 237.

[81] USAF, *CBA Handbook*, 30.

the modern battlefield. The changes explored in this research are critical first steps to achieving that goal. Chapter 2 will examine the literature used to conduct analysis and research, and the researcher believes it will show that the U.S. Army is ready and willing to adopt the changes proposed in this paper.

CHAPTER 2

LITERATURE REVIEW

> High physical condition is vital to victory. There are more tired corps and division commanders than there are tired corps and divisions. Fatigue makes cowards of us all. Men in condition do not tire.
>
> —General George S. Patton, Letter of Instruction No. 1

Introduction

The purpose of a literature review is to capture the background, knowledge, experience, and conclusions from which recommendations are made. In Chapter 1, the reader was introduced to the concept of increasing physical readiness through physical readiness training, holistic health and fitness, and injury recovery. Chapter 1 also discussed the primary and secondary research questions, assumptions, limitations, delimitations, and scope. These sections were used to identify the researcher's Initial Personal Recommendation (R1). Chapter 2 provides an in-depth literature review of published works related to physical readiness and the Joint Capabilities Integration and Development System (JCIDS). In addition, chapter two reviews doctrine, emerging concepts, and medical reports on physical readiness, holistic health and fitness and injury recovery, and current initiatives to correct deficiencies. This is especially important in this paper. In the study of, and desire to optimize physical readiness through physical readiness training, holistic health and fitness and injury recovery, there are multiple streams of information from a variety of organizations that may not necessarily be focused on the goal of increasing readiness. The literature review will provide the bases of the Research Methodology in Chapter 3, and Analysis in Chapter 4.

This chapter highlights that there has been significant emphasis on the methodology of enhancing physical fitness and identifying root causes of common physical fitness related injuries. Separately, there has been several attempts to implement programs at the Army level that enhance physical fitness. However, there is surprisingly little literature that synthesizes the two topics, with all of the published literature that does, spanning the last 15 years.

Literature used in this study is broken down into three categories:

1. The first category will cover the Joint Capabilities Integration and Development System (JCIDS), Capabilities Based Assessment (CBA), and the DOTMLPF-P process. These processes are important to understand the research methodology, covered in Chapter 3. It is also essential to understand, because the recommendations put forth in the paper are given using the DOTMLPF-P methodology.

2. The second category will examine current U.S. Army doctrine, future operating concepts, and studies and reports covering current issues and trends in Physical Readiness Training, injury rates, and injury recovery.

3. The last category will examine British Army doctrine, future operating concepts, and studies and reports covering current issues and trends in Physical Readiness Training, injury rates, and injury recovery. Where applicable, literature that compares U.S. and British Army methodologies of physical fitness, injury sustainment and injury recovery is covered at the end of category three.

Upon review of the available sources, the ability to understand the lack of unity that exists between studies and doctrine will become clear. Furthermore, understanding of how linkages have been developed between physical fitness, injury recovery and overall

physical readiness will be established. The reader will gain appreciation for the importance of enhancing physical fitness and injury recovery capabilities, and the gaps present in current doctrine and concepts. This information is necessary in order to conduct the Functional Area Analysis (FAA) within the Capabilities Based Analysis (CBA) which forms the basis for Chapter 4. With this understanding, the necessity of this paper, and the value of the recommendations that this paper produces will become clear.

Category 1: The JCIDS Process

The Joint Capabilities Integration and Development System is a DOD process designed "to assess joint military capabilities, and identify, approve, and prioritize gaps in these capabilities."[82] The JCIDS process was developed in order to standardize capability integration and development across departments in the DOD.[83] As such, it serves as the base document for outlining the process through which the CBA, and DOTMLPF-P frameworks are used to identify and mitigate gaps.

[82] JCS, *Manual for the Operation of the Joint Capabilities Integration and Development Syste*m (2018), A-1.

[83] JCS, *CBA User's Guide,* 4-6.

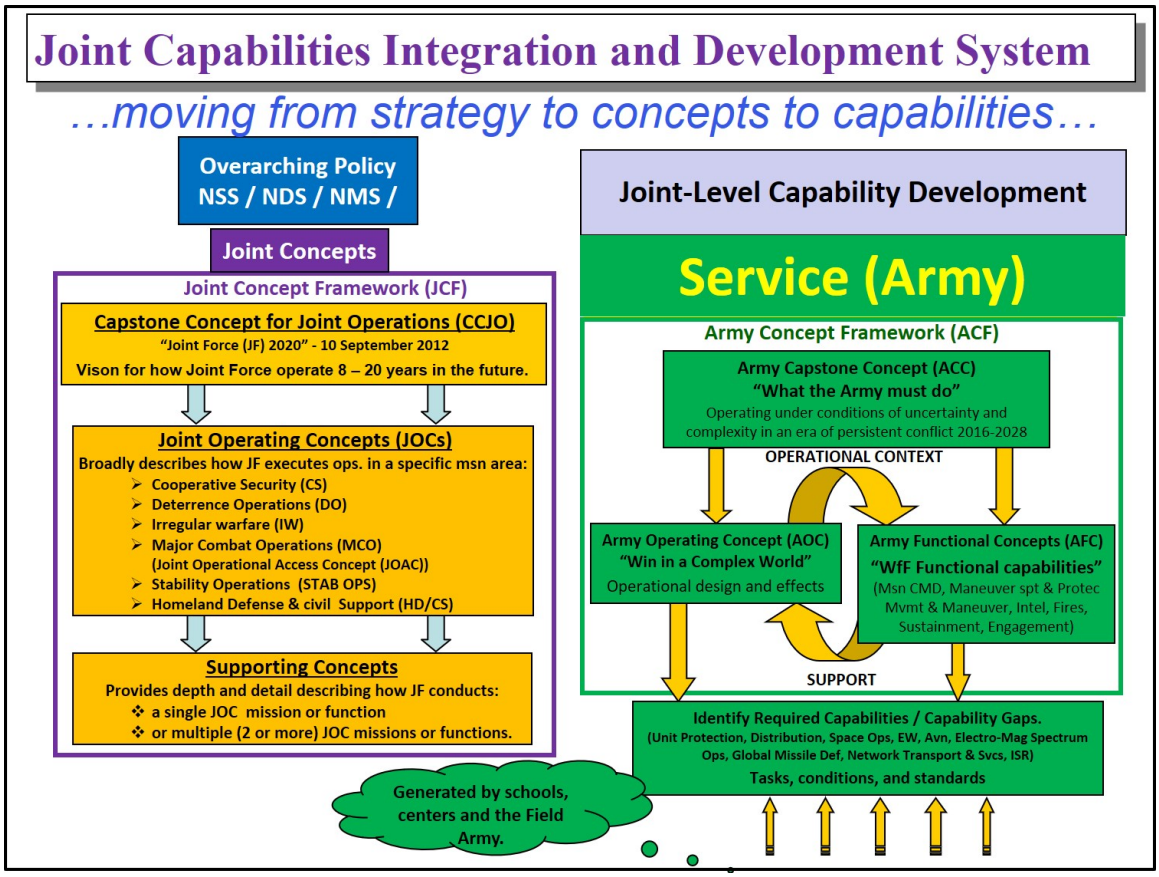

Figure 5. The Department of Defense JCIDS Process

Source: Department of Logistics and Resource Operations, "F102: Joint and Army Capabilities Development" (PowerPoint presentation, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2019), slide 10.

Category 1: The Capabilities Based Assessment Process

The CBA users guide, version 3, defines the CBA as:

> the capabilities and operational performance criteria required to successfully execute missions; the shortfalls in existing weapon systems to deliver those capabilities and the associated operational risks; the possible non-materiel

approaches for mitigating or eliminating the shortfall, and when appropriate recommends pursuing a materiel solution.[84]

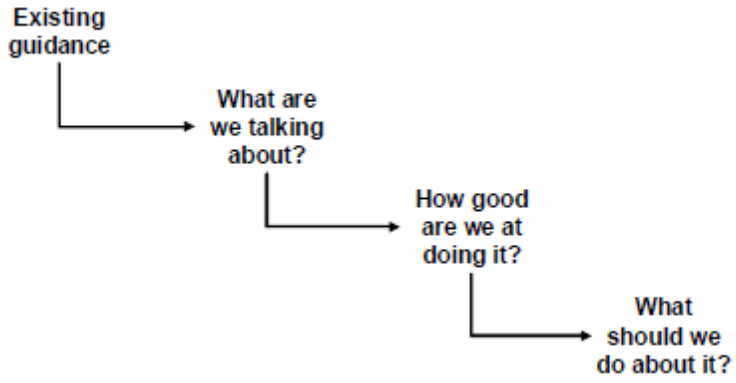

Figure 6. Simplified Diagram of Major CBA Inputs, Analysis, and Outputs

Source: U.S. Joint Chiefs of Staff, *Capabilities Based Assessment (CBA) User Guide, Version 3* (Washington, DC: Government Printing Office, 2009), 10.

The CBA process consists of three main components; the Functional Area Analysis (FAA), the Functional Needs Analysis (FNA), and the Functional Solution Analysis (FSA).[85] The FAA identifies the mission area or military problem to assess, the concepts to examine, the timeframe in which the problem is assessed, and the scope of the assessment.[86] TRADOC will then identify the tasks, conditions, and standards for

[84] JCS, C*BA User's Guide,* 4.

[85] Department of Logistics and Resource Operations (DLRO), "F102: Joint and Army Capabilities Development" (PowerPoint presentation, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2019), 23.

[86] Headquarters, Department of the Army (HQDA), Army Regulation (AR) 71-9, *Warfighting Capabilities Determination* (Washington, DC: Government Printing Office, 2009), 23.

each required capability.[87] In this thesis, the FAA will consist of a list of tasks that U.S. Army Soldiers must execute in order to achieve Physical Readiness. A review of current U.S. Army doctrine will provide the information for the FAA. The FNA assesses current and future force capabilities to meet the military objectives of the scenarios chosen in the FAA.[88] The FNA will identify any capability gaps that may exist in order to increase physical readiness. Documents focused on the Army's future operating concept along with reports and studies conducted with relation to U.S. Army physical readiness will be compared with comparable documents from the British Army to provide the data to complete the FNA. The FSA is the operationally-based assessment of the potential DOTMLPF-P approaches to solving (or mitigating) one or more of the capability gaps identified in the FNA.[89] As with the FNA, documents from the U.S. and British Army's will be used to identify solutions to the identified gaps.

[87] HQDA, AR 71-9, 23.

[88] DLRO, "F102: Joint and Army Capabilities Development," 13.

[89] Ibid.

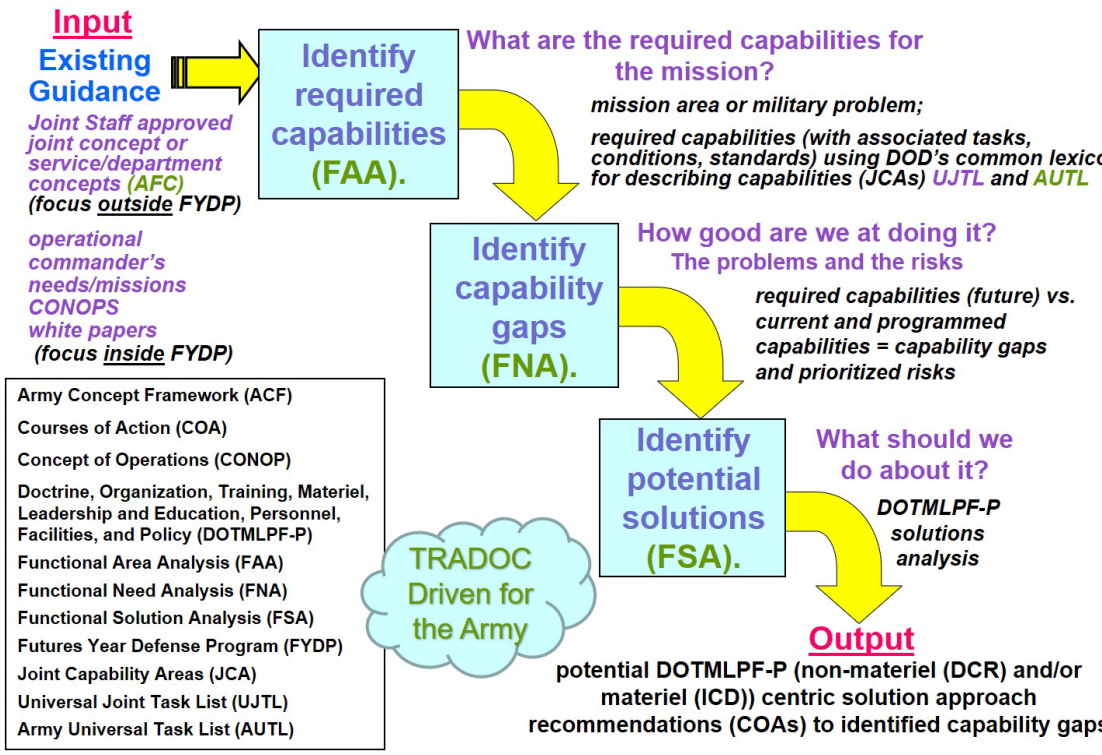

Figure 7. The Capabilities Based Assessment (CBA) Process

Source: Department of Logistics and Resource Operations, "F102: Joint and Army Capabilities Development" (PowerPoint presentation, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2019), slide 13.

Category 1: The DOTMLPF-P Process

The DOTMLPF-P is a classification system used during the CBA when proposing solutions to the FSA. Each solution identified in the FSA is broken down according to a DOTMLPF-P domain. These domains are;

Doctrine: – frames the fundamental principles by which the military forces or military elements guide their actions in support of national objectives.[90]

Organization: – A unit or element with varied functions enabled by a structure through which individuals cooperate systematically to accomplish a common mission and directly provide or support warfighting capabilities. Subordinate units/elements coordinate with other units/elements and, as a whole, enable the higher-level unit/element to accomplish its mission. This includes the manpower (military, civilian, and contractor support) required to operate, sustain, and reconstitute warfighting capabilities.[91]

Training: – The instruction of personnel to increase their capacity to perform specific military functions and associated individual and collective tasks.[92]

Materiel: – All items (including ships, tanks, self-propelled weapons, aircraft, and so forth, and related spares, repair parts, and support equipment but excluding real property, installations, and utilities) necessary to equip, operate, maintain, and support military activities without distinction as to its application for administrative or combat purposes.[93]

Leadership and Education: – Leadership development is the product of a learning

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[90] Headquarters, Department of the Army (HQDA), Army Regulation (AR) 5-22, *The Army Force Modernization Proponent System* (Washington, DC: Government Printing Office, 2015), 13.

[91] Ibid.

[92] Ibid., 14.

[93] Ibid., 13.

continuum that comprises training, experience, formal education, and continual self-improvement.[94]

Personnel: – The development of manpower and personnel plans, programs, and policies necessary to man, support and sustain the Army.[95]

Facilities: – Real property consisting of one or more of the following: a building, a structure, a utility system, pavement, and underlying land.[96]

Policy: – Authoritative written guidance that affects capabilities development. When examining this DOTMLPF–P component force modernization proponents should consider any Department of Defense, interagency, or international policy issues that may prevent effective implementation of changes in the other DOTMLPF–P components.[97]

[94] HQDA, AR 5-22, 13.

[95] Ibid., 14.

[96] Ibid., 13.

[97] Ibid., 14.

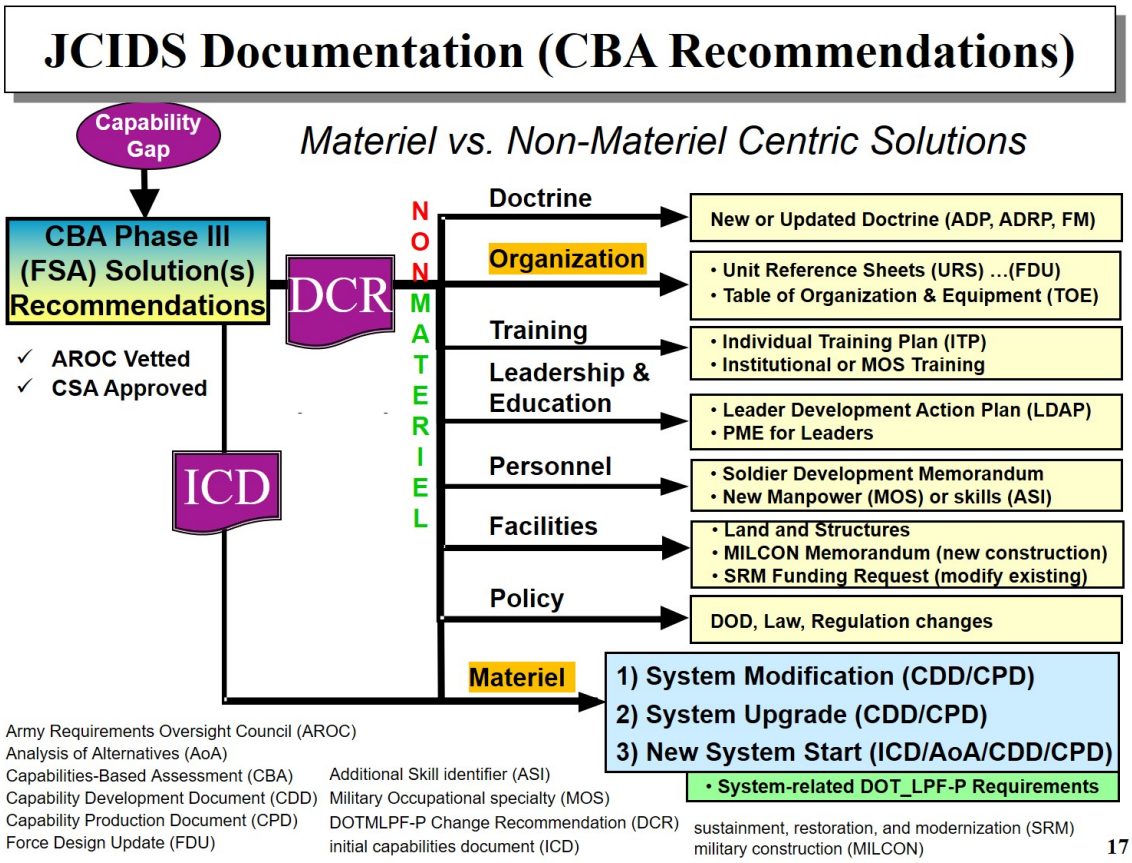

Figure 8. CBA Solutions using the DOTMLPF-P Format

Source: Department of Logistics and Resource Operations, "F102: Joint and Army Capabilities Development" (PowerPoint presentation, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2019), slide 17.

Doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy functional process	Functional process owner
Doctrine	DCS, G–3/5/7
Organization	DCS, G–3/5/7
Training	DCS, G–3/5/7
Materiel	ASA (ALT)
Leader Development and Education	DCS, G–3/5/7
Personnel	DCS, G–1
Facilities	Assistant Chief of Staff for Installation Management
Policy	OSA, OCSA, and Principal HQDA Officials (see DAGO 2012–01)

Figure 9. HQDA, DOTMLPF-P Responsibilities

Source: Headquarters, Department of the Army, Army Regulation 5-22, *The Army Force Modernization Proponent System* (Washington, DC: Government Printing Office, 2015), 4.

In order to give full consideration to the domains of the DOTMLPF-P model, this thesis will examine each component for possible solutions. Now that the JCIDS, CBA, and DOTMLPF-P frameworks have been explained, the reader is ready to transition to categories two and three of the literature review.

Category 2: U.S. Army Doctrine

AR 350-1, *Army Training and Leader Development,* last updated in 2018, is used to implement the "policies, procedures, and responsibilities for developing, managing, and conducting Army training and leader development."[98] In the realm of physical readiness, AR 350-1, delegates the responsibility to several different authorities based off a number of different criteria. These include; The Chief of the National Guard Bureau, The Army Deputy Chief of Staff, G-3/5/7, The Surgeon General, Commanding General U.S. Army Training and Doctrine Command (TRADOC), and the Commanding General,

[98] HQDA, AR 350-1, 1.

U.S. Army Ceneter of Initial Military Training (USACIMT).[99] The Commanding General, U.S. Army Center for Initial Military Training (USACIMT), through the U.S. Army Physical Fitness School (USAPFS) of the Leader Training Brigade (LTB) –

> provides guidance concerning theories and principles of human performance and exercise science as informed by empirical research, institutional best practices and experiential learning to drive PRTP doctrine including periodized individual/unit training programs and performance standards. Following the Army Human Dimension Strategy (F2025B) the PRTP focuses on the force, the unit and the individual. The most important aspect of the PRTP is developing the physical and functional capacity of the individual Soldiers in preparation for combat. Expertise should be supported by professional certification from organizations like the American College of Sports Medicine, the National Strength and Conditioning Association, the American Council on Exercise, and the Cooper Aerobics Research Institute. Moreover, because personal health and fitness is a critical enabler to effective leadership in an era of persistent conflict, the CG, USACIMT will take the lead in holistic health and fitness by developing and sustaining leader enhancement programs during PME to "reset" and strengthen the resiliency and hardiness of Officer, NCO, WO, and Army Civilian leaders. These programs will ensure leaders better understand the linkages between mental and physical readiness and professional development, thereby mitigating the potential effects of operational fatigue.[100]

In terms of physical readiness training, AR350-1 states that "Physical readiness is an integral part of ground combat readiness. The ability to develop, maintain, and perform warrior tasks and battle drills (WTBDs) and high physical demand tasks (HPDTs) is critical to mission success."[101] It states that FM 7-22 is to be the main reference manual from which PRT programs are to be conducted, and breaks down Physical Readiness into the following components:

> The objective of the Army physical readiness training program is to enhance physical readiness for combat by optimizing physical and functional

[99] HQDA, AR 350-1, 21.

[100] Ibid., 34.

[101] Ibid., 12.

capacity in the following domains: (1) Structural Capacity (a) Body Composition – percentage of lean and fat body mass (see AR 600–9). (b) Bone Density – bone thickness contributing to tensile strength. (c) Static Balance – posture, stability and balance while stationary. (d) Static Flexibility – range of motion associated with plasticity. (2) Physical Capacity. (a) Muscular Strength – ability to generate maximum muscular force during a single contraction to lift, push, pull heavy objects. (b) Muscular Endurance – ability to generate repeated submaximal muscular force to volitional fatigue. (c) Power – ability to generate maximal force over the shortest time to move the body or an object through space. (d) Aerobic Endurance – ability to execute sustained movements without stopping or slowing down. (e) Anaerobic Endurance – ability to generate maximal running speed for short distances. (3) Movement Skills. (a) Agility – ability to move rapidly for short durations with multiple changes of direction. (b) Dynamic Balance – posture, stability, and balance while moving - often under load. (c) Coordination - ability to synchronize movement of your arms, legs, and torso while in motion. (d) Dynamic flexibility – range of motion associated with elasticity. (e) Multiaxial Movements – body movements in time and space. (f) Reaction Time – react to external kinesthetic stimuli. [102]

In acknowledging the current PRT structure, AR350-1 states;

> Commanders or the senior military supervisors will establish periodized physical training programs consistent with FM 7–22 and the Army Human Dimension Strategy. PRT sessions will be conducted with appropriate intensity, frequency, and duration to develop a high level of structural, physical, and functional work capacity. Commanders (company through division) will leverage the expertise of Soldiers awarded the Master Fitness Trainer (MFT) ASI in planning, executing the unit's physical readiness training program.

However, AR 350-1 fails to mention H2F at any point in the document, other than one sentence directing the Commanding General USACIMT to take the lead in all H2F initiatives and development. PRT and H2F education are also not included in any training initiatives in the professional military education (PME) system, though there is reference to PME school conduct PRT. Finally, AR 350-1 directs that all fitness standards for entry for military institutional training follow AR 600-9, *The Army Body Composition Program*, which is covered below.

[102] HQDA, AR 350-1, 192.

AR-600-9, *The Army Body Composition Program*, last updated in 2013, states its purpose is to ensure all Soldiers achieve and maintain optimal well-being and performance under all conditions.[103] In speaking to its purpose in relation to physical readiness, it states that "Soldiers must maintain a high level of physical readiness in order to meet mission requirements. Body composition is one indicator of physical readiness that is associated with an individual's fitness, endurance, and overall health.[104]

As with AR 350-1, responsibilities for the execution, maintenance, and modification of the ABCP, are varied across a large section of the U.S. Army's key stakeholder authorities to include; the Deputy Chief of Staff, G-1, The Surgeon General, The Deputy Chief of Staff G-3/5/7, The Deputy Chief of Staff G-4, Chief, National Guard Bureau, Chief, Army Reserve, Commanding General U.S. Forces Command, Commanders of Army commands, Army service component commands, and direct reporting units, Commanding General, U.S. Army Training and Doctrine, School commandants:, Commanding General, U.S. Army Medical Command, Commanding General, U.S. Army Human Resources Command, Individual Soldiers, and Order issuing officials, Commanders and supervisors, Health care personnel, and Designated unit fitness training noncommissioned officer or master fitness trainer:[105]

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[103] Headquarters, Department of the Army (HQDA), Army Regulation (AR) 600-9, *The Army Body Composition Program* (Washington, DC: Government Printing Office, 2013), 1.

[104] Ibid.

[105] Ibid., 1-3.

AR 600-9 states that all Soldiers are to comply with the ABCP, and that their weight and height are to be measured every six months with the exception of Soldiers attached to a Warrior Transition Unit, Soldiers who are pregnant or postpartum, and those that have been hospitalized for greater than 30 consecutive days.[106]

As with AR350-1, H2F is not mentioned, and all direction for PRT is to be taken from FM 7-22.

FM 7-22, *Army Physical Readiness Training*, last updated in 2012, is the authoritative source for all U.S. Army components PRT programs. FM 7-22 is broken down into three parts; philosophy, strategy, and activities.

Philosophy: In part one, FM 7-22 nests in purpose with direction from AR-350-1, and ADP 7-0, *Training.* FM 7-22 states;

> The Army PRT System is performance-based, incorporating physically demanding activities that prepare Soldiers and units to accomplish the physical requirements of [Warrior Tasks and Battle Drills] WTBDs. As Soldiers' physical performance levels increase, standards remain constant, but conditions become more demanding. To ensure the generation of superior combat power, the end state requires leaders to integrate the relative physical performance capabilities of every Soldier. Soldiers and leaders must execute the planned training, assess performance, and retrain until they meet Army Physical Fitness Training Program standards as specified in AR 350-1, *Training and Leader Development*. Conditions should replicate wartime conditions as nearly as possible.[107]

As such, FM 7-22 directs that every PRT event must be given task, conditions, and standards, and be tied to the unit's Mission Essential Task List (METL).[108] This is

[106] HQDA, AR 600-9, 4.

[107] HQDA, FM 7-22, 1-2.

[108] Ibid., 1-3.

important because it focuses PRT towards combat tasks as opposed to general physical fitness. FM 7-22 also directs that units will "train as they fight," Stating:

> All Army training is based on the principle "Train as you will fight;" therefore, the primary focus of PRT goes far beyond preparation for the APFT. Soldiers improve their physical readiness capabilities through PRT. For Soldiers to achieve the desired standard of physical readiness, every unit training program must include a well-conceived plan of PRT. Training must be both realistic and performance-oriented to ensure physical readiness to meet mission/METL requirements.[109]

To help commanders, individuals, and units achieve PRT goals in line with the philosophy stated in part one, FM 7-22 breaks down PRT into eight training tenants, these are;

> 1. PRT must support full spectrum operations and promote quick transitions between missions.
>
> 2. PRT must support proficiency in combined arms operations and unified actions.
>
> 3. PRT focus is on training the fundamentals first.
>
> 4. PRT must be performance-oriented, conducted under realistic conditions, and mission focused.
>
> 5. PRT should incorporate challenging, complex, ambiguous, and uncomfortable situations.
>
> 6. PRT must incorporate safety and [Critical Resource Management] CRM.
>
> 7. PRT must be conducted under conditions that replicate the operational environment.
>
> 8. PRT must be conducted during deployments.[110]

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[109] HQDA, FM 7-22, 1-3.

[110] Ibid.

To help focus the PRT program, FM 7-22, illustrates how PRT skills translate to WTBDs;

Shoot	***Physical Requirements***
Employ hand grenades	Run under load, jump, bound, high/low crawl, climb, push, pull, squat, lunge, roll, stop, start, change direction, get up/down, and throw.
Move	***Physical Requirements***
Perform individual movement techniques	March/run under load, jump, bound, high/low crawl, climb, push, pull, squat, lunge, roll, stop, start, change direction, and get up/down.
Navigate from one point to another	March/run under load, jump, bound, high/low crawl, climb, push, pull, squat, lunge, roll, stop, start, change direction, and get up/down.
Move under fire	Run fast under load, jump, bound, crawl, push, pull, squat, roll, stop, start, change direction, and get up/down.
Survive	***Physical Requirements***
Perform Combatives	React to man-to-man contact: push, pull, run, roll, throw, land, manipulate body weight, squat, lunge, rotate, bend, block, strike, kick, stop, start, change direction, and get up/down.
Adapt	***Physical Requirements***
Assess and Respond to Threats (Escalation of Force)	React to man-to-man contact: push, pull, run, roll, throw, land, manipulate body weight, squat, lunge, rotate, bend, block, strike, kick, stop, start, change direction, and get up/down. Run under load, jump, bound, high/low crawl, climb, push, pull, squat, lunge, roll, stop, start, change direction, get up/down, and throw.
Battle Drills	***Physical Requirements***
React to contact	Run fast under load, jump, bound, crawl, push, pull, squat, roll, stop, start, change direction, and get up/down.
Evacuate a casualty	Squat, lunge, flex/extend/rotate trunk, walk/run, lift, and carry.

Figure 10. Physical Requirements for Warrior Tasks and Battle Drills

Source: Headquarters, Department of the Army, Field Manual 7-22, *Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2013), 1-4.

Part one of FM 7-22 concludes with linking PRT to the Army Force Generation (ARFORGEN) Model, stating that PRT must be linked to both individual Soldier and collective unit fitness. Thus the purpose of the U.S. Army PRT program is to train and

ready Soldiers to fight and win throughout the spectrum of conflict by being physically prepared to meet the rigors of combat.[111]

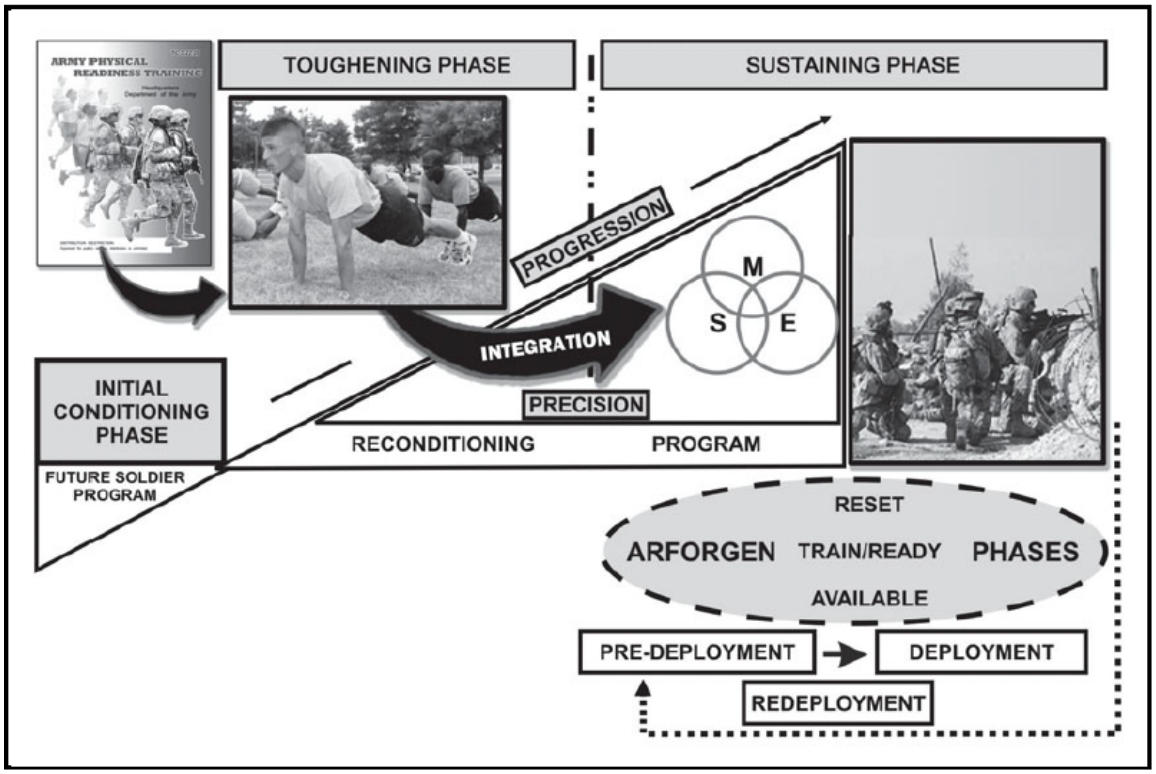

Figure 11. U.S. Army PRT System and its Relation to ARFORGEN

Source: Headquarters, Department of the Army, Field Manual 7-22, *Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2013), 1-8.

Part two of FM 7-22, discusses the strategy behind the U.S. Army PRT program. It describes PRT requirements for the training of Soldiers at; Initial Entry Training (IET), Advanced Individual Training (AIT), One Station Unit Training (OSUT), the Warrant

[111] HQDA, FM 7-22, 1-8 – 1-9.

Officer Candidate School (WOCS), and the Basic Officer Leader Courses (BOLC).[112] It also covers responsibilities of the active and reserve components in the areas of; individual physical readiness, unit physical readiness, reconditioning programs (injury recovery), and pregnancy and postpartum training, failure to perform (APFT failure), and weight control (AR 600-9).[113] Part two also explains planning and training considerations, as well as strategies to prevent injuries through "overreaching," "overtraining," and "overuse." While FM 7-22 lacks in-depth injury prevention strategies, the inclusion of the figures below serves as a simple layman's guide to injury prevention through overtraining.

SYMPTOMS OF OVERTRAINING SYNDROME		
Performance Issues	***Physiological Symptoms***	***Psychological Symptoms***
• Early Fatigue • Increased Heart Rate w/less Effort • Decreased Strength, Endurance, Speed, and Coordination • Decreased Aerobic Capacity • Delayed Recovery	• Persistent Fatigue • On-going Muscle Soreness • Loss of Appetite • Excessive Weight Loss • Excessive Loss of Body Fat • Irregular Menses • Increased Resting Heart Rate • Chronic Muscle Soreness • Increase in Overuse Injuries • Difficulty Sleeping • Frequent Colds or Infections	• Irritation or Anger • Depression • Difficulty in Concentration • Increased Sensitivity to Emotional Stress • Loss of Competitive Drive • Loss of Enthusiasm

Figure 12. Symptoms of Overtraining

Source: Headquarters, Department of the Army, Field Manual 7-22, *Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2013), 5-2.

[112] HQDA, FM 7-22, 4-1 – 4-2.

[113] Ibid., 4-2 – 4-3.

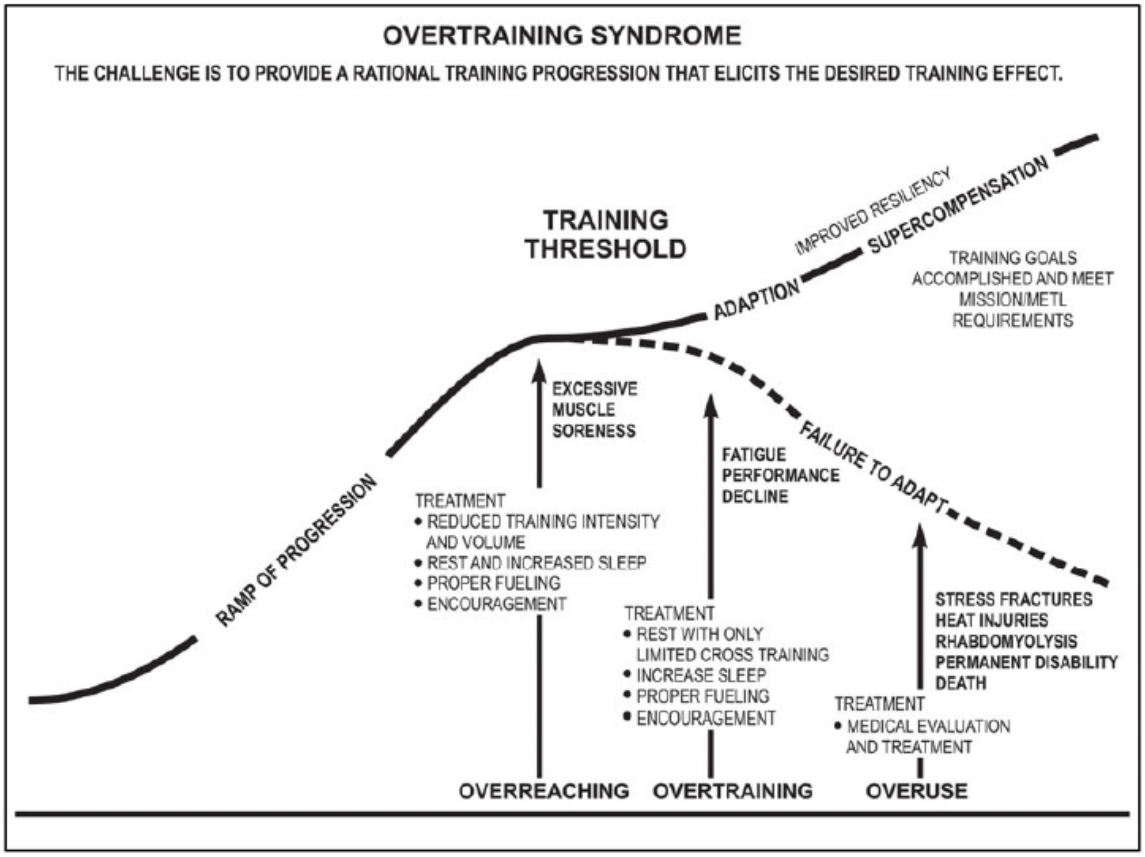

Figure 13. Soldier Response/Adaptation to Overreaching, Overtraining and Overuse

Source: Headquarters, Department of the Army, Field Manual 7-22, *Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2013), 5-4.

To prevent injuries, FM 7-22, directs PRT planning to adhere to the following guidance;

- Conduct strength and mobility training every other day.
- Conduct endurance and mobility training (running) every other day. This also applies to foot marches more than 5 km in the toughening phase.
- Avoid conducting foot marches and endurance and mobility training on the same or consecutive days.
- Perform speed running once per week, preferably in the middle of the week. In the sustaining phase, speed running may be conducted twice per week for well-conditioned Soldiers.

- A typical five-day training week will include two or three strength and mobility days that alternate with two or three endurance and mobility days.

- Conduct the [Preparation Drill] PD before the APFT. If required, Soldiers may perform push-ups in [Conditioning Drill]CD 1 on their knees. After the conclusion of the AFPT, the [Recovery Drill] RD is conducted.

- Schedule APFTs so Soldiers have advance notice. Preferably, the APFT should be scheduled on Monday to allow for recovery provided by the weekend. If the APFT is not conducted on a Monday, no strenuous PRT should be conducted on the day before the APFT.[114]

Part two, also gives example PRT schedules for training units, active units, deployed units, and reserve units.[115] Finally, part two covers PRT programs for "Special Conditioning Programs." These programs are for those members of U.S. Army that cannot conduct a regular PRT program due to APFT failure, injury, prolonged deployment, pregnancy and postpartum considerations. The goal of these programs is to return the individual to regular PRT sessions, and rejoin his or her unit's regular PRT program.[116]

[114] HQDA, FM 7-22, 5-6.

[115] Ibid., 5-7 – 5-34.

[116] Ibid., 6-1 – 6-3.

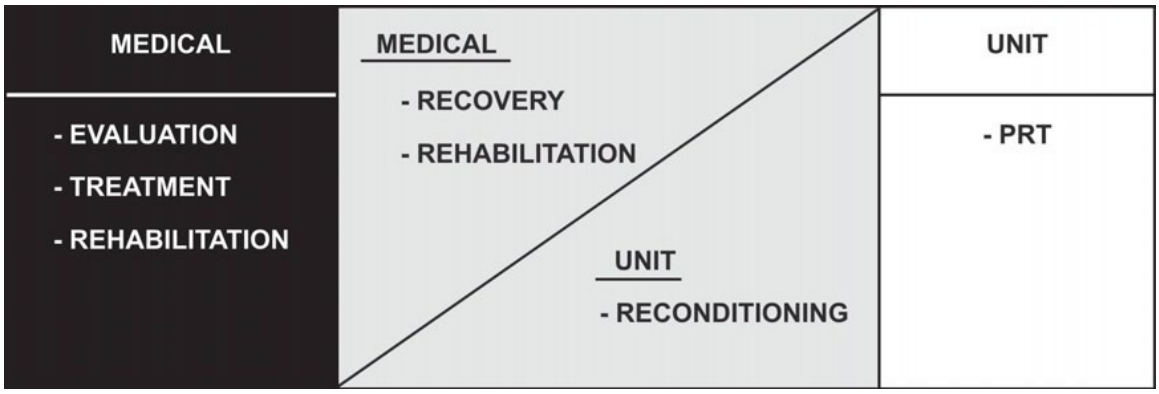

Figure 14. Rehabilitation and Reconditioning Responsibilities

Source: Headquarters, Department of the Army, Field Manual 7-22, *Army Physical Readiness Training* (Washington, DC: Government Printing Office, 2013), 6-7.

Part three of FM 7-22, describes PRT activities. In this section, PRT activities are described in order to both correctly perform the required exercise, and to conduct PRT activities in groups from squad to company.[117] Part three breaks down PRT into; preparation and recovery drills, strength and conditioning drills, endurance and mobility drills.[118] Because FM 7-22 predates the introduction of H2F, it is not mentioned in the document, though it does thoroughly cover PRT, basic injury prevention, individual injury recovery, and conduct of the APFT.

TC 3-22.20: *Army Physical Readiness Training*, published March 2010, in an inactive training circular that formed the basis of FM 7-22. It was used as background research into the Army's current PRT doctrine.

[117] HQDA, FM 7-22, 7-1.

[118] Ibid., 7-1 – 7-14.

TB MED 592: *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training*, published May 2011, is a U.S. Army medical technical bulletin designed to "provide guidance to military and civilian health care providers and allied medical personnel."[119] This bulletin describes seven efforts to reduce and prevent injuries related to PRT training. These are;

> *a*. Understand and implement evidence-based preventive principles to protect U.S. Army personnel from musculoskeletal injuries associated with physical training (PT).
>
> *b*. Understand the physiologic and pathophysiologic responses to exercise.
>
> *c.* Understand the risk factors associated with training-related musculoskeletal injuries.
>
> *d*. Understand interventions with varying levels of evidence for effectiveness in preventing training-related musculoskeletal injuries.
>
> *e*. Understand the presentation and acute treatment of Soldiers with training-related musculoskeletal injuries.
>
> *f*. Implement appropriate evaluation and acute treatment for Soldiers with training-related musculoskeletal injuries.
>
> *g*. Advise commanders on planning, implementing, and evaluating a comprehensive program to reduce musculoskeletal injuries related to PT.[120]

TB Med 529 goes on to describe the roles of commanders, MTFs, NCOs, and Soldiers. TB Med 529 directs unit commanders and others responsible for unit PRT programs to coordinate and implement educational and training programs, as well continually review the unit's PRT program for trends and identify needed changes in training practices. The manual urges unit commanders to foster a culture of injury and

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[119] HQDA, TB 592, 1.

[120] Ibid.

risk prevention in all aspects of PRT. This is achieved through coordination with the unit's supporting medical team, to ensure that PRT is conducted correctly, and that Soldiers receive training on the correct execution of PRT programs, and that Soldiers receive the appropriate level of training based on their underlying physical condition.[121]

TB Med 592 goes on to describe various types on injuries caused by PRT activities. In general, it found that in approximately 25% of all males, and 50% of all females will experience a PRT related musculoskeletal injury during initial entry training.[122] Injury trends continue during AIT, and into active service, to include approximately 42% of residents at the U.S. Army War College.[123]

[121] HQDA, TB 592, 1-3.

[122] Ibid., 6.

[123] Ibid.

Location	Year data collected	Injury incidence (%)[1]		Injury rate (%/month)[1]	
		Men	Women	Men	Women
Fort Leonard Wood, MO[2]	2002	29	53	14	27
Fort Jackson, SC[2]	2000	19	42	10	21
Fort Jackson, SC	1998	31	58	16	29
Fort Leonard Wood, MO	1996	40	64	20	32
Fort Jackson, SC	1994	No data	67	No data	34
Fort Jackson, SC	1988	27	57	14	29
Fort Jackson, SC	1984	28	50	14	25
Fort Jackson, SC	1980	23	42	12	21

Notes:
[1]Percent of Soldiers training who sustained an injury.
[2]Data corrected for longer BCT training cycle introduced in October 1998 (extended from 8 to 9 weeks).

Figure 15. Training-related Injury Incidence during 8 Weeks of U.S. Army Basic Combat Training

Source: Headquarters, Department of the Army, Technical Bulletin 592, *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training* (Washington, DC: Government Printing Office, 2011), Table 2-1, 6.

Year data collected	Military occupational specialty	Length of training (weeks)	Injury incidence (%)[1]		Injury rate (%/month)[1]	
			Men	Women	Men	Women
2000-2001	Fuel and Electrical System Repairer	9	28	46	12	20
	Field Artillery System Mechanic	10	25	No data	10	No data
	Track Vehicle Mechanic	12	33	50	11	17
	Wheel Vehicle Repairer	13	36	52	11	16
	Track Vehicle Repairer	16	40	60	10	15
1996	Combat Medic	10	24	30	10	12

Note: [1]Calculated based on number of trainees with one or more injuries during training

Figure 16. Injury Incidence Among Soldiers in Advanced Individual Training

Source: Headquarters, Department of the Army, Technical Bulletin 592, *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training* (Washington, DC: Government Printing Office, 2011), Table 2-2, 7.

TB Med 592 speaks to the epidemic of musculoskeletal injuries and rates of disability. Army disabilities for all causes cost the Veterans Affairs Administration over $21 Billion a year in 2002, with 73 percent of these disabilities being musculoskeletal related.[124]

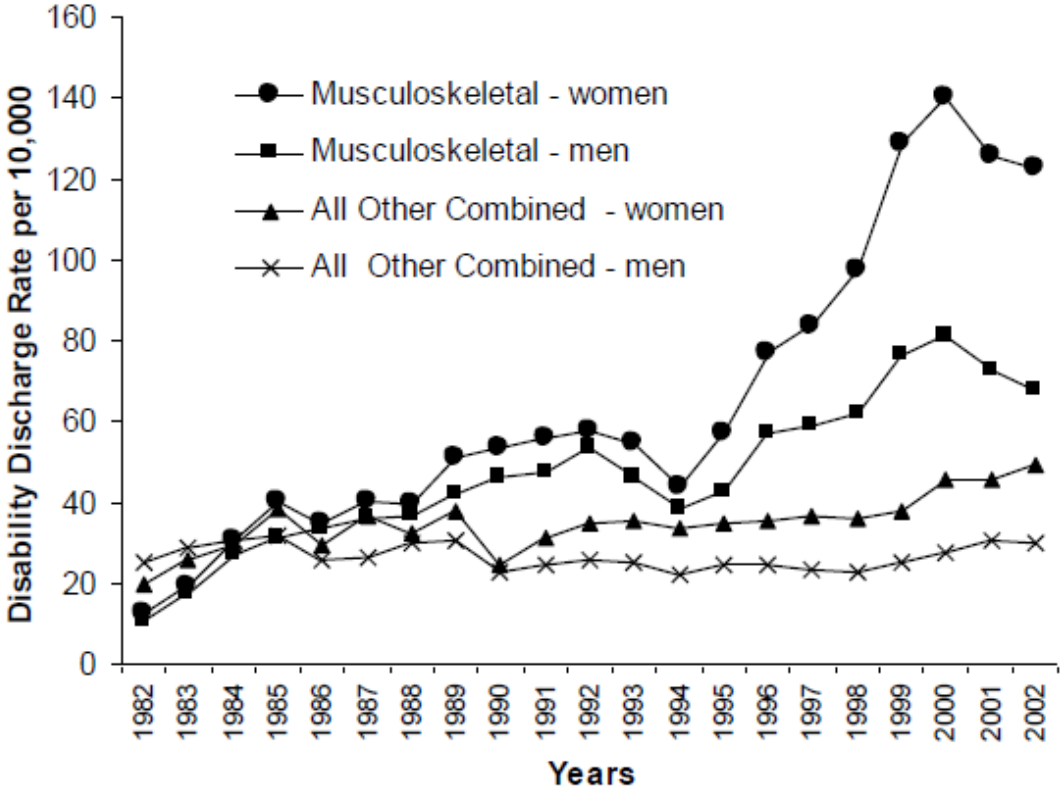

Figure 17. U.S. Army Soldier Disability Rates Grouped by Gender and Disability Category (Musculoskeletal vs. All Others)

Source: Headquarters, Department of the Army, Technical Bulletin 592, *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training* (Washington, DC: Government Printing Office, 2011), 11.

[124] HQDA, TB 592, 7.

The remainder of TB Med 592, addresses a systematic approach to physical readiness training in order to prevent injuries, and to speed the treatment and recovery of injuries when they do occur. Overall, the document concludes that highly prescribed and controlled PRT training, including limiting run mileage, and repetitive exercises, results in fitter Soldiers with less occurrence of injuries. [125]

Category 2: U.S. Army Emerging Concepts and Separate Programs

TRADOC PAM 525-3-1, The U.S. Army Operating Concept: Win in a Complex World, 2020-2040: This pamphlet, published in October 2014, is focused on;

> how future Army forces will prevent conflict, shape security environments, and win wars while operating as part of our Joint Force and working with multiple partners. The [Army Operating Concept] AOC guides future force development by identifying first order capabilities that the Army needs to support U.S. policy objectives. It provides the intellectual foundation and framework for learning and for applying what we learn to future force development under Force 2025 and Beyond. [126]

The pamphlet goes on to cover two major themes related to this thesis; human performance optimization, and medical sciences. The pamphlet states;

> Advances in cognitive, behavioral, and learning sciences will improve critical thinking, increase cognitive and physical performance, foster intuition and social empathy, improve health and stamina, facilitate talent management, enhance leader training, and strengthen unit cohesion. Human performance technologies will help the Army develop adaptive leaders, resilient Soldiers, and cohesive teams that thrive in uncertain, dangerous, and chaotic environments. New pre-accessions tools hold promise for matching a recruit's aptitude to specific military occupations and building effective teams with appropriate combinations of abilities. Blended live, virtual, constructive, and gaming training environments replicate complex operating environments and improve leader and team competence and confidence. Cognitive and physical training techniques could reduce time required for mastery of Soldier and leader skills, abilities, and

[125] HQDA, TB 592, 13-52.

[126] TRADOC, TRADOC Pamphlet 525-3-1, 5.

> attributes. . . Advancements in medical sciences benefit not just Soldiers and the military, but the world as well. For example, innovations in prosthetics technology increase the quality of life for Soldiers and civilians, often returning them to pre-injury activity levels. Improved casualty evacuation and treatment at the point of injury increase the number of 'golden hour' survivors to unprecedented levels. Research in preventative medicine moves the world towards cures for viruses previously untreatable. Traumatic brain injury is at the forefront of both military and civilian medical efforts, with both entities sharing research and technological discoveries. Continued investment in the medical sciences allows improved Soldier resiliency, quicker physical and mental healing, smoother integration back into society, and improved quality of life for the Soldier.[127]

TRADOC PAM 525-3-7-01, The U.S. Army Study of the Human Dimension in the Future: 2015-2024: This pamphlet, published in April 2008, is focused on how to optimize U.S. Army Soldier's readiness through the human dimension. The human dimension is defined as "the moral, cognitive, and physical components of Soldier and organizational development and performance essential to raise, prepare, and employ the Army in full spectrum operations."[128] Chapter four, covers the physical component of the human dimension. It contains a "conceptual approach that focuses on *holistic* fitness to ensure optimal and perhaps even enhanced performance."[129] The chapter goes on to outline that holistic fitness includes components of

> both the traditional aspects of physical fitness, such as aerobic capacity, strength, endurance, flexibility, and coordination while also attending to the

[127] TRADOC, TRADOC Pamphlet 525-3-1, 37.

[128] U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-7-01, *The U.S. Army Study of the Human Dimension in the Future 2015-2024* (Washington, DC: Government Printing Office, April 2008), http://www.dtic.mil/dtic/tr/fulltext/u2/ada489116.pdf, iii.

[129] Ibid., 87.

> nutritional, psychological, and sports medicine contributions for optimal physical performance across a full spectrum of operations.[130]

The pamphlet goes on to recommend restructuring of AR 350-1, and FM 21-20 (since replaced with FM 7-22), to better meet the evolving science and practice of holistic fitness. In this recommendation, TRADOC recommends breaking physical performance into three categories; tactical and technical (METL Tasks, and adaptive situational awareness), physical fitness, discipline, and physical resiliency, and toughness, determination, and tenacity.[131] To accomplish this recommendation, TRADOC recommends;

> The future Modular Force will see a shift in the role of physical fitness programs from training to meet test standards to developing Soldier-athletes. A Soldier-athlete is someone who is *holistically fit*—physically ready, nutritionally sound, mentally strong, and confident in their own abilities and in those of the members of the team.[132]

The pamphlet goes on to recommend increased supervised, structured and programmed physical fitness, planned, resourced, and executed, by trained competent leaders starting at initial entry training and remaining for the lifetime of the Soldier's service. PRT is to take into account individual and unit fitness goals, directed tasks, appropriate recovery, injury rehabilitation, and nutrition goals. Finally, TRADOC recommends that physical fitness assessments examine not only Soldier fitness, but physical readiness to perform combat tasks.[133]

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[130] TRADOC, TRADOC Pamphlet 525-3-7-01 (2008), 87.

[131] Ibid.

[132] Ibid.

[133] TRADOC, TRADOC Pamphlet 525-3-7-01 (2008), 88-94.

The Operating Environment and the Changing Character of Future Warfare: This position paper, published by TRADOC's Mad Scientist Blog, covers the future of warfare over two distinct periods;

> **The Era of Accelerated Human Progress, 2017-2035,** which relates to a period where our adversaries can take advantage of new technologies, new doctrine and revised strategic concepts to effectively challenge U.S. military forces across multiple domains.
>
> **The Era of Contested Equality, 2035-2050,** which period is marked by significant breakthroughs in technology and convergences in terms of capabilities, which lead to significant changes in the character of warfare. During this period, traditional aspects of warfare undergo dramatic, almost revolutionary changes which at the end of this timeframe may even challenge the very nature of warfare itself.[134]

The document goes on to describe 12 identified trends. One trend, increased human performance, involves preparing future Soldiers for combat through the use of PRT, chemical, biological, and genetic enhancement. This is an area of concern to the U.S. Army, as some of its potential adversaries already have established programs in these areas.[135]

U.S. Army ACFT Field Testing Manual, V1.4: This manual, published in August of 2018, sets the standards for conducting the new Army Combat Fitness Test (ACFT) during its Phase I – Initial Operating Capability – Field Test Period from 2018 – 2019. It describes the task, conditions, standards, and testing procedures needed to conduct the

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[134] U.S. Army Training and Doctrine Command (TRADOC), *The Operational Environment and the Changing Character of Future Warfare* (Washington, DC: Government Printing Office, May 2017), http://www.arcic.army.mil/App_Documents/The-Operational-Environment-and-the-Changing-Character-of-Future-Warfare.pdf, 2.

[135] Ibid., 7, 9, 11, 17, 19.

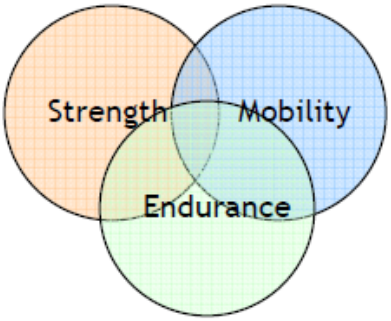
ACFT, along with prescribed guidance on personnel and equipment needed to conduct the test.

101st Airborne Division Tactical Athlete Program: This handbook, published by the 101st Airborne Division, in conjunction with the Blanchfield Army Community Hospital Physical Therapy Clinic, provides a condensed guide to FM 7-22, and TB Med 592, designed to enhance the physical readiness of the 101st Airborne. The handbook goes on to note that there is a disconnect in unit's using PRT to train for the APFT instead of METL tasks.[136] In order to ensure maximum readiness and deployability the Tactical Athlete Program prescribes a program that balances muscular strength, endurance, and mobility.[137] It includes sample training plans, advice on the prevention of common PRT injuries, as well as exercise guides. It's major difference to FM 7-22, is the inclusion of gym-based compound movement strength exercises.

[136] U.S. Army, 101st Airborne Division, *101st Tactical Athlete Program* (Fort Campbell, KY: Government Printing Office, 2019), 4.

[137] Ibid., 7.

Overall, in broader terms, we need a balance of endurance, strength, and mobility:



Where is our current focus? APFT training places the majority of the emphasis on endurance training.

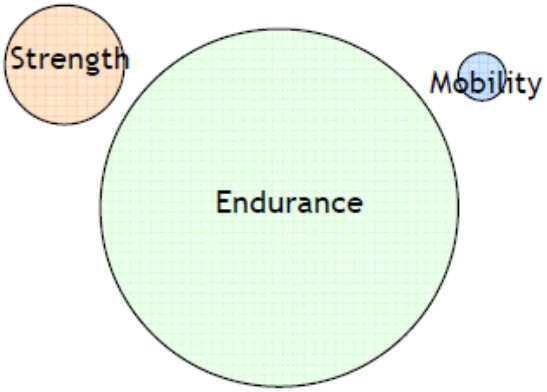


Figure 18. 101st Tactical Athlete Program Physical Performance Triad

Source: U.S. Army, 101st Airborne Division, *101st Tactical Athlete Program* (Fort Campbell, KY: Government Printing Office, 2019), 7.

Ranger, Athlete Warrior (RAW) Physical Training Handbook V4: This handbook, is used to execute the 75th Ranger Regiment PRT program which was created in 2005. The basics of the program are mentioned in Chapter 1. The purpose of the program is to "provide education and training that optimize the physical/mental development and sustainment of the Regiment's most lethal weapon - the individual Ranger." The program's endstate is to

> field a self-sustaining system to ensure that all Ranger's: Achieve a level of physical fitness that is commensurate with the physical requirements of Ranger missions. Understand and choose sound nutritional practices. Employ mental toughness skills to enhance personal and professional development. Receive screening/education for injury prevention and prompt, effective, and thorough treatment/rehabilitation of injuries when they do occur. [138]

The philosophy of RAW 4.0 is based around ensuring that the individual Ranger remains the Regiment's most lethal weapon through an extremely physically demanding program able to prepare the Ranger for operations in any physical environment against a larger and stronger enemy force. The philosophy focuses on smart training, adequate recovery, and adaptive workouts. The RAW 4.0 philosophy is best summed up as "Train right, eat right, sleep right, and keep your head in the game."[139] The remainder of the handbook is similar to FM 7-22 in that it describes and demonstrates a wide range of exercises and basic injury prevention, but also adds in sections on nutrition and sample diets.

Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning (THOR3): This program, established by U.S. Army Special Operations Command (USASOC) in 2009, is a program designed to incorporate PRT, injury prevention, and injury recovery, as well as non-traditional services such as dietitians, and mental performance coaches. The goal of THOR 3 is to maximize special operations force's skills, fitness through "maximize[ing] these abilities, help prevent injuries, and increase

[138] U.S. Army, 75th Ranger Regiment, *Ranger Athlete Warrior: RAW 4.0* (Washington, DC: Government Printing Office, 2013), 3.

[139] Ibid., 4.

the length of time these soldiers spend in the force."[140] This program is executed in a similar fashion to RAW 4.0, or the 101st Tactical Athlete Program, but with purpose built facilities, and a full time training and medical staff to include; physical trainers, physical therapist, chiropractors, nutritionist, and cognitive enhancement (mental health) specialist.[141]

Category 2: U.S. Army Reports, Studies and Articles

Evaluation of Two Army Fitness Programs: The TRADOC Standardized Physical Training Program for Basic Combat Training and the Fitness Assessment Program, published in 2004 by the U.S. Army Center for Health Promotion and Preventative Medicine, is a study that examines the training outcomes, fitness, and injuries of BCT trainees. It studies the implementation of the current PRT program, and the Fitness Assessment Program. The Fitness Assessment Program was a BCT mandated fitness program for BCT trainees who failed the BCT initial APFT. The study concludes that the current PRT program increases APFT pass rates, and reduces injuries, while the Fitness Assessment Program, while not necessarily increasing APFT pass rates, does reduce rates of BCT trainee attrition due to injury.

Evaluation of the Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning Program (THOR3): This report, published in 2016, studies the effectiveness of the THOR3 program which was described in chapter 1. The report found;

[140] Kelly et al., *An Assessment of the Army's Tactical Human Optimization, Rapid Rehabilitation and Reconditioning Program*, i.

[141] Ibid., i-ix.

> About three fourths of the Soldiers reported improvements in physical fitness and being more physically fit for the mission as a result of THOR3. Having an onsite SOF physical therapy clinic allowed a majority of the Soldiers (in this evaluation) with injuries to be seen within a day or less with more than half of the Soldiers reporting complete recovery from their injuries. The physical therapy clinic was also well utilized with about 75 percent of the Soldiers having made an appointment or consulted with the THOR3 physical therapy staff. Results indicated that the THOR3 group had marginally lower self-reported injury rates.[142]

Based on the reports analysis it finds that "Soldiers may benefit from participation in THOR3 compared to other human performance programs."[143]

Injuries from Participation in Sports, Exercise, and Recreational Activities Among Active Duty Service Members—Analysis of the April 2008 Status of Forces Survey of Active Duty Members, published in 2011, studies injury rates among active duty military personnel from across the DOD, who sustained an injury while participating in sports, exercise or recreational activities. The report found that 72% of all exercise related injuries occurred while performing unit-level exercise, and that 50.2% of these injuries occurred while running, with the second leading cause of injuries being weight lifting.[144] The report goes on to state that the average limited duty time from these injuries was greater than 15 days per injury.[145]

Injury and Fitness Outcomes During Implementation of Physical Readiness Training, published in 2010, explores the injury rates and physical fitness outcomes of

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[142] Grier et al., Technical Report No. WS.0030636.3, 37.

[143] Ibid.

[144] Loringer et al., Injury Prevention Report No. 12-HF-0DPT-08, 44-45.

[145] Ibid., 36-39.

BCT trainees using the current PRT methodology versus the previous BCT methodology. The study found that the current PRT methodology resulted in lower injury rates, higher first time APFT pass rates, and lower rates of APFT failures when compared with the previous BCT physical training Methodology. In part, it notes that highly prescribed PRT programs with reduced running mileages reduce the risk of injuries, while achieving the approximately the same results when conducting the running portion of the APFT, but decreased results in the sit-up and push-up portions of the test.[146]

Physical Training Injuries and Interventions for Military Recruits, is a journal article published in 2012. The author finds that approximately 25% of male recruits and 50% of female recruits experience one or more injuries during BCT.[147] The authors go on to state that PRT is effective in training Soldiers for duty, but that pre-enlistment health and fitness remains one of the largest contributing factors to BCT injuries. The authors recommend that all U.S. Army recruits are given fitness assessments prior to entering BCT, and that when appropriate, unfit recruits are withheld from entering BCT until they reach a baseline of fitness comparable to the average recruit.[148]

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[146] Joseph J. Knapik, K. Hauret, S. Arnold, M. Canham-Chervak, A. J. Mansfield, E. L. Hoedebecke, and D. McMillian, *Injury and Fitness Outcomes During Implementation of Physical Readiness Training* (Aberdeen Proving Ground, MD: US Army Center for Health Promotion and Preventive Medicine, 2010), accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/a523652.pdf, 372-381.

[147] Joseph M. Molloy, David N. Feltwell, Shawn J. Scott, and David W. Niebuhr, "Physical Training Injuries and Interventions for Military Recruits" *Journal of Military Medicine* 177 (2012): 553-558, accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/a578927.pdf, 553.

[148] Ibid., 556-557.

Preventing Injuries in the U.S. Military: The Process, Priorities, and Epidemiologic Evidence, published in 2008, by the U.S. Army Center for Health Promotion and Preventative Medicine, is a report that explores a systematic data-based injury surveillance program as a way to prevent future injuries. In the report, physical training is identified as the number one cause of preventable Soldier injuries. The report notes that in 2006, the U.S. Army treated 743, 547 musculoskeletal injuries. 82% of these injuries were determined to be overuse injuries.[149]

Injury Location			Inflammation/Pain[c] (Overuse)	Inflammation/Pain with Nerves[c] (Overuse)	Stress Fracture	Sprains/Strains/ Rupture	Dislocation	Other Joint Derangement[c]	Total	% Total
Spine and Back	Vertebral Column (VCI)	Cervical VCI	24,671	4,249	0	0	0	3,208	**32,128**	**6.0%**
		Thoracic/Dorsal VCI	0	5,698	0	0	0	338	**6,036**	**1.1%**
		Lumbar VCI	78,750	6,120	0	0	0	10,955	**95,825**	**17.8%**
		Sacrum Coccyx VCI	3,216	0	0	0	0	0	**3,216**	**0.6%**
		Spine, Back Unspec. VCI	20	1,303	177	0	0	3,423	**4,923**	**0.9%**
Extremities	Upper	Shoulder	57,416	0	0	1,990	1,641	4,756	**65,803**	**12.3%**
		Upper arm, Elbow	12,535	0	11	0	20	195	**12,761**	**2.4%**
		Forearm, Wrist	11,815	0	22	0	14	505	**12,356**	**2.3%**
		Hand	6,820	0	0	502	41	206	**7,569**	**1.4%**
	Lower	Pelvis, Hip, Thigh	19,016	0	106	192	12	283	**19,609**	**3.7%**
		Lower leg, Knee	124,648	0	5,449	8,017	358	12,989	**151,461**	**28.2%**
		Ankle, Foot	86,119	0	0	240	114	4,545	**91,018**	**16.9%**
Unclass. by Site	Others and Unspecified	Other specified/Multiple	3,019	0	271	55	9	147	**3,501**	**0.7%**
		Unspec. Site	23,113	2,585	4,754	303	11	183	**30,949**	**5.8%**
		Total	**451,158**	**19,955**	**10,790**	**11,299**	**2,220**	**41,733**	**537,155**	
		% Total	**84.0%**	**3.7%**	**2.0%**	**2.1%**	**0.4%**	**7.8%**		

Notes:
[a] Source: AFHSC, as of 31 Dec 07.
[b] Primary diagnosis only. Injuries during deployment not included. Incident rule is >60 days from preceding visit for the same diagnosis (using 3-digit ICD-9 code).
[c] Examples of pain/inflammation musculoskeletal conditions include tendonitis, bursitis, and lumbago. Examples of pain/inflammation with nerve involvement include sciatica and thoracic/lumbosacral neuritis and radiculitis. Examples of other joint derangements include intervertebral disc disorders, meniscus tear, and joint instability.

Figure 19. Frequency of Injury Related Musculoskeletal Conditions for Ambulatory Visits 2006

Source: Steven Brewster, *Preventing Injuries in the U.S. Military: The Process, Priorities, and Epidemiologic Evidence* (Aberdeen Proving Ground, MD: U.S. Army Center for Health Promotion and Preventive Medicine, 2010), accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/ADA496266.pdf, 3-18.

[149] Steven Brewster, *Preventing Injuries in the U.S. Military: The Process, Priorities, and Epidemiologic Evidence* (Aberdeen Proving Ground, MD: US Army Center for Health Promotion and Preventive Medicine, 2010), accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/ADA496266.pdf, ES-4.

The study goes on to recommend that due to the high percentage of overuse injuries being due to physical training, that units should set up a robust medical surveillance program monitored by trained personnel in conjunction with smart physical training strategies in order to lower the rate of injuries.[150] It goes on to recommend six prevention strategies to reduce physical training related activities, these are;

> (1) prevention of overtraining, (2) performance of multiaxial agility training, (3) use of mouth guards during high-risk activities, (4) use of semi-rigid ankle braces during high-risk activities, (5) consumption of nutrients to restore energy balance one hour following high intensity exercise, (6) use of synthetic blend socks to prevent blisters.[151]

Recommendations for Prevention of Physical Training (PT)-Related Injuries: Results of a Systematic Evidence-Based Review by the Joint Services Physical Training Injury Prevention Work Group (JSPTIPWG), published in 2008, is a report published through the U.S. Army Center for Health Promotion and Preventative Medicine. The purpose of the report is to;

> establish the evidence base for making recommendations to prevent injuries, 2) prioritize the recommendations for prevention programs and policies, and 3) substantiate the need for further research and evaluation on interventions and programs likely to reduce PT-related injuries.[152]

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[150] Brewster, *Preventing Injuries in the U.S. Military*, 3-1 – 3-10.

[151] Ibid., 7-5.

[152] Steven H. Bullock, and Bruce H. Jones, *Recommendations for Prevention of Physical Training (PT)-Related Injuries: Results of a Systematic Evidence-Based Review by the Joint Services Physical Training Injury Prevention Work Group (JSPTIPWG)* (Aberdeen Proving Ground, MD: U.S. Army Center for Health Promotion and Preventive Medicine, July 2008), accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/a484873.pdf, ii.

The study identifies physical training, as the number one injury producing activity conducted by the U.S. Army, and examined 40 physical training related injury prevention strategies, and makes four recommendations for what the study calls "essential elements" necessary for the successful implementation of injury prevention strategies. These four recommendations are;

> (1) Education of Service members, especially leaders, in injury prevention principles and evidence-based strategies.
>
> (2) Leadership enforcement of injury prevention policies and programs.
>
> (3) Unit injury surveillance reporting.
>
> (4) Investment of greater resources in research and program evaluation of training-related injury prevention interventions.[153]

Strategies for Optimizing Military Physical Readiness and Preventing Musculoskeletal Injuries in the 21st Century, published in 2013, identified physical training injury rates at level similar to previous studies mentioned. The article suggests that "physical readiness requires a new strategic paradigm that recognizes that physical training, physical fitness, and injury prevention are interrelated and can be optimized simultaneously."[154] The authors go on to describe the effects that injuries have on U.S. Army readiness;

> the Army owns the largest share (slightly over 40%) of those limited duty days or about 10 million limited duty days (about 27,000 man-years on limited

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[153] Bullock, and Jones, *Recommendations for Prevention of Physical Training (PT)-Related Injuries*, ES-2.

[154] Bradley C. Nindl, Thomas J. Williams, Patricia A. Deuster, Nikki L. Butler, and Bruce H. Jones, "Strategies for Optimizing Military Physical Readiness and Preventing Musculoskeletal Injuries in the 21st Century," *Army Medical Department Journal* 8, no. 13 (October-December 2013): 5-23, accessed August 15, 2018, https://www.ncbi.nlm.nih.gov/pubmed/24146239, 5.

> duty each year). The healthcare costs alone ascribed to those 68,000 DoD service members are over $700 million a year. The cost of salaries of Soldiers who cannot deploy is just over $3 billion annually. The costs to the Army for medical care and salaries of Soldiers on limited duty can be conservatively estimated to be about $1.5 billion per year. The time lost to commanders and organizations is incalculable.[155]

The study goes on to identify many of the separate programs discussed in the thesis, as well as a brief analysis of current PRT doctrine and its perceived shortcomings The authors then recommend six ways to improve Physical Readiness, through Human Performance Optimization (HPO). These are;

> Increase HPO knowledge and expertise across the military. Implementation of additional occupational specialties or additional skill identifiers dedicated toward HPO/IP (ie, MFTs) could be productive.
>
> Implement/adapt evidence-based, proven physical training and injury prevention strategies based on preestablished priorities.
>
> Evaluate effectiveness of all implemented policies, procedures, and interventions/countermeasures on a continuous basis.
>
> Identify gaps in knowledge of human physical performance optimization and injury prevention, and target these gaps for research.
>
> Establish routine channels for disseminating information based on each public health and evidence based decision-making process to ensure key stakeholders receive the information and training necessary to effectively reduce the impact of injuries on the health and readiness of military personnel.
>
> Use readily available military surveillance databases to identify the largest, most serious military injury problems.[156]

The Soldier-Athlete Initiative: Program Evaluation of the Effectiveness of Athletic Trainers Compared to Musculoskeletal Action Teams in Initial Entry Training, Fort

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[155] Nindl et al., "Strategies for Optimizing Military Physical Readiness and Preventing Musculoskeletal Injuries in the 21st Century," 7.

[156] Ibid., 19.

Leonard Wood, June 2010 – December 2011, published in 2012, was a study conducted at Fort Leonard Wood, MO on IET trainees. The purpose of the study was to compare the effectiveness of "athletic trainers (ATs) and musculoskeletal action teams (MATs) for reducing injuries, reducing medical attrition, and improving physical fitness" of IET trainees. The MAT consisted of a physical therapist, physical therapy technician, two ATs, and two certified strength and conditioning specialists.[157] The study consisted of an "B" phase (Baseline, no intervention), and an "I" phase (interventions by the AT and MAT). It found that out of 53 training companies tested;

> clinic/hospital in the intervention phase decreased 17% in the MAT group and 22% for the AT group; among the women, comparable declines were 22% in the MAT group and 19% for the AT group. Compared to the B phase, the number of male injury-related medical encounters seen in the clinic/hospital in the I period declined 19% for the MAT group and 17% for the AT group; among the women, comparable declines were 21% in the MAT group and 8% in the AT group. When the injury encounters from the clinic/hospital were combined with those of the AT/MAT, the total numbers of male encounters in the I phase (compared to the B) was 11% higher in the MAT group and 44% higher in the AT group; among women I encounters were16% higher in the MAT group and 32% higher in the AT group. Compared to the B phase, medical attrition in the I phase was reduced 44% in the MAT group and 17% in the AT group among the men; among the women comparable reductions were 50% for the MAT group and 6% for the AT group.

[157] Joseph J. Knapik, Bria Graham, Jacketta Cobb, Diane Thompson, Ryan Steelman, Tyson Grier, Timothy Pendergrass, Nikki Butler, Janet Papazis, and Rodney Gonzales, *The Soldier-Athlete Initiative: Program Evaluation of the Effectiveness of Athlete Trainers and Musculoskeletal Teams in Initial Entry Training, Fort Leonard Wood, June 2010-December 2011* (Aberdeen Proving Ground, MD: US Army Public Health Command (Provisional), 2012), accessed August 15, 2018, http://www.dtic.mil/dtic/tr/fulltext/u2/ADA586863.pdf, i.

The report also notes that MAT and AT teams decreased attrition rates in IET saving the origination "$3,502,725 for the MAT group and $744,178 for the AT group (men and women combined)."[158] The report concludes by saying;

> There were few differences between the MAT and AT groups in terms of the injury outcomes: both groups demonstrated similar reductions in the proportion of injured recruits and in the number of injury encounters seen in the clinic/hospital during the intervention period. Despite the reduction in the number of injured recruits, the total number of injury encounters (clinic/hospital encounters plus AT/MAT encounters) increased in both groups, likely because of the more convenient access to medical care provided by the MAT/AT. In terms of medical attrition, there was a greater reduction in the MAT group. In terms of physical fitness, improvements in the intervention period were greater in the MAT group than in the AT group when the groups were compared to their respective baselines, although these performance increases were small. When the MAT and AT group were directly compared in the intervention period, the MAT had higher performance in a greater number of comparisons. Based on this data, it is recommended that the MAT group model be favored over the AT group model, primarily because of more favorable changes in attrition.[159]

Category 2: U.S. Army PRT Background

A Historical Review and Analysis of Army Physical Readiness Training and Assessment, written by Dr. Whitfield B. East, in 2013 is a comprehensive review of U.S. Army PRT training methodology and assessments from the 1800's through 2010. This book covers the trials, goals, and focuses of building a combat ready army through Physical Readiness Training, and describes many of the significant challenges faced by the U.S. Army in its attempts to modernize its PRT program.

[158] Knapik et al, *The Soldier-Athlete Initiative*, 55.

[159] Ibid., 66.

Category 3: British Army Doctrine

Defence Instructions and Notices (DIN), Armed Forces Weight Management Policy: This document, published in 2009, is the UK Army version of AR 600-9. The intent of this DIN is to give guidance of the yearly requirement of "Body Composition Measurement (BCM) and Health Risk Assessment." The DIN used waist circumference and body mass index (BMI) to determine risk to health.

BMI (kg/m^2)		**WAIST CIRCUMFERENCE**		
		Men < 94 cm Women < 80 cm	Men 94 – 101.9 cm Women 80 – 87.9 cm	Men ≥ 102 cm Women ≥ 88 cm
Underweight	< 18.5	Refer to Paragraph 16		
Healthy weight	18.5 - 24.9	No Increased Risk	No Increased Risk	Increased Risk
Overweight	25.0 - 29.9	No Increased Risk	Increased Risk	High Risk
Obese Class I	30.0 - 34.9	Increased Risk	High Risk	Very High Risk
Obese Class II	35.0 - 39.9	High Risk	Very High Risk	Extreme Risk
Obese Class III	≥ 40	Very High Risk	Extreme Risk	Extreme Risk

Figure 20. UK Army Health Risk Assessment by BMI and Waist Circumference

Source: U.K. Army, Defence Instructions and Notices: DIN01-181, *Armed Forces Weight Management* (London: UK Ministry of Defense, Crown Copyright, 2008), 5.

The manual goes on to mandate medical and command interventions based on risk level;

Health Risk	Management
None	Nil Specific.
Increased	Brief Intervention. A reminder of the need to maintain a healthy body weight. Delivered on an opportunity basis by PTI/Health Trainer and medical staff.
High	As above. Given the opportunity to visit unit MO (optional). Strongly encouraged to increase physical activity levels and to monitor diet. Unit PTI to monitor performance quarterly with additional WM.
Very High	Mandatory assessment by unit MO required. Individual assessed to determine if there are any underlying medical conditions that would prevent the individual undergoing specific programme of physical activity and diet advice by PT Staff and WM re-assessed on a monthly basis. Those who are unable to undertake physical activity will be managed on a case by case basis by Unit MO.
Extreme	As above.

Figure 21. Health Risk Category and Management by Weight Category

Source: U.K. Army, Defence Instructions and Notices: DIN01-181, *Armed Forces Weight Management* (London: UK Ministry of Defense, Crown Copyright, 2008), 5.

Army General and Administrative Instructions (AGAI), Volume 1, Chapter 7:

Physical Training: This manual published in 2019, serves the same purpose as the U.S. Army's FM 7-22. The manual states as its aim;

> Success on operations is influenced by the physical ability and performance of the individual officer and soldier in every role. Physical Education addresses the core requirement for physical fitness by promoting a life-long exercise habit and healthy lifestyle, in a specific military context. The purpose of Physical Training (PT) is to ensure personnel are able to withstand the rigours of Service life and supports a good level of health. Supporting the moral and physical components of fighting power, PT is a core Command responsibility and individuals at every rank have a duty to keep themselves fit and healthy through organised, structured and personal fitness regimes.
>
> The aim of this instruction is to direct the requirement to conduct PT in line with MOD policy, the Delivery of Physical Education and Training in Defence. It further details the specific Army PT policy for the Regular and Reserve Army, which includes Home Command (Army Recruiting and Initial Training Command (ARITC) and Field Army (Land Warfare Centre (LWC)),

whilst providing direction to the Chain of Command (CofC) on the conduct of PT and fitness testing and assessments within units.[160]

The manual defines military physical fitness as "Military Physical Fitness is defined as the ability to perform military tasks within the Army to meet Operational requirements in the Firm Base [UK] and Overseas."[161] It mandates that commanders at all levels publish a yearly Physical Training Directive (PTD), and establish a Physical Training Program (PTP) in accordance with the Army Physical Training System (APTS). These programs are directed to focus on the two facets of Military Physical Fitness. These are;

> **Role Fitness.** Role fitness is the acceptable fitness level required to meet the physical demands of a role as defined by Physical Employment Standards (PES). PES are underpinned by science and have no age or gender bias. Commanders are to ensure that all personnel maintain role fitness levels through a formal structured PTP, and are tested in accordance with Military Annual Training Tests (MATT) 2 Fitness. The Army no longer recruits using generic fitness standards, therefore, it is not necessary for individuals within different Career Employment Groups (CEGs) to train or be tested to an equal standard.
>
> **Operational Fitness**. Operational fitness is the specific fitness level necessary to meet the physical requirements of an operation or task (ie mission specific). Fitness levels will be determined from analysis, conducted by the Chain of Command (CofC) and PT staff. Training using the APTS will build upon and supplement MATT 2 fitness level, be progressive and reflect the specific physical requirements of an operation or task. The CofC is to acknowledge that personnel within the same unit may be required to undertake differing roles once on operations and therefore may need to attain varying standards and levels of fitness.[162]

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[160] U.K. Army, *AGAI*, 1.

[161] Ibid., 2.

[162] Ibid., 2-3.

The PES is defined as “testing that is role-related, reflecting the essential, most physically demanding tasks required to perform the specific role successfully.” PES testing is designed to; “Ensure that all Army personnel have the physical ability to meet the force preparation required for their role. Mitigate the risk of Musculoskeletal injury (MSkI). Satisfy the Army’s obligations to comply with UK employment legislation. Maintain the British Army's reputation against other Armies.” [163]

In order to accomplish these tasks, the UK Army developed the APTS, which breaks physical training into three categories; endurance, strength, and mobility. These Three components are further broken down in the following table;

[163] U.K. Army, *AGAI*, 3.

Table 6. UK Army Physical Training System Components of Fitness

Serial	Fitness Category	Fitness Component	Definition
	Endurance		The ability to maintain or to repeat a given force or power output
1.		Aerobic Capacity	Ability to sustain sub-maximal efforts for a sustained period of time
2.		Anaerobic Capacity	Ability to sustain maximal efforts for a short period of time
	Strength		
3.		Muscular Endurance	Ability to exert sub-maximal external forces for a long period of time
4.		Muscular Strength	Ability to generate varying levels of external forces ranging from sub-maximal to maximal
5.		Explosive Strength	Ability to exert maximal external force in the shortest possible time
	Mobility		Movement proficiency and skilled application to tasks
6.		Flexibility	Range of motion around a joint
7.		Agility	The skills and abilities needed to change direction, velocity or mode in response to a stimulus
8.		Balance	Maintenance of equilibrium while stationary or moving
9.		Speed	Ability to perform movements in a short period of time
10.		Coordination	Ability to use the senses, such as sight or hearing, together with the body parts in performing motor tasks smoothly and accurately.

Source: U.K. Army. *Army General and Administrative Instructions (AGAI), Volume 1, Chapter 7: Physical Training* (London: UK Ministry of Defense, Crown Copyright, 2019), 5-6.

Execution of the UK APTS is a command responsibility. While the commander is responsible for the production of the PTD, each unit battalion size and larger has a cadre of trained personnel to assist in the execution of the PTP. These positions and their responsibilities include;

Unit Fitness Training Officer (UFTO). The UFTO in conjunction with the unit Commander is responsible for the implementation of unit's APTS. The UFTO is required to complete the UFTO course (available on the Defence Learning Environment (DLE)) before assuming the UFTO appointment.

Royal Army Physical Training Corps Instructor (**RAPTCI).** The RAPTCI in conjunction with the CO/OC and UFTO is responsible for the design, development and delivery of the APTS. The RAPTCI is the Commander's advisor on all PD activities. All RAPTCIs must remain technically current and competent to deliver training by attending the annual RAPTC Conference (normally 3 days), Regional training/study days and by completing mandated Annual Deficit Training (ADT). In line with direction provided in ABN 58/17, a record of all PT activity and further training completed in the form of ADT, Continuous Professional Development (CPD) and In-Service Training (IST) must be recorded in the individual's RAPTCI Log Book. RAPTCI Log Books will be audited through the PDA process.

Physical Training Instructors (PTIs) PTIs are to be employed within units under the supervision of a RAPTCI or, for units without a RAPTCI, the UFTO. In units with a RAPTCI, the PTI is responsible for assisting with the delivery of the APTS and MATT 2 testing. In units without a RAPTCI, the PTI is responsible for the delivery of the APTS and MATT 2 testing under the supervision of the UFTO. All qualified personnel must remain technically current and competent to deliver training by attending annual Regional training/Study days and completing mandated ADT. PTIs are to record all PT activity in their PTI Log Book in line within ABN 58/17 (to include PT activity, ADT and any CPD/IST completed). PTI Log Books will be audited through the PDA process.

Endurance Training Leader (ETL). The ETL is an officer or substantive NCO who is trained in the administration, preparation and safety requirements to conduct low level running and marching endurance training in direct support of MATT 2 Fitness. This is a basic award which lasts 3 years and permits the individual to conduct non-technical PT41 in support of MATT 2 Fitness. An ETL is not afforded the in-depth training given to a PTI; therefore, their ability to conduct activities is limited. An ETL may also be an individual that has been identified for future Army Reserve PTI training. Close management of ETL activities by the CofC is essential, ideally by the UFTO. They are to receive regular training by the senior PTI based on HQ RAPTC directed ADT. In addition they are to be informally and formally assessed by the senior PTI annually in accordance with JSP 822. Supervision of Training.[164]

[164] U.K. Army, *AGAI*, 10-12.

AGAI Vol 1, Chapter 7, goes on to state that there should be roughly one PTI per 100 Soldiers, but no less than 3, for a battalion, and two to five PTIs for separate units depending on size. [165] The remainder of the manual discusses the execution of the APTS, including mandating no less than three days of supervised PT and one day of group sports per week. It also discusses testing, the prevention of injuries, and conduct of the APTS in a similar manner to FM 7-22.

The Unit Fitness Training Officer – A Guide to Physical Training: This manual published in 2011, gives direction and guidance on the planning and execution of the APTS and associated testing. The goal of the manual is to enable Unit Fitness Training Officers throughout the U.K. Army to maintain its unit's operational capability through physical fitness. The manual gives instruction designed to help the Unit Fitness Training Officer maximize the utility of the APTS through leveraging RAPTCI, PTI, and ERI personnel to execute the PTP.

Get Fit for the Army: This is a 19-page pamphlet used by U.K. Army recruiters to help potential recruits get into shape prior to BCT, and inculcate the principles of the U.K. Army's APTS. The pamphlet is part of the U.K. Army's injury reduction plan, and covers strength and endurance training, diet, injury prevention, as well as the benefit of both team and individual sport as a vehicle to achieve better fitness in line with the goals of the APTS.

Fitness Training in the Army- The Way Ahead: This policy memo, published in 2009, directs the British Army to adopt strategies designed to promote life-long fitness in

[165] UK Army, *AGAI*, 12.

Soldiers, and avoid fitness decline in non-line unit assignments and long leave periods. "To ensure an enduring effect we must change soldiers' mindset to adopt a positive attitude that promotes a lifelong habitual exercise regime that begins from the day they join the Army."[166] The memo charges all personnel to undergo a minimum of 2-3 hours of physical training per week, regardless of duty status, and for all personnel to take charge of the their own personal fitness, as well as model and direct subordinates to do the same in order to increase overall physical readiness not tied to the " [Force Operations and Readiness Mechanism] FORM cycle," the UK Army's version of the U.S. Army's Sustainable Readiness Model.[167]

Military Annual Training Tests 2 (MATT2) – Fitness: This manual, published in 2016, defines the British Army's annual requirements for fitness testing. This manual is similar in nature to Appendix A of the U.S. Army's FM 7-22. The British Army MATT2 contains two fitness tests. The first test, is called the Physical Fitness Assessment (PFA), given bi-annually. The test consists of 2-minutes of press-ups [push-ups], sit-ups, and a 1.5-mile timed run. The test is conducted in a similar fashion to the APFT, with the following exceptions; there are five minutes between events, the Soldier may rest in the down position for the press-up, and sit-up, and the 1.5-mile run consists of an untested 0.5 mile formation warmup run, prior to the start of the event. Passing and maximum score standards are similar, with the APFT max score being higher in press-ups and sit-

[166] U.K. Army, Assistant Chief of Staff, Headquarters Land Forces, Directorate of Training (Army), *Fitness Training in the Army: The Way Ahead* (Wiltshire, UK: Crown Publishing, 2009), 2.

[167] Ibid., 3.

ups, and the PFA being faster, pace wise, for a maximum score. The PFA includes two alternate aerobic fitness assessments, the Multi-stage Fitness Test (MSFT) to be performed only in forward deployed areas where safety is a concern, and the Alternative Aerobic Assessment (A3) for those Soldiers on low impact profiles. The MSFT is a beep test, consisting of a 20-meter shuttle run. This assessment is similar to that employed by the 75th Ranger Regiment in their RAW program. The A3, is a monitored 15-minute bike test, that consists of a five-minute warmup and a 10-minute execution. The score is based on Watts per Kilogram of body weight.[168]

The second MATT2 test is the Annual Fitness Test (AFT). The test is a 12.8 km forced march at pace, in formation. The test is to be completed between 1-hour 55-minutes, and 2-hours. The test is to include at least 4.8 km on unpaved terrain. The load for the march is based on occupation: 25 kgs for all infantry, and RAPTC personnel, as well as everyone who is Parachute or commando qualified regardless of branch. 20 kgs for the Household Calvary, Royal Armoured Corps, and Royal Artillery Corps, and 15 kgs for all others. Dress for the test includes boots, combat uniform, load bearing vest, rucksack, and weapon.[169]

Category 3: British Army Emerging Concepts

Global Strategic Trends- The Future Starts Today, 6th Edition: This report, published in 2018, looks at UK strategic issues for defense and security from 2018 to

[168] U.K. Army, *Military Annual Training Tests 2: Fitness* (London: Crown Publishing, 2016). 2-1 – 2-27.

[169] Ibid., B 2.1 – B 2.3.

2050. The document presents 16 key areas of focus. One of these areas is Human Enhancement. The document states:

> Human enhancement technologies, including gene editing, physical and cognitive prosthesis, and pharmaceutical enhancement, are nascent now and their development over the next 30 years is likely to offer profound expansion of the boundaries of human performance. The application of these technologies and the integration of human and machine on the battlefield present opportunities to enhance military capability and improve performance of force elements. An actor's willingness and appetite to exploit these technologies may confer a competitive advantage over an adversary.
>
> • Moral, ethical and legal thresholds need to be defined to inform the development of human enhancement technologies within societies and armed forces.
>
> • Timely investment to understand the potential applications and risks of enhancement technologies will generate competitive advantage and could enable global leadership in developing governance frameworks.[170]

The document goes on to the state that enhanced nutrition, regenerative medicine, gene therapy, next-generation prosthetics and exoskeletons, and neurotechnology will all be areas that will affect global security and military operations, and urges defense establishments to be early adopters of these technologies in order to increase physical fitness and readiness.[171]

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[170] U.K. Ministry of Defence, *Global Strategic Trends*, – *The Future Starts* Now, 6th Edition (London: Crown Publishing, London, 2018) 17.

[171] U.K. Ministry of Defence, *Global Strategic Trends: The Future Starts Today,* 6th ed. (London: UK Ministry of Defence, 2018), accessed August 15, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/749002/20181005-GST6_Web_Version_1_.pdf, 68-71.

Category 3: British Army Reports and Studies

Low fitness, low body mass and prior injury predict injury risk during military recruit training: a prospective cohort study in the British Army: This study, published in 2016, found that 58% of 1,810 British Army recruits studied experienced at least one injury during training, with 65% of those injuries due to physical training and overuse injuries. The study finds that the main factor that contributed to overuse injuries was the fitness level of the recruit before they entered BCT. With those who had not conducted a pre-entry fitness plan being most at risk.

Musculoskeletal Injuries in British Army Recruits: A prospective study of diagnosis-specific incidence and rehabilitation times: This study, published in 2015, looked at musculoskeletal injuries in 3500 British Army recruits conducting BCT under the guidance of its normal cadre of instructors and physical trainers. The study found that the overall incidence of musculoskeletal injuries due to physical training for the 26-week Combat Infantryman's Course was 48.6%, with an average rehabilitation time of 99 days for the most serve stress fracture injuries. The study also found, that despite injuries, only 8% of all studied subjects were attired due to injury.[172]

Risk Factors for Training Injuries among British Army Recruits: This study, published in 2008, studied 11,937 male and 1,480 female British Army recruits to identify risk factors for injuries. The study found that, the discharge rate due to training

[172] Jagannath Sharma, Julie P. Greeves, Mark Byers, Alexander Bennett, and Iain R. Spears, "Musculoskeletal Injuries in British Army Recruits: A prospective study of diagnosis-specific incidence and rehabilitation times," *BioMed Central, Journal of Musculoskeletal Disorders,* 16, no. 106 (2015): 1-7*,* accessed 05 February 2018, http://dx.doi.org/10.1186/s12891-015-0558-6.

injuries for the British Army is approximately 2.68%, while injuries that required recovery or remediation were approximately 9.39%. Largest risk factors for injury included age, body mass index, and initial fitness level.[173]

Conclusion

This chapter focused on three key areas. The first, gave an overview of the JCIDS, CBA, and DOTMLPF-P processes in order to understand the framework from which this study will be conducted. The second and third areas, provide the necessary background on U.S. Army and British Army physical fitness doctrine, concepts, and studies in order to fully understand the scope of the problem and provide the information necessary to conduct a thorough CBA. This chapter also provides the documents that are critical in helping answer the primary and secondary research questions. All the sources used in this literature review are unclassified, and are accessible by the reader if further personal research is required. Chapter 3, research methodology, will explain how the literature reviewed in Chapter 2 will be organized in order to answer the primary and secondary research questions, conduct the case study, and provide the analysis and updated recommendations in Chapter 4 and Chapter 5.

[173] Sam Blacker, David Wilkinson, James Bilzon, and Mark P. Rayson, "Risk Factors for Training Injuries among British Army Recruits," *Military Medicine* 173 (2008.): 278-286. 10.7205/MILMED.173.3.278.

CHAPTER 3

RESEARCH METHODOLOGY

> Soldiers are professional athletes. The profession of soldiering is a physical one. Success as a professional athlete is akin to success as a Soldier in that both professions demand physical prowess. That physical prowess must be task specific. A basketball team trains differently than a football team. Both teams must be essentially physically fit, but their missions are quite different, and their daily training reflects that difference. In the same way, an Infantry unit and a Field Artillery unit both must be comprised of fit Soldiers to be successful, but their training should be mission specific in order to optimize their physical training.
>
> —101st Airborne Division, *Building the Tactical Athlete*

Introduction

Chapters one and two of this study examined the questions concerning the continued need to develop and refine physical fitness and injury preventions strategies, doctrine, and implementation in order to improve physical readiness. With the need for change now established, the remainder of this study will focus on the doctrine, organization, training, leadership, and personnel necessary to ensure that the U.S. Army achieves maximum physical readiness utilizing current doctrine and nested with the future operating concept. Since changes are needed, then the DOTMLPF-P methodology must be used. This chapter discusses the approach and methodology that were undertaken to conduct this research.

The Primary and Secondary Research Question

The primary research question addressed in this study asks if physical readiness can be enhanced by introducing a physical training corps similar in nature to the one that exists in the British Army. Stated another way, could the introduction of a professional

corps of physical trainers and associated medical staff, positioned at the Battalion through Division level, enhance the physical fitness and injury recovery outcomes in the U.S. Army? The primary research question is informed by six secondary questions. First, what is the difference between the U.S. Army and the British Army's methods of physical training and supervision? Second, what is the difference in the rate of injury between U.S. and British Soldiers? Third, what is the difference in the rate of recovery after injury between U.S. and British Soldiers? Fourth, what is the difference in the time of recovery after injury between U.S. and British Soldiers? Fifth, what programs are currently available and in-use to increase / maintain U.S. Soldier readiness? Finally, what comparisons can be made between the British method and bespoke methods offered to U.S. Army special populations, specifically, special operation forces.

Research Design

The intent of this thesis is to persuade the Chief Decision Maker (CDM) that the R3 recommendations presented in Chapter 5 address the identified gaps, and are feasible, suitable and acceptable in line with the CBA methodology seen through the DOTMLPF-P framework. In order to achieve this goal, and persuade policy makers to make informed decisions about a complex issue in order to improve physical readiness, an applied professional case study was used.[174]

[174] Kenneth Long, "Emerging Best Practices from professional applied case study research" (Lecture, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2016).

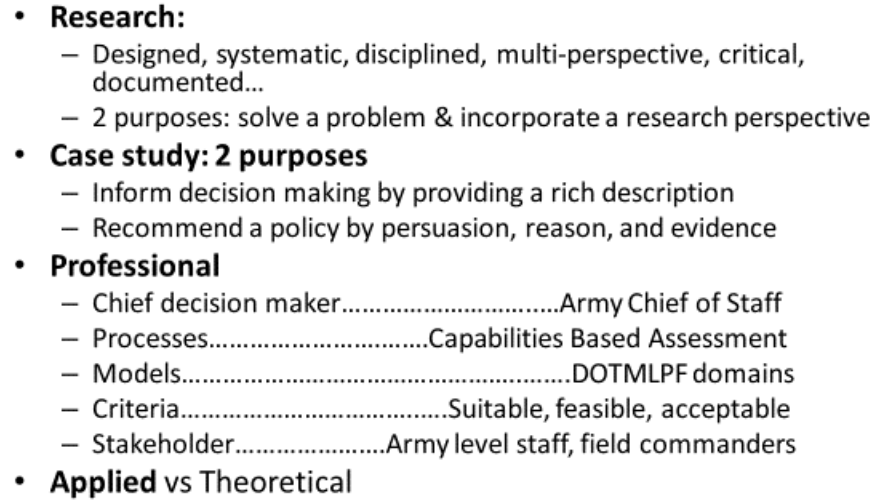

Figure 22. The Applied Professional Case Study Outline

Source: Kenneth Long, "Case Study Insights" (PowerPoint Presentation, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2017), slide 5.

This thesis uses the case study methodology in order to compare the physical readiness methodologies of the U.S. and British Armies. The research design of this paper uses four categorized areas of study: a historical review of the U.S. Army's physical fitness requirements, studies on Soldier physical fitness injuries and injury prevention, current doctrine on physical fitness and injury recovery, and physical fitness and injury recovery considerations in the future operating environment. The topics, were explored in chapters one and two, and confirmed the need for this paper. Analysis of current doctrine, current doctrine implementation, and of requirements demanded from the future operating concept will be used to identify capability gaps, in line with the CBA, and will answer the primary and secondary research questions. The analysis conducted in chapter four, will lead to the informed position, R2, and final solutions and recommendations, the R3 in Chapter 5.

The CBA process, and its three parts, the Functional Area Analysis, the Functional Needs Analysis, and the Functional Solutions Analysis were discussed at the beginning of Chapter 2. In order to conduct the CBA using the case study, the author used the following methodology;

Table 7. Author's Approach to Conduct of the Research

Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Background Initial Personal Recommendation (R1)	Literature Review	Methodology	Analysis (R2)	Recommendation for CDM (R3)
Modified Capabilities-Based Assessment (CBA)				
Phase One FAA			Phase Two FNA	Phase Three FSA
Modified DOTMLPF-P Analysis				
	Review of doctrine, studies, and concepts related to the U.S. and U.K PRT program		Analysis of Required PRT capabilities related to DOTMLPF-P process	Proposed solutions for the U.S. Army to increase physical readiness through PRT across the DOTMLPF-P process
			R2 improved by Stakeholder Analysis–basis for R3	Areas for further and future research

Source: Kenneth Long, discussion with author, 11 November 2018. Chart modeled after those in Robert J. Weitershausen "Conventional Air Advising in the Combat Environment" (Master's Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2018).

In Chapter 4, the Personal Initial Recommendation (R1) presented in Chapter 1 will be analyzed using the literature in Chapter 2 to present the Informed Position (R2). This position will then be assessed through the perspective of the CDM and key

stakeholders in order to provide the Recommended Solutions (R3) and recommendations for implementation in Chapter 5. The Chief Decision Maker is identified as the Chief of Staff of the Army. The key stakeholders identified for this thesis are the U.S. Army Commanding General for Initial Military Training, the U.S. Army Surgeon General, and the Brigade Combat Team Commander. This is based largely on the authorities granted to these individuals under AR 350-1, AR 600-9, and FM 7-22.

Table 8. Research Model

Initial Personal Recommendation	Evaluated Through	Informed Position	Evaluated Through	Recommended Solutions
R1	The History of U.S. Army Physical Readiness through PRT	R2	CDM Perspective	R3
	U.S. Army PRT Doctrine			
	U.S. Army Emerging Concepts and separate PRT programs			
	U.S. Army reports and studies on PRT, injuries, and injury recovery			
	British Army PRT Doctrine			
	British Army Emerging Concepts		Key Stakeholders' Perspective	
	British Army reports and studies on PRT, injuries, and injury recovery			

Source: Kenneth Long, discussion with author, 11 November 2018. Chart modeled after those in Robert J. Weitershausen "Conventional Air Advising in the Combat Environment" (Master's Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2018).

Summary

This chapter described the research methodology used in this thesis. Employing the applied professional case study, and the capabilities-based assessment allows the

author to answer the primary and secondary research questions. It also informs R1 to form the R2. Identified capability gaps are then given proposed solutions through the DOTMLPF-P framework, and analyzed through the perspective of the CDM and Key Stakeholders. This in turn, gives the CDM and Key Stakeholders a sound logical format from which to implement the proposed R3 solutions.

CHAPTER 4

ANALYSIS

> Our culture is becoming increasingly "unfit," due to poor nutrition, a lack of adequate and formal exercise, and too much technology. Still, the Soldiers who come to our Army from our society will be asked to fight in increasingly complex and demanding conflicts, and they must be prepared through new, unique, and scientifically based techniques.
>
> —Lieutenant General (Retired) Mark P. Hertling, *A Historical Review and Analysis of Army Physical Readiness, Training, and Assessment*

Introduction

The purpose of this chapter is to analyze the data provided in chapter 2 through the research methodology discussed in chapter 3. Specifically, the author will use the applied professional case study through a Capabilities Based Assessment in order to provide the reader with the Informed Position (R2). The R2 is formed through two parts. First, it uses the literature reviewed in Chapter 2 to inform and update the Initial Personnel Recommendations (R1) in Chapter 1. Secondly, it uses a stakeholders' perspective to complete step 2 of the CBA, the Functional Needs Analysis (FNA). This ensures that the R2 has addressed all current and future capabilities, and identified any capability gaps.

In order to maintain consistency throughout this thesis, analysis in this chapter will follow the DOTMLPF-P format as presented in Chapter 1. Once this is completed, the author will then discuss the analysis through the lenses of the key stakeholders which include; the U.S. Army G3/5/7, the Commanding General, Center for Initial Military Training (CIMT), the U.S. Army Surgeon General, and Brigade Combat Team

Commanders. These two parts will then fuse to form the Informed Position (R2) and complete the chapter.

Doctrine

It is clear from part two of the analysis, that current PRT doctrine lags behind current concepts and accepted practices. FM 7-22 was last updated in 2012, and does not contain any of the holistic health and fitness doctrine or concepts, nor does it include any mention of the new ACFT. FM 7-22, does not provide the detail on injury prevention and recovery strategies that are found in TB MED 592, or in separate programs such as RAW and THOR3. Furthermore, FM 7-22 lacks any type of strength or agility exercises that cannot be completed with only bodyweight. The utility of these types of exercises has been proven as not only beneficial, but as a critical component to war-fighting focused physical readiness. The use of weighted strength and agility training has been included in every U.S. Army separate unit fitness program, and the British Army PRT program. U.S. Army doctrine is also not logically organized, with AR 600-9 only tangentially related to the U.S. Army's PRT doctrine. It also fails fully incorporate weight control strategies with PRT.

This gap in doctrine has manifest itself in the creation of sperate fitness programs at various divisions, brigades, and special operations units. These unit fitness manuals combine all of the relevant doctrine in a concise guide that synthesizes the relevant information to help units manage their PRT programs. The British Army PRT documents from part three, are also organized in this manner. In addition, British PRT doctrine also includes guides for unit fitness leaders, in order to help plan and execute PRT programs in line with British Army fitness, weight control injury prevention and recovery guidance.

This approach is justified by the injury studies in part two and three which show that injury rates and recovery times are reduced when a wholistic fitness concept is used.

Organization

Separate unit programs and studies in part two identified increased physical readiness, decreased injuries, and decreased injury recovery times when organizations incorporated some combination of physical trainers, physical therapists, dietitians, and behavior health specialists. In all of these cases, besides THOR3, these enablers are not permanently assigned to the units they service even though they produced positive outcomes. The use of these enablers to increase physical readiness is supported by the comparison of literature in part three, where Royal Army Physical Training Corps Instructors (RAPTCI), and All Arms Physical Training Instructors (AAPTI / PTI) are part of every British Army battalion and company.

Training

Part two of the literature review shows that physical fitness performance is increased and injury rates decrease when Soldiers are trained in proper fitness techniques. Average decreases in injury rates for BCT trainees was approximately 20%, while attrition from medical issues was reduced by up to 50%.[175] It also shows that this goes beyond the physical realm, and that physical readiness in increased when it incorporates topics such as hygiene, diet, mental preparation, and correct work and recovery techniques. This is especially evident in the comparing the effectiveness of the RAW and

[175] Knapik et al., *The Soldier-Athlete Initiative.*

THOR3 programs to standard U.S. Army PRT programs. Studies reviewed in part three further promote the idea that a holistic health and fitness concept produces superior physical readiness results as compared to PRT programs alone. Furthermore, PRT program techniques and procedures must span both officer and enlisted training, as currently only enlisted personnel who graduate from BCT are exposed to, and trained in H2F procedures and techniques.

Materiel

A review of the literature did not find any significant gaps in materiel needs to accomplish increased physical readiness. Studies and programs reviewed in both part two and part three show increased PRT results through the use of strength training, and the new ACFT requires equipment to be performed. However, every U.S. Army garrison currently has sufficient strength training equipment to accomplish recommendations outlined in the literature review, and the U.S. Army is currently in the process of fielding the correct type and amount of equipment necessary to perform the ACFT.

Leadership and Education

Analysis of leadership involved in PRT decision making in part two, specifically the authorities listed in AR 350-1 and AR 600-9 shows that there are far too many authorities spread out over too many key stakeholders to effectively monitor, update, adapt and improve PRT and H2F doctrine in a manner that is timely and relative. In chapter 1, the history of the current FM 7-22 was discussed. A key point was that it took nearly a decade to approve and publish an updated PRT manual. The current FM 7-22 is now over seven years old, and lacks many of the updates, techniques, procedures, and

best practices contained in the studies of part two. H2F was first introduced as a concept in 2014, and has yet to be actioned into doctrine over five years later.

An analysis of professional military education shows that there is no continuing education mechanism to educate and update leaders on current PRT performance optimization, injury prevention, and injury recovery techniques and procedures. This creates a mis-alignment between leaders who have not received formal PRT and H2F training, and recent enlisted BCT graduates who have. There is a lack of dedicated PRT personnel who have the skills, knowledge, and expertise to maximize physical readiness through the U.S. Army's PRT program. While the MFT program does fill some of this gap, its assignment as an additional duty relegates its effectiveness. This gap only becomes more obvious once it is compared to its British Army counterpart. Finally, a comparison of the U.S. Army Master Fitness Trainer course and the British All Arms Physical Training Instructor shows a large gap in knowledge and skills provided to MFT graduates compared with their British Army counterparts.

Personnel

As with organization, the literature review part two identified increased physical readiness, decreased injuries, and decreased injury recovery times when organizations incorporated some combination of physical trainers, physical therapists, dietitians, and behavior health specialists. However, these billets do not either exist at all, or are in insufficient numbers to provide every brigade combat team with these specialties, much less brigade in the U.S. Army. As of now, part two identifies the Master Fitness Trainer as the only formally trained PRT personnel available at the Brigade Combat Team and lower, and only as an additional duty. MFT personnel are not adequately trained,

equipped, or empowered to integrate injury prevention and injury recovery strategies between the unit, the Solider, and health care providers. Part two of the literature review also identified superior performance from select BCT companies, the 75th Ranger Regiment, and U.S. Army Special Operations Command due in large part to the availability of full time qualified physical fitness trainers who are integrated with health care providers. Part three of the literature review shows that the British Army's PRT program is better integrated, and incorporates a unit fitness leader, and a RAPTCI at the battalion level, and several AAPTI / PTIs at the company level.

Facilities

The literature review did not show any major dissimilarities in PRT or injury recovery facilities between the U.S. and British Armies. While USASOC's THOR3 program benefits from their fitness and recovery facilities being collocated within one facility, the benefits provided by this construct can be replicated with already existing infrastructure available to every Brigade Combat Team; a Medical Treatment Facility, and a gymnasium. All of the needed fitness modalities to achieve physical readiness can be accomplished in multiple ways so that each Brigade Combat Team would not require a dedicated gymnasium or strength training facility.

Policy

The literature review did not find any deficiencies or gaps in policy that currently help or hinder the U.S. Army's PRT program nor prevent the implementation of recommendations. However, as noted in part two if the proposed reorganization of the

DOD's health system occurs as planned, a policy gap may exist in effectively implementing and coordinating the efforts of physical trainers and health care personnel.

Addressing the Research Questions

The primary research question this thesis seeks to answer asks if physical readiness can be enhanced by introducing a physical training corps similar in nature to the one that exists in the British Army. The analysis above concludes that a physical training corps will improve physical readiness through increasing physical fitness education and performance, reducing physical training related injuries, and increasing injury recovery timelines and outcomes.

The primary research question was informed by six secondary research questions. 1. What is the difference between the U.S. Army and the British Army's methods of physical training and supervision? The analysis shows that the British Army provides its battalion sized units with one Unit Fitness Officer, responsible for executing the Commander's fitness program, one RAPTCI, a physical training SME, responsible for physical training, injury prevention, and injury recovery programs, and two to five AAPTIs responsible for helping the Unit Fitness Officer, and RAPTCI execute physical training, injury prevention, and injury recovery programs at the company level. This is in contrast to the U.S. Army system which provides a MFT program which is optional for battalion and company formations. Furthermore, the MFT is an additional duty designed to help units execute their physical fitness program, and does not retain authorities to own the Commander's PFT program.

2. What is the difference in the rate of injury between U.S. and British Soldiers? The analysis shows that injury occurrence rates due to physical training are approximately 20% lower in British Soldiers than U.S. Army Soldiers.

3. What is the difference in the rate of recovery after injury between U.S. and British Soldiers? An analysis of discharge rates between British and U.S. Army BCT programs, finds that injury attrition in British BCT is approximately 14% less than U.S. Army BCT.

4. What is the difference in the time of recovery after injury between U.S. and British Soldiers? Loss time due to injuries remains high for both the U.S. and British Armies. Recovery time due to injury is highly dependent on the individual and the injury sustained. The literature reviewed was unable to draw a direct comparison between recovery times between the U.S. and British Armies. This will be addressed in Chapter 5.

5. What programs are currently available and in-use to increase / maintain U.S. Soldier readiness? At the Army level, the MFT qualification remains the major program designed to increase physical readiness through PRT and injury recovery. However, several U.S. Army divisions and brigades have developed their own programs to increase PRT outcomes, and reduce injury. Trials of embedding physical trainers and physical therapist into U.S. Army BCT units have been conducted with promising results. Furthermore, the creation of the RAW and THOR3 programs, with included physical trainers and associated medical personnel have produced improved physical readiness through increased fitness, reduced injuries, and better injury recovery outcomes.

6. What comparisons can be made between the British method and bespoke methods offered to U.S. Army special populations, specifically, special operation forces?

This study reviewed two PRT programs currently in place for special operation forces, RAW and THOR3. Upon review of these programs, and comparison with the British Army PRT program, analysis shows that these programs are similarly designed and implemented. The use of physical trainers, physical therapist, and dietitians are found in all three programs. The inclusion of extensive injury prevention strategies, and focus on multimodal fitness focused around operational workloads and tasks is also similar.

DOTMLPF-P Analysis in the FNA

As described in Chapter 2, the Functional Needs Analysis seeks to identify capability gaps, assess the impact of those gaps, and classify the proximate cause of the gap.[176] From the DOTMLPF-P analysis above, the reader can clearly assess that there are gaps in doctrine, organization, training, leadership and education, and personnel that hinder Soldier and organizational physical readiness and physical fitness. The impact of these gaps is also easy to identify when comparing the U.S. Army PRT program with special programs such as RAW and THOR3, and the British Army's PRT program. The two main impacts of the identified gaps are decreased physical readiness through increased injury rates and increased recovery times, and overall decreased physical performance when compared to other PRT systems available. There are four categorizations of cause for identified gaps. These are;

1. Proficiency (inability to achieve the relevant effect in particular conditions).

2. Sufficiency (ability to achieve the effect but inability to bring the needed force to bear due to force shortages or other commitments).

[176] DLRO, "F102: Joint and Army Capabilities Development," slides 15-23.

3. Lack of existing capability.

4. Need for recapitalization due to aging of an existing capability.[177]

By using the analysis above, the reader can see that the gaps identified fall into three of the four categories. The current MFT program and overall PRT program suffer gaps due to proficiency and sufficiency. This stems from an underutilization of MFT qualified personnel, and a lack of synergy between updated PRT, injury prevention, and injury recovery procedures and techniques, which leads to decreased physical readiness. The gaps identified for increased education, training, and dedicated personal training, and injury recovery personnel is due to a lack of existing capability.

R2 Informed Position

The R2 Informed Position uses the R1 Initial Personnel Recommendation and validates, modifies, removes, or adds recommendations based on the analysis provided above. The completed R2 should confirm or deny the gaps identified through the FNA, and provide solutions to those gaps. The completed R2 is then further validated through the Stakeholder Analysis and Chief Decision Maker Analysis to form the R3 Proposed solutions and recommendations which will be presented in Chapter 5.

[177] "Functional Needs Analysis," JCIDS Process, Acqnotes, last modified March 19, 2018, http://acqnotes.com/acqnote/acquisitions/functional-needs-analysis

Table 9. R2: Informed Position, Doctrine

Which Element of the DOTMLPF-P Framework does the recommendation fall under?	R1 Initial Personal Recommendation	Is the R1 Validated by the Analysis?	Does the R1 need to be Modified?	Which Stakeholder(s) does it affect?	Does the analysis support additional recommendations?	R2 Informed Position.
DOCTRINE	Recommendation 1: Establish all PRT and H2F doctrine under ADP 7-0, *Training.* In order to establish continuity.	Yes	Yes, H2F replaces PRT.	CG USACIMT	Yes, see R2 Doctrine Recommendation 3	Recommendation 1: Establish all H2F Doctrine under ADP 7-0, *Training,* in order to establish continuity.
	Recommendation 2: Create ADRP 7-22 *U.S. Army Holistic Health and Fitness*	Yes	Yes. Combine with Recommendation 3, as H2F replaces PRT	CG USACIMT	No	Recommendation 2: Update FM 7-22 with H2F concept, and rename ADRP 7-22, *U.S. Army Holistic Health and Fitness*
	Recommendation 3: Update FM 7-22, *Physical Readiness Training,* to align with current doctrine and testing to include injury prevention and recovery strategies.	Yes	Combine with Recommendation 2, as H2F replaces PRT	CG USACIMT Surgeon General	No	Recommendation 3: Update and publish TB MED 592 as ADRP 7-22.1, *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training.*

Source: Created by author.

Table 10. R2: Informed Position, Organization

Which Element of the DOTMLPF-P Framework does the recommendation fall under?	R1 Initial Personal Recommendation	Is the R1 Validated by the Analysis?	Does the R1 need to be Modified?	Which Stakeholder(s) does it affect?	Does the analysis support additional recommendations?	R2 Informed Position.
ORGANIZATION	Recommendation 1: Consolidate all authority to develop, test, implement, track, monitor and assess its H2F and PRT programs and initiatives under Commanding General, USACIMT.	Yes	No	CG USACIMT	No	Recommendation 1: Consolidate all authority to develop, test, implement, track, monitor and assess its H2F and PRT programs and initiatives under Commanding General, USACIMT.
	Recommendation 2: Revise U.S. Army manning guidance to increase authorizations and billets in the Brigade Physical Therapy Section to include: two Physical Therapist, MOS 65B, four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven Physical Readiness Training Specialist, MOS 68I.	Yes	No	CG USACIMT Surgeon General Brigade Combat Team Commanders	Yes, See R2 Organization recommendation four.	Recommendation 2: Revise U.S. Army manning guidance to increase authorizations and billets in the Brigade Physical Therapy Section to include: two Physical Therapist, MOS 65B, four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven Physical Readiness Training Specialist, MOS 68I.

Source: Created by author.

Table 11. R2: Informed Position, Organization, and Training

Which Element of the DOTMLPF-P Framework does the recommendation fall under?	R1 Initial Personal Recommendation	Is the R1 Validated by the Analysis?	Does the R1 need to be Modified?	Which Stakeholder(s) does it affect?	Does the analysis support additional recommendations?	R2 Informed Position.
ORGANIZATION	Recommendation 3: Rename the Brigade Physical Therapy Section to the Brigade Physical Readiness Section.	Yes	No	CG USACIMT Brigade Combat Team Commanders	No	Recommendation 3: Rename the Brigade Physical Therapy Section to the Brigade Physical Readiness Section.
	N/A	N/A: New	N/A: New	CG USACIMT Brigade Combat Team Commanders	N/A:	Recommendation 4: Realign MFT qualified personnel training responsibilities under Brigade Combat Team Commanders, delegated to Brigade Surgeon.
TRAINING	Recommendation 1: Amend AR 350-1 to mandate PRT and H2F training and education as a component of unit in-processing.	Yes	No	Brigade Combat Team Commanders	No	Recommendation 1: Amend AR 350-1 to mandate PRT and H2F training and education as a component of unit in-processing.

Source: Created by author.

Table 12. R2: Informed Position, Training, and Leadership and Education

Which Element of the DOTMLPF-P Framework does the recommendation fall under?	R1 Initial Personal Recommendation	Is the R1 Validated by the Analysis?	Does the R1 need to be Modified?	Which Stakeholder(s) does it affect?	Does the analysis support additional recommendations?	R2 Informed Position.
TRAINING	Recommendation 2: Establish an Advanced Individual Training school to accommodate a new Physical Readiness Training Specialist MOS under guidance from the USAPFS	Yes	No	CG USACIMT	No	Recommendation 2: Establish an Advanced Individual Training school to accommodate a new Physical Readiness Training Specialist MOS under guidance from the USAPFS.
LEADERSHIP AND EDUCATION	Recommendation 1: Amend AR 350-1 to mandate all PME courses incorporate PRT and H2F training into its curriculum.	Yes	No	CG USACIMT	Yes, See R2 Leadership and Education Recommendations two and three.	Recommendation 1: Amend AR 350-1 to mandate all PME courses incorporate PRT and H2F training into its curriculum.
	N/A	N/A	N/A	CG USACIMT	N/A	Recommendation 2: Require annual continuity, and refresher training to all MFT qualified personnel.
	N/A	N/A	N/A	CG USACIMT	N/A	Recommendation 3: Create a Unit Fitness Leader Course, and designate 1x Officer or Senior NCO per BN charged with implementing the unit commander's PRT program.

Source: Created by author.

Table 13. R2: Informed Position, Personnel

Which Element of the DOTMLPF-P Framework does the recommendation fall under?	R1 Initial Personal Recommendation	Is the R1 Validated by the Analysis?	Does the R1 need to be Modified?	Which Stakeholder(s) does it affect?	Does the analysis support additional recommendations?	R2 Informed Position.
PERSONNEL	Recommendation 1: Establish the creation of a new MOS, 68I, Physical Readiness Training Specialist, and associated manning billets.	Yes	No	CG USACIMT Brigade Combat Team Commanders	Yes, See R2 Personnel Recommendation three	Recommendation 1: Establish the creation of a new MOS, 68I, Physical Readiness Training Specialist, and associated manning billets.
	Recommendation 2: Revise U.S. Army manning priorities and operational mission requirements in the HQDA manning guidance to request placement of MOS 68I, 7 per Brigade Combat Team, Sperate Brigade, and independent Regiment.	Yes	No	CG USACIMT Brigade Combat Team Commanders	No	Recommendation 2: Revise U.S. Army manning priorities and operational mission requirements in the HQDA manning guidance to request placement of MOS 68I, 7 per Brigade Combat Team, Sperate Brigade, and independent Regiment.
	N/A	N/A	N/A	CG USACIMT Brigade Combat Team Commanders	N/A	Recommendation 3: Modify AR 350-1 to mandate 1x MFT qualified personnel per Company, and Battalion.

Source: Created by author.

Stakeholder Analysis

As stated in Chapter three, the author used the authorities for PRT and weight control granted in AR 350-1, AR 600-9, and FM 7-22 to identify three key stakeholders; the U.S. Army Commanding General for Initial Military Training, the U.S. Army Surgeon General, and the Brigade Combat Team Commander from which to filter and improve this chapter's analysis. To conduct the stakeholder analysis, this subchapter will identify the authorities and responsibilities of each stakeholder, as it relates to PRT and then validate or repudiate each section of the DOTMLPF-P analysis. This will complete the Functional Needs Analysis, and allow the R2 Informed Position to be rendered.

The Commanding General, U.S. Army Center for Initial Military Training (CG USACIMT) is responsible for all guidance and development of PRT programs and doctrine through its relationship with the U.S. Army Physical Fitness School. As such, the CG USACIMT is directly responsible for the development and execution of H2F and PRT doctrine and its implementation throughout the U.S. Army. The CG USACIMT accomplishes these tasks through continuous study and development of the human dimension strategy, exercise science, and tie-in with civilian organizations and universities dedicated to health science and human performance.[178]

The U.S. Army Surgeon General is responsible for providing medical, physiological, and health guidance to the force to ensure that Soldiers are able to accomplish their individual and collective tasks.[179] The Surgeon General is also

[178] HQDA, AR 350-1, 34.

[179] Ibid., 26.

responsible for establishing and evaluating the Army Body Composition Program. In executing those duties, the Surgeon General must also review medical trends, and establish both PRT and nutrition policies to ensure that Soldiers can maintain the standards set forth in the Army Body Composition Program.[180]

The Brigade Combat Team Commander has several PRT related responsibilities as the Commander, and senior military officer within the Brigade Combat Team. These include; establishing a PRT program in line with FM 7-22 and the Army Human Dimension Strategy, managing the Master Fitness Trainers within the Brigade Combat Team, and implement the Army Body Composition Program in-line with AR 600-9.[181], [182] The Brigade Combat Team Commander is also responsible for implementing PRT educational and training principles, review all PT procedures and unit injury data to assess program effectiveness, ensuring that PRT is conducted in line with risk mitigation policies, and that supporting medical personnel are given the time and scope to properly treat and rehabilitate PRT related injuries.[183]

With the R2 now formed, and the PRT and weight control responsibilities for the stakeholders now established, the R2 can be validated through the stakeholder's lens. This will validate the R2 Informed Position by ensuring that the R2 recommendations

[180] HQDA, AR 600-9, 1-3.

[181] HQDA, AR 350-1, 26.

[182] HQDA, AR 600-9, 3.

[183] HQDA, TB 592, 1-3.

either enables or enhances the stakeholder's ability to accomplish its duties and execute its responsibilities.

Table 14. R2: Informed Position, Doctrine with Stakeholder Analysis

R2: Informed Position DOTMLPF-P Element	R2: Informed Position	Stakeholder involved	Does the R2 help the stakeholder accomplish stated responsibilities and improve physical readiness?	How does the recommendation help the stakeholder?
DOCTRINE	Recommendation 1: Establish all H2F Doctrine under ADP 7-0, *Training,* in order to establish continuity.	CG USACIMT	Yes	Consolidation of all H2F Doctrine under ADP 7-0 ensures H2F doctrine changes, updates, and validation can be quickly actioned and published.
	Recommendation 2: Update FM 7-22 with H2F concept, and rename ADRP 7-22, *U.S. Army Holistic Health and Fitness*	CG USACIMT	Yes	Use of ADRP and the use of H2F ensure inculcation of TRADOC concepts into doctrine.
	Recommendation 3: Update and publish TB MED 592 as ADRP 7-22.1, *Prevention and Control of Musculoskeletal Injuries Associated with Physical Training.*	CG USACIMT Surgeon General	Yes	Inclusion of TB MED 592 into doctrine ensures that H2F and Injury prevention strategies are nested, and provides the U.S. Army with a more wholistic H2F approach.

Source: Created by author.

Table 15. R2: Informed Position, Organization with Stakeholder Analysis

R2: Informed Position DOTMLPF-P Element	R2: Informed Position	Stakeholder involved	Does the R2 help the stakeholder accomplish stated responsibilities and improve physical readiness?	How does the recommendation help the stakeholder?
ORGANIZATION	Recommendation 4: Consolidate all authority to develop, test, implement, track, monitor and assess its H2F and PRT programs and initiatives under Commanding General, USACIMT.	CG USACIMT	Yes	Consolidating H2F authorities under a single source allows for rapid updates and implementation of proven emerging concepts, and provides a single source for continuity and future development.
	Recommendation 5: Revise U.S. Army manning guidance to increase authorizations and billets in the Brigade Physical Therapy Section to include: two Physical Therapist, MOS 65B, four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven Physical Readiness Training Specialist, MOS 68I.	CG USACIMT Surgeon General Brigade Combat Team Commanders	Yes	By providing proven H2F resources to commanders, the improved Brigade Physical Therapy Section is able to provide increased physical readiness to unit commanders and provide a feedback mechanism to CG USACIMT and the Surgeon General on the H2F program and injury and recovery trends.

Source: Created by author.

Table 16. R2: Informed Position, Organization and Training with Stakeholder Analysis

R2: Informed Position DOTMLPF-P Element	R2: Informed Position	Stakeholder involved	Does the R2 help the stakeholder accomplish stated responsibilities and improve physical readiness?	How does the recommendation help the stakeholder?
ORGANIZATION	Recommendation 6: Rename the Brigade Physical Therapy Section to the Brigade Physical Readiness Section.	CG USACIMT Brigade Combat Team Commanders	Yes	Renaming the Brigade Physical Therapy Section realigns medical providers within the cell with the H2F program, and provides alignment throughout the Commander's physical training program.
	Recommendation 7: Realign MFT qualified personnel training responsibilities under Brigade Combat Team Commanders, delegated to Brigade Surgeon.	CG USACIMT Brigade Combat Team Commanders	Yes	Realignment of MFT personnel ensures that the Commander's H2F goals are met in line with the unit's METL, and provides validation and feedback on the MFT program. Furthermore, it aligns MFT personnel with injury prevention and recovery strategies.
TRAINING	Recommendation 8: Amend AR 350-1 to mandate PRT and H2F training and education as a component of unit in-processing.	Brigade Combat Team Commanders	Yes	Ensures all arriving personnel understand and can execute the unit's H2F program in line with the most recent guidance and doctrine.

Source: Created by author.

Table 17. R2: Informed Position, Training and Leadership and Education with Stakeholder Analysis

R2: Informed Position DOTMLPF-P Element	R2: Informed Position	Stakeholder involved	Does the R2 help the stakeholder accomplish stated responsibilities and improve physical readiness?	How does the recommendation help the stakeholder?
TRAINING	Recommendation 9: Establish an Advanced Individual Training school to accommodate a new Physical Readiness Training Specialist MOS under guidance from the USAPFS.	CG USACIMT	Yes	Establishes the appropriate program in order to provide Physical Readiness Trainers to the force.
LEADERSHIP AND EDUCATION	Recommendation 10: Amend AR 350-1 to mandate all PME courses incorporate PRT and H2F training into its curriculum.	CG USACIMT	Yes	Ensures all personnel are educated on the principles of the H2F program, injury prevention and injury recovery, and can execute the H2F program for the Commander.
	Recommendation 11: Require annual continuity, and refresher training to all MFT qualified personnel.	CG USACIMT	Yes	Ensures all MFT personnel remain up-to-date on all H2F programs, initiatives, and trends.
	Recommendation 12: Create a Unit Fitness Leader Course, and designate 1x Officer or Senior NCO per BN charged with implementing the unit commander's PRT program.	Brigade Combat Team Commanders	Yes	Provides the Brigade Combat Team Commander with a direct representative at the Battalion level to execute the unit's PRT, injury prevention, and injury recovery programs.

Source: Created by author.

Table 18. R2: Informed Position, Personnel with Stakeholder Analysis

R2: Informed Position DOTMLPF-P Element	R2: Informed Position	Stakeholder involved	Does the R2 help the stakeholder accomplish stated responsibilities and improve physical readiness?	How does the recommendation help the stakeholder?
PERSONNEL	Recommendation 13: Establish the creation of a new MOS, 68I, Physical Readiness Training Specialist, and associated manning billets.	CG USACIMT Brigade Combat Team Commanders	Yes	Provides the unit with a PRT / H2F, injury prevention, and injury recovery subject matter expert. This SME will be able to align the unit's METL with the PRT program. The SME will also be tasked with managing injury prevention and injury recovery programs at the Battalion level for the Brigade Surgeon.
	Recommendation 14: Revise U.S. Army manning priorities and operational mission requirements in the HQDA manning guidance to request placement of MOS 68I, 7 per Brigade Combat Team, Sperate Brigade, and independent Regiment.	CG USACIMT Brigade Combat Team Commanders	Yes	Provides one PRT SME per Battalion to execute the Commander's PRT program. Provides a direct conduit back to USACIMT for the revision, implementation, and validation of H2F, injury prevention, and injury recovery programs and initiatives.
	Recommendation 15: Modify AR 350-1 to mandate 1x MFT qualified personnel per Company, and Battalion.	CG USACIMT Brigade Combat Team Commanders	Yes	Provides each 68I one MFT qualified personnel per Company in order to assist Company Commanders execute the Commander's PRT, injury prevention, and injury recovery programs.

Source: Created by author.

R2 Informed Position with CDM Validation

As with the stakeholder analysis above, the R2 Informed Position must be validated with analysis from the Chief Decision Maker. The CDM for this analysis was identified as the Chief of Staff of the Army (CSA). This determination is based of two criteria, first, statements made from the current Chief of Staff, and secondly, the duties

and responsibilities of the Chief of Staff under United States Code Title 10. Most famously, in his initial address to the U.S. Army, Chief of Staff Mark A. Miley stated that, "Our most valued assets, indeed, the Nation's most valued assets, are our Soldiers, and our solemn commitment must always be to never send them into harm's way untrained, poorly led, undermanned, or with less than the best equipment we can provide. Readiness is #1 and there is no other #1."[184] Additionally, in a widely circulated interview on the new Army Combat Fitness Test with the online publication Task and Purpose, General Miley stated;

> This has everything to do with effectiveness in combat—that's why it's gender-neutral; that's why it's age-neutral," Milley said. "Combat is unforgiving. It doesn't matter how old you are. The enemy doesn't care. Before they shoot you, they don't say: 'Hey are you 25 or are you 45?' They don't do that. They just shoot you. And dead is dead. So we want to make sure that our soldiers are in top physical condition to withstand the rigors of ground combat. And there's nothing like it. Ground combat is unbelievable. Go look at those kids, who are walking up and down the hills of Afghanistan. My dad at the beaches of Iwo Jima went 19 consecutive days without eating in some of the most brutal combat in military history. Combat is not for the faint of heart. It's not for the weak-kneed.[185]

The duties and responsibilities imparted on the CSA are found in U.S. Code, Title 10, sub-section 7033. It states in part that the CSA is to "preside over the Army Staff; transmit the plans and recommendations of the Army Staff to the Secretary and advise the Secretary with regard to such plans and recommendations; after approval of the plans or recommendations of the Army Staff by the Secretary, act as the agent of the Secretary in

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[184] Mark A. Milley, "39th Chief of Staff of the Army Initial Message to the Army," Washington, DC, August 2015).

[185] Jeff Schogol, "Army Chief of Staff Tells Soldiers to Get Fit or Get Out," *Task & Purpose*, 08 October 2018, accessed 01 March 2019, https://taskandpurpose.com/army-chief-milley-get-fit-get-out.

carrying them into effect."[186] To better qualify the CSA's qualifications as the CDM, the CSA's oversite of the Army Staff's responsibilities is also important. U.S. Code, Title 10, sub-section 7032 states that the Army Staff must "investigate and report upon the efficiency of the Army and its preparation to support military operations by combatant commands; prepare detailed instructions for the execution of approved plans and supervise the execution of those plans and instructions; as directed by the Secretary or the Chief of Staff, coordinate the action of organizations of the Army."[187]

As the R2 largely looks to improve the efficiency of the U.S. Army PRT program in order to increase physical readiness, and by extension preparation to support military operations, it is logical to conclude that the CSA's position as the CDM is well founded, and that the R2 recommendations addresses gaps that the CDM can, and is willing to implement.

Summary and Conclusion

This chapter conducted an analysis of the literature reviewed in Chapter 2 with the research methodology presented in Chapter 3. Overall, the analysis supports the creation and implementation of a physical fitness training corps, which was the basis of the primary research question. Evidence found to answer the six secondary research questions all found that the implementation of a physical fitness training corps will increase physical readiness through increased physical fitness, reduced injuries, and

[186] U.S. Government, *U.S. Code, Title 10, Armed Forces* (Washington, DC: Government Printing Office, 2019).

[187] Ibid.

increased physical injury recovery outcomes. The analysis points to several instances of U.S. Army Divisions and Brigades creating ad hoc programs to address deficiencies in the current PRT program. It also found that the framework for these programs exists in enduring U.S. Army programs such as RAW and THOR3. By using the FNA through the DOTMLPF-P framework, the R1 Initial Personal Recommendations presented in Chapter 1, were able to be combined with the analysis in this chapter to produce the R2: Informed Position. The R2 makes 15 recommendations that span Doctrine, Organization, Training, and Leadership and Education. This updated position was then validated by first examining the R2 through the lens of key stakeholders necessary to drive and enact the proposed changes, and then through the lens of the Chief Decision Maker responsible for approving and appropriating the changes. The validated R2 will be used to propose the R3: Recommended Solutions to the CDM if Chapter 5.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

> You have to lead men in war by bringing them along to endure and display qualities of fortitude that are beyond the average man's thought of what he should be expected to do. You have to inspire them when they are hungry and exhausted and desperately uncomfortable and in great danger; and only a man of positive characteristics of leadership, with the physical stamina that goes with it, can function under those conditions.
>
> —General George C. Marshal, *Nineteen Stars*

Introduction

In Chapter 4, an analysis of the literature reviewed in Chapter 2 was conducted using DOTMLPF-P framework to answer the Functional Needs Analysis (FNA) of the CBA, and create the R2, Informed Position. This position was then further analyzed and validated through the lens of three key stakeholders, and the chief decision maker (CDM). In this chapter, the results of Chapter 4 will be used to create the R3, Recommended Decisions, which will be presented to the Chief Decision Maker. The R3 Recommended Decisions will also complete the CBA by providing the Functional Solutions Analysis (FSA). Additionally, this chapter will discuss recommendations for further studies, as well as, the author's personal learning reflections.

R3: Recommended Solutions

The R3 Recommended Solutions is formed through validating the R2 Informed Position through the lens of the CDM. For this thesis, the CDM was identified as the Chief of Staff of the U.S. Army, and the CDMs responsibilities and authorities were discussed in the previous chapter. When implemented by the CDM, the R3 Recommended Solutions are designed to increase physical readiness by utilizing non-

material solutions through the DOTMLPF-P framework. These solutions, also form the FSA of the CBA process, and provide solutions to the gaps identified by the analysis as part of the Functional Needs Analysis (FNA). The following table presents the R3 Recommended Solutions by DOTMLPF-P category.

Table 19. R3: Recommended Solutions, Doctrine, Organization and Training

DOTMLPF-P Category	R3: Recommended Solutions
DOCTRINE	Recommendation 1: Establish all H2F Doctrine under ADP 7-0, Training, in order to establish continuity.
DOCTRINE	Recommendation 2: Update FM 7-22 with H2F concept, and rename ADRP 7-22, U.S. Army Holistic Health and Fitness.
DOCTRINE	Recommendation 3: Update and publish TB MED 592 as ADRP 7-22.1, Prevention and Control of Musculoskeletal Injuries Associated with Physical Training.
ORGANIZATION	Recommendation 4: Consolidate all authority to develop, test, implement, track, monitor and assess its H2F and PRT programs and initiatives under Commanding General, USACIMT.
ORGANIZATION	Recommendation 5: Revise U.S. Army manning guidance to increase authorizations and billets in the Brigade Physical Therapy Section to include: two Physical Therapist, MOS 65B, four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven Physical Readiness Training Specialist, MOS 68I.
ORGANIZATION	Recommendation 6: Rename the Brigade Physical Therapy Section to the Brigade Physical Readiness Section.
ORGANIZATION	Recommendation 7: Realign MFT qualified personnel training responsibilities under Brigade Combat Team Commanders, delegated to Brigade Surgeon.
TRAINING	Recommendation 8: Amend AR 350-1 to mandate PRT and H2F training and education as a component of unit in-processing.
TRAINING	Recommendation 9: Establish an Advanced Individual Training school to accommodate a new Physical Readiness Training Specialist MOS under guidance from the USAPFS.

Source: Created by author.

Table 20. R3: Recommended Solutions, Leadership and Education, and Personnel

DOTMLPF-P Category	R3: Recommended Solutions
LEADERSHIP AND EDUCATION	Recommendation 10: Amend AR 350-1 to mandate all PME courses incorporate PRT and H2F training into its curriculum.
LEADERSHIP AND EDUCATION	Recommendation 11: Require annual continuity, and refresher training to all MFT qualified personnel.
LEADERSHIP AND EDUCATION	Recommendation 12: Create a Unit Fitness Leader Course, and designate 1x Officer or Senior NCO per BN charged with implementing the unit commander's PRT program.
PERSONNEL	Recommendation 13: Establish the creation of a new MOS, 68I, Physical Readiness Training Specialist, and associated manning billets.
PERSONNEL	Recommendation 14: Revise U.S. Army manning priorities and operational mission requirements in the HQDA manning guidance to request placement of MOS 68I, 7 per Brigade Combat Team, Sperate Brigade, and independent Regiment.
PERSONNEL	Recommendation 15: Modify AR 350-1 to mandate 1x MFT qualified personnel per Company, and Battalion.

Source: Created by author.

The 15 recommendations above did not change from the R2 Informed Position. The analysis through the lens of the Key Stakeholders and the CDM, validated the R2 to form the R3. Under the current authorities' structure, implementation of these recommendations can only come through direction of the CDM. Implementation of several of the recommendation, especially those in the personnel category, require major structure changes to the current force structure, and will realistically take multiple years to fully employ, and receive benefits from.

Recommendations for the Chief Decision Maker

In order to better distill the R3 Recommended Solutions into achievable changes, recommendations to the CDM are broken down in to near, mid, and long-term implementation recommendations. The recommendations presented are a direct result of the author's knowledge presented in Chapter 1, the literature reviewed in Chapter 2, and the analysis conducted on that literature in Chapter 4, through the research methodology presented in Chapter 3.

Near-term solutions focus on solutions that can be implemented between 0-2 years, and when properly implemented will serve as the basis for the implementation of the mid and long-term solutions.

The U.S. Army should update FM 7-22 to ADRP 7-22 and fully implement the H2F concept. Included in this recommendation is the update and publishing of TB MED 592 either as part of ADRP 7-22, or as a standalone ADRP. The analysis presented in Chapter 4 has shown that separate U.S. Army unit PRT programs, and the British Army PRT program have both developed manuals in line with the recommendation above. Furthermore, these units experience higher levels of physical readiness, and reduced injuries as a direct result of the physical training methodology included in these manuals.

The U.S. Army should amend AR 350-1 to mandate that each battalion and company in the Army possess one MFT qualified personnel under authority of the Brigade Surgeon to plan, implement and monitor the unit's PRT program. The analysis has shown that MFTs are under-utilized as compared to their British counterparts, and that there is currently a lack of MFT SMEs tasked with PRT and injury prevention outcomes.

Mid-term solutions are those that can be fully implemented between 1and 5 years from recommendation approval. Mid-term solutions should expand and adjust based on the success and feedback of solutions presented in the near-term.

The U.S. Army should amend AR 350-1 to mandate that each battalion possess a unit fitness officer responsible for the unit's PRT program, and design a course for implementation of the same. The analysis shows that the increased accountability provided to units through a unit fitness officer provides a better focused PRT program in line with the unit's METL and improved communication between units and health care provides reducing injuries and increasing positive injury recovery outcomes.

The U.S. Army should amend AR 350-1 to mandate that every PME school includes H2F curriculum. This recommendation will ensure that leaders receive the proper knowledge and training to lead formations through the new H2F concept regardless of rank.

The U.S. Army should amend AR 350-1 to mandate that all MFT qualified personnel receive annual refresher training on H2F, injury trends, injury recovery techniques, and science-based training. This will ensure that MFTs remain relative, and useful for the career of the MFT qualified Soldier.

The U.S. Army should amend AR 350-1 to mandate that H2F education is part of unit in-processing. This will ensure that H2F training methodologies in support of the unit's METL are understood, as well as educate incoming personnel to the unique challenges of the unit or duty station.

Long-term recommendations are those projected to take five years or longer to implement. As with mid-term recommendations, long-term recommendations should be

tempered by the success and feedback from the previously implemented recommendations.

The U.S. Army should create a new MOS, tentatively designated 68I *Physical Readiness Training Specialist*. This MOS would be the SME on H2F doctrine and implementation, and be responsible for executing the Commander's PRT, injury prevention and injury recovery programs in line with the units METL and mission. The 68I would be positioned in each Brigade Combat Team Surgeon cell, with one 68I per battalion. The 68I program should be eventually expanded to include every battalion or equivalent organization throughout the Army. The analysis shows that both the THOR3 program, and the British Army PRT program, which both have similarly assigned personnel, have increased their physical readiness through occupationally focused fitness, reduced injury through monitored and adaptive injury prevention programs, and reduced time lost to common physical training injuries.

The U.S. Army should augment the manning of the current Brigade Surgeon Cell to include; two Physical Therapist, MOS 65B, four Physical Therapy Specialist, MOS 68F, one Nutritional Care Specialist, MOS 68M, one Behavioral Health Specialist, MOS 68X, and seven Physical Readiness Training Specialist, MOS 68I. This augmentation would mirror the medical personnel currently available to participants in the RAW, THOR3, and British Army PRT programs. These programs have shown to produce better physical readiness, through focused PRT, injury prevention, and injury recovery.

Recommendations for Further Studies

The research undertaken in the thesis has identified the need for several further studies. First and foremost, a committee should be established to determine change

proponency. While this study focused on three stakeholders due to time and research constraints, the actual number of stakeholders is much higher and in addition should also include: the Army G1, the Army G3, Human Resources Command, PEO Soldier, the Army Physical Fitness School, and the Soldier Lethality Cross Functional Team at a minimum.

Once formed, a study should be undertaken to determine what the appropriate level of physical readiness should be for the U.S. Army to accomplish its mission. Is every Soldier an athlete? If so, how should that athlete be managed? This fundamental question will determine the overall physical readiness level required by conventional Army Soldiers, and the resources needed to accomplish it. Should a conventional Soldier-Athlete model the U.S. Army's special operations forces, and be able to exert peak physical performance at a moments notice? If so, recommendations 13 and 14, the creation of a new MOS and an associated change to manning the Bde Surgeon's cell are needed s it conforms to the whole Soldier concept. However, should it be determined that a Soldier's physical performance be managed under a similar system to the sustained readiness model; brought to a high level and then surged prior to deployment, then a different recommendation focusing of the Soldier as a system, that is less manpower intensive, focused around instillations instead of units, and scalable may be more appropriate. This study should look at existing athlete management models, such as various U.S. Olympic teams, professional sports teams, and the THOR3 program to determine the correct balance of readiness to resources.

A capabilities-based assessment should be undertaken using data gathered during the ACFT field test period that will conclude in October 2019 in order to ensure that the

test meets its stated purpose of increasing physical readiness. This CBA should use the criteria of implementation cost, physical fitness scores, and injury rates. This data should then be correlated and compared to other fitness assessments both inside and outside the military. Ideally, this study would be conducted twice, once with the current PRT doctrine, and again once the H2F doctrine is implemented. The results of this study should be used to re-evaluate the R3 Recommended Solutions proposed in this thesis.

This thesis did not address the cost associated with implementing the R3. In order to ensure the validity of the recommended solutions, another capabilities-based assessment study should be conducted using the metrics of current costs associated with PRT related injuries, disabilities, discharges, and time lost, versus the cost of implementing the R3 Recommended Solutions.

Unfortunately, the author was unable to find any studies that provided a direct comparison between the U.S. and British Army's PRT systems, injury sustainment and injury recovery rates, and thus the analysis presented between these two systems could be seen as largely anecdotal. Furthermore, the author was unable to find any similarly designed studies that compare the THOR3 or RAW programs versus conventional U.S. Army PRT. In order to achieve maximum physical readiness of the force, a direct comparison study between PRT methods is warranted. Such a study would go to further validate the R3 Recommended Solutions.

Finally, a series of applied professional case studies utilizing the R1, R2, R3 methodology should be conducted at the conclusion of implementation of the near, mid, and long-term recommendations. This study will ensure that the recommendations made by this thesis remain valid, and provide the stakeholders and CDM additional the ability

to validate, amend, delete, or change the initial R3 Recommended Solutions in order to maximize physical readiness while minimizing the cost and changes associated with each recommendation's implementation.

Personal Learning Reflections

In undertaking the writing of this thesis, the author has greatly expanded his knowledge and understanding of physical readiness as it relates to physical readiness training, Holistic Health and Fitness, injury prevention, and injury recovery. It is clear from this study that the U.S. Army has not been able to capitalize on previously published reports and studies that show significant gaps in the U.S. Army's PRT program. Additionally, it is clear to the author that the major hinderance to achieving increased physical readiness lies in the establishment of authorities, the Army's established change process, and the ability for physical training SMEs to effect change at the Army level. If the current state is allowed to continue then the Army risks implementing the new ACFT without the proper doctrinal and organizational support to realize the programs potential success.

Furthermore, the author was able to understand the scope and magnitude at which PRT related injuries effect overall physical readiness. Even a minor reduction in overuse injuries resulting from PRT would result in major cost savings in both time and money for the average U.S. Army unit. However, there is a distinct lack of emphasis on science-based PRT and injury reduction strategies despite numerous studies and reports being published on the issue. While the root cause of this problem remains elusive it is clear that there is a lack of synergy between health care providers, commanders, and PRT SMEs, a lesson of significant importance as the author returns to the operational Army.

This thesis has provided the opportunity for the author to contribute to the U.S. Army's PRT program, and hopefully drive changes that will produce a more ready, more physically fit, and more lethal Army. In conducting the research necessary to complete this thesis, the author was able to better understand how the U.S. Army conducts, manages and implements PRT. It also provided knowledge on the critical linkage that exists between physical readiness, physical fitness, and a unit's mission essential task list.

Most importantly, the author was able to gain a deep knowledge and appreciation on the applied case study methodology, and the capabilities-based assessment process. The ability to form an initial opinion, conduct research, and then identify and exclude personal bias through rigorous research and analysis is an important skill for any professional. Furthermore, the ability to view data critically through the lens of decision stakeholders and a chief decision maker in order to refine recommendations is an indispensable skill for the field grade officer to possess. This knowledge has contributed to making the author a better researcher, U.S. Army officer, and steward of the profession.

Conclusion

This thesis attempted to analyze, identify gaps, and provide solutions to the current U.S. Army PRT program in order to increase physical readiness. In doing so, the research used the Capability Based Analysis through an applied professional case study to compare and contrast the U.S. Army and British Army's PRT systems. In doing so, the author used the DOTMLPF-P framework to recommend short, mid, and long-term recommendations to the current U.S. Army PRT, and validated these recommendations through analysis of key stakeholders, and chief decision maker authorities and priorities.

The findings of this research indicate that the standard U.S. Army PRT system lags behind significantly when compared to the British Army, programs in use by U.S. Army Special Operation Forces, and its own emerging doctrine. This is especially evident in the realms of injury prevention and injury recovery. The solutions proposed within this research are an attempt to realign the U.S. Army's PRT program with the Army's physical readiness requirements. The solutions proposed, were developed through the study, analysis, and comparison of doctrine, emerging doctrine and concepts, and medical studies and reports. The findings, are an attempt to realign the U.S. Army's PRT program with a more holistic approach, one that has already been developed as a doctrinal concept. This concept focuses of METL aligned PRT, injury prevention, and injury recovery, planned and executed by subject matter experts at the company to brigade level, and all working in synergy to increase physical readiness and combat effectiveness. Regardless of the readers agreement or disagreement with the recommended solutions presented in this chapter, the applied professional case study methodology, used in this thesis is broadly applicable, and is, in the author's opinion, the most appropriate vehicle from which to identify, analyze, produce, compare, and validate recommendations to capability gaps. It is the author's hope that this thesis, and its methodology, are used as the foundation for the modernization of the U.S. Army's PRT program.

APPENDIX A

RESEARCH SUPERVISOR COMMENTARY, 10 MAY 19

Memorandum for record: Thesis appendix document
Subject: Research supervisor commentary for MAJ Emmons, 10 May 19
Purpose: To document the professional discourse between researcher and committee during the conduct culminating in the successful thesis defense, for the record.
Author: Dr Kenneth E Long, D.M.
Date: 10 May 19
Organization: U.S. Army Command & General Staff College, Ft Leavenworth KS 66027

One of the features of the Applied Professional Case Study (APCS) is the iterative nature of the research. The researcher and the committee go through a series of iterative check-ins that allow for a review and an update of the research questions the preliminary findings, initial insights, and the possibility for other excursions for the research to follow. This is typical of the experience of action researchers in a similar way, for example. Based on cross-talk between multiple researchers and committees we have collaboratively decided that it would be a good idea to add an appendix at the end of an APCS thesis to document the socialized experience of the professional dialogue without intruding into the researcher's privileged spaces within chapters one through five.

In this way, we believe we can capture some of the dynamics and synergies that arise from the professional discourse on these focused inquiries. This is similar to the idea of military scouts departing on a reconnaissance patrol with certain specific things to look for and then reporting back on the “everything” that they found which might cause a change in both strategies and tactics once the command group and the scouts exchange their information. We will start documenting the insights from these dialogues which are often summarized during the actual thesis defense in an appendix to the theses with the standard introduction.

This is important because what has emerged from this method is what we describe as two objectives: Objective Near and Objective Far. This resonates with our professional doctrinal language on the importance of objectives as seen in the idea that military campaigns are a series of linked objectives that have logical, geographical and operational connections in a series of continuous efforts. Objective Near we think of as the researcher’s effort to get good answers to interesting questions. This is the explicit purpose of the thesis after all. Objective Far is what we have come to characterize as the development of a broader professional skill set in the researcher that will support future independent research of this type. We think this could be combined with the ability to act as a project manager while supervising the professional staff work of a team of action officers working towards a collaborative goal on a more complex problem. These two skill sets of direct research ability and project management ability collectively create the kind of broad professional skill set we hope to develop in our professional officers and which is a feature of the application of this method.

In the action research tradition, this process would be seen as one of a series of memorandums for record which document essential checkpoints along the iterative research

journey and in that spirit we offer this as an important contribution to this method which surfaced in part during this thesis. Our collective professional thanks to the researchers and committee members who contributed to these emergent insights and provided important critical thinking and creative insights to our deeper professional understanding of the potential of this method.

Important insights from the committee that surfaced during our professional dialogue:

MAJ Emmons:

1. The importance of developing mature assumptions that are important, necessary, relevant and reasonable are amply displayed in the stage setting chapters of this thesis. That mapped naturally to a proper set of limitations and delimitations which demonstrated successful scoping for purposes of this inquiry. Most of the comments from the committee dealt with follow-on studies/inquiries any or all of which could build off of this methodology and this thesis which establishes the researcher's credentials and skills in successfully designing and executing this form of case study research. The thesis itself demonstrates the utility of the method in the artful blending of a variety of sources and the evidence of critical thinking being applied in the development of the findings and recommendations.

2. The use of multiple mental models in this thesis approach reflects the sense of much of the community of practice associated with complexity theory which treat the triangulation and mutually supporting effects of multiple mental models to be an appropriate strategy to respond to complexity. This thesis demonstrates an advantageous and practical implementation of that approach. It also illustrates why it is necessary to get all the models and analogies on the table when considering a topic that allows for so many perspectives, some of which will be described below. Without a full and complete engagement with the many perspectives on fitness and readiness, the Army could fall prey to premature selection of a line of operation. The committee consensus was that the next round of research conducted at the Army level should begin with a much broader set of perspectives o consider than has previously been the case.

3. The literature review reflected the broad and deep dimensions of such a complex environment and the stage setting chapters met the standards of a case study's purpose to inform policymakers of the broad context they will encounter in the search for solutions.

4 The researcher did not shrink from the challenges of this complex problem, and we observe that if it were easy, then even the committee members could do it. We applaud his intellectual courage and curiosity in pursuing this difficult line of inquiry.

5. The APCS method offers two formal opportunities for the committee to evaluate the critical thinking skills and preferences of the researcher. In R1 we asked the officer to establish the pre-research position and then we compare that position to the R2 position which is produced after a thorough review of literature in the first round of analysis. If the officer researcher applies critical thinking, we would not be surprised if there was a change in position due to the cognitive effort. In fact, no change in the R1 and R2 positions is suggestive that the research was simply an effort to confirm pre-existing biases. A normal result is to see an evolution and sometimes a revolution of the officer's position. It's even more difficult for the officers to change their mind when going from R2 to R3, when they must supply the different professional perspectives to their newly found position. This is even harder than shifting from R1 to R2 because normal human practice is to be more convinced of your new position after deep reflection. Kahneman and Tversky talk

about this in their work on human biases. When the officer properly applies these new perspectives we can then see that they can step outside of their personal opinion and adopt a truly broad-based professional perspective which is crucial to the development of senior staff officers and commanders in the broad military profession. This thesis is an example of a successful demonstration of critical thinking in both dimensions, and we applaud the researcher for his efforts in this area.

6. A list of future research questions suggested by this effort could include:

a. The Army should develop a comprehensive cost model using Activity Base Costing methods to develop a decision support tool to properly compare the return on investment payoffs of various approaches at the institutional level, connected to other means of raising readiness levels to properly evaluate courses of action coming out of the next round of research. This cost model should reflect fully burdened costs and life-cycle implementations consistent with those used to evaluate the decades-long consequences of choices we make about materiel solutions in order to place the Soldier as System in the proper context.

b. The subset of DOTMLPF-P domains for the study were proper; the next round of research should fully explore all of the domains with dedicated research resources from proponents to get tp the level of detail required to support a decision of this magnitude and consequence.

c. The next round of research should incorporate physical training and performance data historically from Marshall's soldier mobility studies and the voluminous data available from WW2 and Korea co0ncerningt he long term effects of LSCO conflict on large populations. Deeper dives into that data should control for or at least examine the difference in demographic baseline data about the broader population we draw on for soldiers.

d. Proactive support systems f nutrition, stress management, biofeedback, visualization emotional/cognitive support strategies should be included as dimensions in a broader study.

e. The Army should examine other models of physical readiness and training from the worlds of: endurance athletes; survival in extreme environmental conditions studies; astronaut and submariner physical data for maintaining readiness under severely restricted environments with little external support; Cross-fit; soft and hard forms of yoga; professional sports teams; competitive power lifting; rock-climbing and body weight conditioning realms; combatives as physical readiness straining; preparation programs for first responders; specialists in extreme environmental domains.

f. A future round of studies should look at specific phases of training in the expected lifecycle management program for solders including prep work that could be exported to high schools and communities as a public service. Other phases should include initial entry, installations support programs, MTTs, deployable support packages, environmental support packages and missions specific support packages. Incorporation into lifecycle holistic fitness and readiness should also be addressed.

g. A high payoff study would be to ensure that the Army could populate the proper executive committee to guide the comprehensive research that would include subject matter experts from academics, public and private group stakeholders in order to properly construct an advisory panel to ensure the project was comprehensive, professional and complete from the

beginning. It should also incorporate time series studies and longitudinal studies as much as possible in a meta-study format in order to leverage the existing body if knowledge to refine the next phase of inquiry. ARI, the Defense science Board and RAND would be natural advisors on this project.

h. Proponents for human resource life cycle management must be engaged in the project to ensure that proper consideration is given to such diverse choices for solutions as: ASI, branches, MOS management, schooling opportunities inside and outside of the Army; partnering with industry.

7. In conclusion, we think these discussions deserve to be documented as part of the thesis, as spinoffs and professional insights suggested by the thesis and serve as an illustration of the emerging insights available from the application of this APCS method. We hope to use this as evidence to further demonstrate the relevance and utility of the method to members of our military profession and offer it for insights to other professions concerned with finding a synthesis between the practical needs of a profession with a bias for action and the academic interest of research rigor, quality, validity and transparency.

8. The insights from this discourse are solely the responsibility of the research supervisor who made an effort to fairly represent the views of the committee members. Responsibility for any error in transmission or misconstrual of insights is strictly the research supervisor's (Dr. Long), whereas all useful insights derive from the due diligence and professional excellence of the researcher, whom we congratulate on a job well done.

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