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PROPOSED DEFINITION OF HUMAN PERFORMANCE IN THE DEPARTMENT OF WAR

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FOREWORD – HUMAN PERFORMANCE IN THE MILITARY: THE COMPETITIVE ADVANTAGE

In the arena of human performance, elite competitive athletics and the military stand out for their relentless pursuit of excellence. Though their missions differ – one seeks victory on the scoreboard while the other secures wins in the battle space in pursuit of our national defense – their foundations are strikingly similar. Both demand peak physical and mental readiness, both operate in high-stakes environments, and both rely on the human element as their decisive advantage.

In professional sports, the mission of Human Performance (HP) is clear: maximize availability and elevate elite performance. Every investment from nutrition and recovery to cognitive training is made to ensure athletes are ready to compete and win. In the military, this mission translates to mission readiness and lethality. When comparing the military to sports, the stakes are higher and the consequences are more profound, but the principle remains: people must be prepared to perform at their best when it matters most.

Winning – whether in competitive athletics or on the battlefield – is never accidental. It requires deliberate risk management. Athletes accept personal risk to achieve team success. They push through injury, fatigue, and pressure for the sake of victory. The military trades risk to force daily to buy down risk to mission. This strategic exchange underscores a shared truth: success demands sacrifice, and performance must be optimized to navigate uncertainty.

The first Special Operations Forces (SOF) Truth declares, "Humans are more important than hardware." This ethos is not just a military mantra; it is a universal principle of high-performance organizations. No matter how advanced the technology or how sophisticated the strategy, it is the human being who executes, adapts, and overcomes. In both competitive athletics and military operations, people are the competitive advantage. They are the difference-makers, the force multipliers, and the reason outcomes shift from possible to actualized.

Human performance programming enhances an individual's competitive advantage when it is meticulously tailored to meet specific demands. For athletes, this programming is customized to the unique physical and cognitive requirements of their sport, ensuring they can compete at peak levels with specialized training, nutrition, and recovery protocols. To maintain and enhance the military's competitive advantage, military human performance must evolve and adapt to the multifaceted operational demands of various mission units. This involves not only physical conditioning but also cognitive sustainment, stress management, family support, and spiritual connectedness that enhances adaptability across diverse and unpredictable environments. This tailored approach is how military human performance optimizes individual capabilities to support readiness, lethality, and mission success in an ever evolving and complex battle space.

The character of modern military conflict has shifted dramatically. Today's battlespace is multidomain, fast-paced, and cognitively demanding. Warfighters must operate across cyber, space, urban, and irregular environments with precision and adaptability. This evolution has driven a transformation in human performance programming. No longer limited to physical conditioning, military human performance now encompasses cognitive resilience, sleep optimization, stress inoculation, performance nutrition, and recovery science. These integrated systems are designed to sustain readiness, enhance decision-making under pressure, and preserve force capability over time. As the complexity of conflict grows, so too does the imperative to invest in the human weapon system. For every mission, it is the warfighter who remains the decisive advantage.

Human performance is not a peripheral concern; it is central to force readiness, lethality, mission execution, and maintaining our strategic advantage. To ensure that our military remains the world's premier fighting force, it is crucial that we persist in advancing our understanding and investment in the individual capabilities of the war fighter. The ever-evolving nature of modern conflict demands that we stay ahead of the curve by resourcing cutting-edge research, innovative training methods, and comprehensive support systems.

This article examines the science, strategy, and operational relevance of human performance in the military. From physical readiness to cognitive resilience, the modern warfighter is supported by an evolving system of performance optimization designed to meet the demands of complex and high-risk missions. At the heart of every maneuver, every decision, and every success is the individual who is trained, trusted, and prepared to perform. Only through a steadfast commitment to the continual enhancement of our warfighters' physical, cognitive, and emotional capabilities can we maintain our decisive edge and secure our national objectives in an increasingly complex and unpredictable world.

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PROPOSED DEFINITION OF HUMAN PERFORMANCE IN THE DEPARTMENT OF WAR

BLUF: As Human Performance Optimization continues to grow across the Department of War it is important to define and delineate human performance from health, wellness, and fitness.

Overview: Human Performance Optimization (HPO) is an overarching term that includes health, wellness, fitness, and human performance (HP). Lack of granularity among health, wellness, fitness, and HP, causes confusion within and outside of the Department of War (DoW). Defining HP appropriately will provide senior leaders and the subject matter experts (SME) a full understanding of the roles and functions of each HP SME. Ultimately, this will support full integration of the HP SMEs into the DoW institutionally rather than through organically cultivated iterative and disparate efforts.

Generalized health, wellness, and fitness can be sufficient for many military Service Members (SM). However, SMs involved in combat (i.e., Warfighters) need focused support provided by HP training sessions, strategic fueling, and optimal rehabilitation interventions.

This paper will focus on the term HP as the ability to respond effectively to heightened levels of physiological, psychological, and technical and tactical challenges, using occupational specificity to optimize the process. Though the foundation of HP is health, wellness, and fitness, these elements of HP are indeed different and can cause a great deal of confusion.

Where possible, citations are included to support statements and provide additional further reading. However, all statements appearing to require substantiation cannot be cited in this paper due to a lack of prior publications on every insight. Uncited statements appearing to require substantiation are made on the basis of the subject matter expertise and professional knowledge of one or more of the authors who have nearly 100 years combined experience in DoW HP.

The information represented in this paper are the opinions of the authors, they are not the official views of the National Strength and Conditioning Association (NSCA), United States Government, Department of War, United States Special Operations Command, United States Army, or the United States Air Force.

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HUMAN PERFORMANCE IN THE DEPARTMENT OF WAR

The United States Department of War (DoW) has actively been investing in health, wellness, fitness, and human performance (HP) for its more than 2 million men and women Service members (SM), including those in the Army, Navy, Marine Corps, Air Force, and Space Force (84). This investment is evidenced by their new and updated facilities, tailored training, and (most importantly) the hiring of subject matter experts (SME). The facilities range from wellness that typically focus on education for behavior change to achieve a healthy lifestyle (e.g., Armed Forces Wellness Centers), to those that focus on performance and holistically improving and/or sustaining warfighters based on mission essential task lists (METL) and specialized deployment/redeployment capabilities (e.g., the Preservation of the Force and Family (POTFF) HP Training Centers). Tailored training investments may involve sending military personnel to private sector courses or developing internal courses such as the Army's Master Fitness Trainer Course and the Marine Corps' Force Fitness Instructor Course for DoW's self-sustainment. The DoW's investment in SMEs includes hiring federal employees and contractors. These SMEs have varying expertise in multi-disciplinary areas such as physical therapy, strength and conditioning, personal training, performance and/or clinical nutrition, behavioral health, cognitive performance, spirituality, behavior change, education, and applied and/or clinical research. These SMEs can be referred to as Human Performance Optimization (HPO) professionals.

Multi-disciplinary interactions among SMs and the HPO professionals fundamentally involve all aspects of performance, health, wellness, and fitness, though the mission-first culture of the military necessitates focus on the "performance" aspect of HP. It is worth noting that the foundation of HP is health, wellness, and fitness; however, these elements of HPO (Figure 1) are distinct from HP and can cause a great deal of confusion.

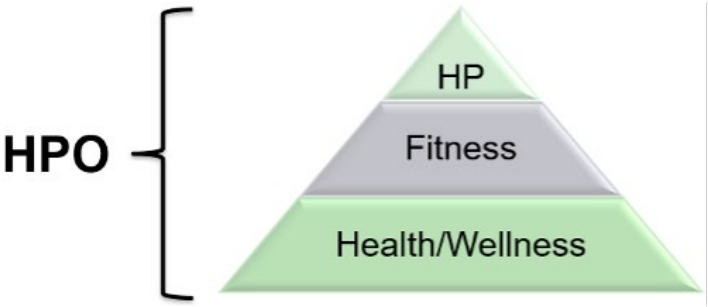

FIGURE 1. VISUAL REPRESENTATION OF THE COMPONENTS OF HPO

- *Health*: A state of complete physical, mental, social, and spiritual well-being and not merely the absence of disease or infirmity (154).
- *Wellness*: Force health protection program that consolidates and incorporates physical and mental fitness, health promotions, and environmental and occupational health (154).
- *Fitness*: The relationship between one's behavior and their positive or negative health outcomes (154).
- *HP*: The ability to respond effectively to heightened levels of physiological, psychological, as well as technical and tactical challenges utilizing occupational specificity to optimize voluntary and involuntary responses to anticipated and unanticipated stimuli.

When attempting to communicate application of health, wellness, fitness, and HP support of SMs, "Human Performance Optimization" is the phrase commonly used throughout the DoW. The term HPO is most often utilized, "because all encompassing optimal is the end result-either through enhancement, modification, sustainment, or restoration," (48). HPO has been previously defined by Nindl and colleagues as "the process of applying knowledge, skills and emerging technologies to improve and preserve the capabilities of military members, and organizations to execute essential tasks," (128). More recent HPO efforts within the DoW have been focused on optimization of the human weapon system for occupational performance, as initiated at the U.S. Army's Soldier Center and supported in the US Air Force's Air Combat Command and the United States Special Operations Command (USSOCOM).

Understanding the pragmatic right and left limits of what *may* be and what *should* be included in DoW HPO efforts can be problematic for users and decision-makers alike. In its broadest sense, HPO includes elements of health, wellness, fitness, and HP, but due to the mission-centric nature of the military, HPO in the DoW must focus foremost on the "performance" aspect, with consideration of the other HPO elements as supporting factors. Additionally, the following terms are used within this paper to enable pragmatic relevance of HPO within the military and tactical populations:

Occupational Specificity: The degree to which the physical, mental, spiritual, and nutritional testing and training align with a given occupation (10).

Occupational Performance: The ability to carry out specific tasks based on the physical, mental, spiritual, and nutritional requirements of a given occupation (10).

The DoW's persistent need in the development of the human weapon system for occupational performance is the application of occupational specificity. The modern application of this concept within the DoW to implement HPO has been through SME professionals, embedded at multiple levels to bolster combat warfighters (a.k.a., the human weapon system), mission support personnel, and senior leaders – depending on specific METL required within all SM occupations. The METL can dictate the nature of occupational specificity essential to holistically developing each SM's cognitive and physical abilities. As examples, senior leaders may need more mental resiliency to consistently make important and timely decisions than they do physical abilities like hiking a mountain with a ninety-pound rucksack. Another example could be mission support personnel needing to have the mental fortitude to protect the nation's computer infrastructure or physical attributes of loading bombs on different aircraft. Alternately, combat warfighters may need both mental prowess and superior physical abilities to attack and repel the enemy in hostile and ever-changing environments (6,83). Occupational specificity can be used to plan and design initial levels of HPO support provided to the SM so that he/she can have successful occupational performance. Moreover, embedded HPO professionals often help individual SMs exceed minimum METL-specific standards, so that unexpected training interruptions (e.g., injury, illness, etc.) will result in less disruption to optimal occupational performance (56).

THE ROLE OF HP, HOW IT SUPPORTS ACTIONS ON THE OBJECTIVE AND THE METL

The role of HP within the DoW has developed over the years since Captain Thomas De Lorme's World War II-era emphasis on training and rehabilitation specificity (168). Some iterative efforts such as the US Army Special Operations Command (USASOC) 10th Special Forces Group (Airborne) Trojan Warrior Project in 1985, have attempted to improve warfighter knowledge and abilities by providing specific training on things like psychophysiology and martial arts (160). Other efforts to which present day programs can directly trace their roots include the provision of regularly embedded staff such as the USASOC Commanding General's addition of one active-duty Physical Therapist to each line battalion in 2001 (69).

Programs such as these were designed to provide improvement in physical and cognitive performance as well as readiness to deploy rates for military personnel. "Military personnel" is a broad term that includes all SMs. Not all SMs are referred to as "warfighters," which is a term that includes SMs who engage in combat. When HP training becomes of high value to sustain deployment and military readiness, having HP staff easily available to warfighters is a cost effective and time-efficient solution (3). Permanently embedded HP staff with unit-specific experience also provide continuity in these military environments where command nuances can introduce unique learning curves during SM turnover. The role of embedded HP staff members is typically to first focus on improvement and sustainment of physical capabilities because those are often the first consideration due to the significant impact of musculoskeletal injuries to readiness. A large

percentage of warfighters' METL require a high level of physical occupational performance, which means musculoskeletal injuries have the potential to significantly limit operational availability and deployment (156). METLs can be considered to contain indirect proxy measures, because this includes the training requirements that are specific to the operationally-relevant tasks for which a warfighter must have competency in a deployed setting. When embedded HP staff conduct performance-based evaluations and provide physical training plans aimed at optimally completing their METLs, the HP staff are enabling supporting actions on the military objective.

Given the heavy focus on the physical capabilities of a warfighter, appropriate training by HP staff typically starts with supervised strength and conditioning sessions conducted by qualified experts. These HP staff also provide tailored programs specific to the warfighter's identified, mission-relevant, physical performance needs and goals. This regularly includes movement drills that help complete rehabilitation processes, address movement limitations, and sustain abilities which mitigate injury risk and preserve warfighters' training and deployment readiness. When injuries occur, rapid access to care by a Sports Medicine Physician, Physical Therapist (PT), or Certified Athletic Trainer (ATC) is designed to expedite the healing process and limit unnecessary additional cost (16,130). This kind of care can directly support individual warfighter training and deployment availability, especially through direct access to musculoskeletal expertise provided by embedded PTs and ATCs. Direct access to this type of Sports Medicine care is a force multiplier that mitigates reinjury risk, supporting unit training and deployment availability statuses (130).

Similarly, Performance Dietitians play a role in both care and training. Nutritional care is provided for pre- and post-operative needs, while performance nutrition services focus on performance sustainment and improvement, which is comparable to the support provided by cognitive performance experts. Cognitive Performance Practitioners (CPP), Cognitive Enhancement Practitioners, and other performance-minded SMEs provide a range of support from goal-setting and adherence to task-specific endeavors, to improvement in cognitive drills linked to improved marksmanship (32), quantitative electroencephalogram neurofeedback for psychophysiological modifications to improve and sustain performance, and occasionally perceptual enhancement training for optimization of focus for task performance.

As demonstrated by the USSOCOM's POTFF program, the addition of permanent HP staff has also come with changes of the role of HP from merely patching up warfighters for return to war (69), to the efforts provided to improve physical and cognitive training (32). Current efforts under a larger human performance umbrella extend beyond the physical aspects by including implementation of the psychological, spiritual, social, and family components of HP (90).

PROGRAM RATIONALE, FUNDING, MANAGEMENT, AND EXECUTION WITHIN THE DOW

There are many perspectives as to what the DoW should focus on in order to get the most out of SMs' time and to improve their quality of life upon separation from Service. During the past decades of the DoW's HP efforts, the words chosen to depict the goals, outcomes, and needs of the Services (a.k.a., "General Purpose Forces"; GPF) and their SMs, might have been misaligned. These misunderstandings can be further amplified when attempting to comprehend the various versions of "HP" implemented among the Services/Branches and Special Operations Forces (SOF). Therefore, it is important to review health and wellness, fitness, and HP and how they are implemented programmatically.

HEALTH AND WELLNESS

Health and wellness programs are growing in popularity in public, private, and military organizations, given that the focus areas are the absence of disease and goal-oriented improvements of vital physical and mental functions. These programs commonly include assessments of biomarkers, blood pressure, resting heart rate, and body fat or girth distributions compared to population norms, as well as cessation of tobacco use and dietary intake recommendations (111).

While these are important aspects of having basic daily function, these elements have struggled to demonstrate useful application to the military performance environment because of the vague link between health and wellness on its direct impact to militarily-relevant tasks. While correlations may exist, there is little to no demonstrable predictive power of health and wellness variables to performance of militarily-relevant tasks (83,129,165).

FITNESS

Throughout the various overarching and Service-specific instructions on the definition of fitness and how to perform it, the several definitions of "physical fitness" range from the most specific from the Assistant Secretary of War (46), to the least specific from the Air Force (58). The main idea from most of these definitions seems to be that "physical fitness" is determined by a capacity or ability to perform physical activities or exercises. The Army's definition gets the closest to being relevant to SMs' job-specific tasks by including "ability to function effectively in physical work, training, and other activities," while the Air Force focuses on "healthy behaviors needed to enhance health and well-being...," (58).

With the recent programmatic and physical assessment advancements such as the more relevant Army Fitness Test, the Navy's elimination of the sit-up variation known as the curl-up, and the Air Force's addition of Occupationally Specific Physical Fitness Assessments there appear to be increasing examples of the Services' physical fitness efforts pointing more towards militarily-relevant performance requirements.

HUMAN PERFORMANCE

One of a few known programs in the DoW that focuses on sustaining and improving performance of humans is in USSOCOM, through the POTFF program. Through its five Performance Domains (i.e., Physical, Psychological, Cognitive, Social/Family, Spiritual), POTFF covers the gaps between what the Services provide and what USSOCOM needs for all of SOF. Specific to the Physical Domain, the subdomains of Strength and Conditioning (S&C), Sports Medicine, and Performance Nutrition further delineate the roles supporting physical performance. This is achieved with tailored training and rapid access to care provided by embedded Strength and Conditioning Specialists (SCSs), ATCs, and Performance Dietitians (PDs). While similar to other Sports Medicine programs in some regards, the rapid access to Sports Medicine care provides a hastened timeline for returning to performance, which is bolstered by the bridging that typically occurs to S&C, helping ensure the healing process completes to the point of full performance capability, further reducing reinjury risk.

FUNDING, MANAGEMENT, AND EXECUTION

As of Fiscal Year 2025, there has been and continues to be no central source of programmatic funding and management for the DoW's HPO requirements. From their inception, HPO initiatives and programs have pulled personnel and funding from various sources to meet their most apparent and pressing needs. Though quickly effective, this approach drives simultaneous competition each fiscal year for funding and reporting to different decision-makers when funding is not from a single line of accounting. Some HPO initiatives have gained substantial traction and developed into a Program of Record (PoR). This level of development comes with Congressional authorization (i.e., authority of a permanent nature) and appropriation (i.e., predictable taxpayer funds provided each year on a specific line of accounting). Funding for the DoW's physical fitness and performance programs can be pulled from of 3 out of the 12 available funding lines: Major Force Program (MFP) 2, 8, and 11. The Services are able to utilize MFP-2 and MFP-8 funding, which cover GPF and Training, Medical, and Other General Personnel Activities, respectively.

USSOCOM can only use MFP-11 funding for its "SOF-unique" requirements gaps, of which the Physical and Cognitive domains (a.k.a., "HP") were persistent gaps until ~2010-2012. There are also Service- and unit-specific research and development efforts funded by MFP-6 dollars such as the United States Army Research Institute of Environmental Medicine Rapid Access to Comprehensive Expertise to improve musculoskeletal injury-related outcomes (61) or Uniformed Services University and Consortium for Health and Military Performance Reducing Injuries with Training Enhancement, Targeted Rehabilitation, and Core Conditioning II studies (46). Efforts such as these have been utilized to objectively demonstrate unbiased requirements gaps to decision-makers when initiating the development of a PoR.

The management and execution of the multiple funding streams which allow programs to come to fruition is vital for long-term success. MFP-2 and MFP-8 funding for the Services supports areas beyond physical fitness and partly because the funding is used at multiple command levels subordinate to where the program's funding and reporting requirements are primarily managed. The funding of various efforts has only recently been dedicated to new programs, such as the Army's Holistic Health and Fitness (H2F) program; as a result, the ownership of each moving part can take time to fully conceptualize, implement, and execute. These moving parts can realize the most gain when high-level commands have HP-experienced staff working closely with the command financial management team during initial implementation of HPO programs (3,165). This type of teaming arrangement helps to avoid the frequent detrimental assumptions among DoW personnel regarding HPO program needs. It is also common for the inverse relationship of subject matter expertise in HPO and comprehension of DoW contracting, line of accounting limitations, and funding execution and obligation timelines.

USSOCOM's POTFF PoR includes the Physical Performance Domain, which uses MFP-11 funds for enhancing SOF mission readiness and operational availability through expert driven programs aims to decrease recovery time, optimize physical training, and increase career longevity. This is one of five domains under the unified umbrella of USSOCOM's POTFF program which culminated from decades of various unit-level SOF HP initiatives which were limited in staffing and resources, yet effectively modeled the reduction in recovery time and medical costs possible through direct access to care (58). The USSOCOM's Commander's pursuit of a permanent budget for a "Resilience program" to relieve "pressure on the force and families," later became the POTFF PoR that sought to bridge the gap between what the Services provide and SOF-peculiar requirements. Strategic and programmatic management of this program occurs at Headquarters (HQ) USSOCOM, with increasingly more detailed management being the responsibility of the subordinate O-8/9 and O-5/6 commands. The common phrase used for this approach is "centrally managed and de-centrally executed" (58).

Centrally managing and de-centrally executing these services take on advantageous complexities when the Services ensure provision of MFP-2 and -8 services to all of their Service-specific SMs, including those serving within USSOCOM. For example, H2F was initially rolled-out to only Soldiers in the U.S. Army, but has also recently been embedded at USASOC locations alongside POTFF staff. The H2F mission is to improve Soldiers' health, fitness, and well-being, while the USSOCOM POTFF Physical Performance Domain uses MFP-11 funds for enhancing SOF mission readiness and operational availability through expert driven programs aims to decrease recovery time, optimize physical training, and increase career longevity.

Effective execution of HPO programs directly involves HP staff providing embedded services to warfighters, with frequent oversight by warfighter's cadre at assessment and selection locations such as the Ranger Assessment and Selection Program and the United States Army John F. Kennedy Special Warfare Center and School. Within USSOCOM and Service-specific programs, program execution is decided in accordance with respective policies and reporting requirements that range from the internal chain of command levels, all the way to Congress in accordance with regulations and/or the National Defense Authorization Act (NDAA). SOF execution is similar across each location, with variations based on what the Services provide, what local policies permit, and available resources. Day-to-day function of program execution is decided by each USSOCOM line commander at the O-5/6 level, with minimal program needs determined by the USSOCOM Commander's HQ staff and reporting requirements for various iterations of the NDAA.

HPO staff must also comply with training and documentation standards through credentialing authorities at Military Treatment Facilities (MTFs) (5). This has historically presented challenges for the DoW's HPO teams and the Defense Health Agency (DHA) (81) teams. This is primarily due to the differing aspects of providing embedded clinical care verses traditional rehabilitation provided in the MTF. In the traditional MTF clinical setting, the goal of Sports Medicine and PT clinics is to treat injuries and facilitate Service members' return to duty following injury. Productivity expectations for conducting this work are set through Relative Value Units (RVUs), which provide a standardized measure for assessing the value and output of clinical services. RVUs take into account the complexity, time, and resources required for different medical procedures and services (130). This system of accountability is designed to track individual clinician productivity and align healthcare delivery within the broader organizational goals of the DHA (5).

The DHA sets the RVU rehabilitation productivity standards by using Current Procedural Terminology (CPT) codes. These codes are used to bill for services and are weighted more towards treatments common in a clinical environment, such as therapeutic exercise, manual therapy, neurorehabilitation, and functional activities, which are each higher on the RVU scale (15). Interventions common in the performance optimization realm, such as dry needling, therapeutic modalities, and soft tissue or spinal manipulation mobilization, are much lower on the RVU scale. Many S&C staff are not licensed medical staff, and thus do not generate RVU, but often account for hours of allocated time. Therefore the time spent with a S&C professional has to be rolled into an RVU category that is linked to a licensed professional. Because Sports Medicine staff at an MTF must generate high numbers of RVUs to justify efficient utilization and justification of rehabilitation staff, MTF staff frequently utilize high-scoring RVU interventions such as therapeutic exercise as the primary treatment option and limit the use of lesser weighted treatment options (5).

In non-traditional military clinical operations such as with embedded POTFF staff, performance optimization is the focus, where HP teams (e.g., ATCs, Dietitians, and SCSs) have staffing models, resources, and goals that diverge somewhat from those within DHA-managed MTFs. Within a military HP team, the Sports Medicine staff (i.e., ATCs) focus on identifying impairments, symptom management, and education on injury management and prevention. Similar to elite athletic settings, HP teams are available to provide both clinical intervention and consultative services that guide and improve physical performance for each warfighters specific needs. Though CPT codes are documented as a part of standard care, RVUs are not calculated, and no clinician productivity standard is set. Individual HP teams are evaluated by each command with a focus on whether they are adequately supporting the local tenant unit's occupational performance requirements. The HP Sports Medicine staff possess skills and tools typically unavailable in traditional MTF rehabilitation clinics, with the shared goal of improving and maintaining elite physical performance of every warfighter treated. This multidisciplinary effort allows the HP Sports Medicine team to refer warfighters over to professional SCSs for planning and managing follow-on therapeutic exercises as a part of reintegration into performing optimally, without impairment during all levels of occupational performance.

PERFORMANCE NUTRITION OVERVIEW

Performance Nutrition is a foundational component of the HP paradigm within the military. As a standalone discipline it can be overlooked or be absorbed by other specialties on a medical team that does not have a sports or performance dietitian. The various nutrition-related components are differentiated along a spectrum of health, wellness, fitness, and HP. In the performance nutrition domain, there are numerous—and at times divergent—definitions of health, wellness, fitness, HP, etc. Health-, Wellness-, and Fitness-based nutrition programming generally focuses on the continuum of nutrition in relation to life stages, increasing quality of life, being free from pain and disease, and decreasing morbidity and mortality risk in the general population (140). Performance Nutrition, on the other hand, is defined in the DoW as the "nutritional contribution to the execution of physical and cognitive actions by the human body to the greatest degree attainable under specified conditions and objectives" (45).

It should be noted that there are many terms for registered dietitians within the realm of health, fitness, and performance. Common terms related to area of expertise are Sports Dietitians, Tactical Dietitians, and Performance Dietitians. These terms are often used interchangeably. However, the credential "Registered Dietitian" was updated to "Registered Dietitian Nutritionist" (RDN) by the Commission on Dietetic Registration (CDR), the

TABLE 1. DIFFERENCES IN DIETITIAN ROLES AND SKILLSET APPLICATION

	MEDICAL NUTRITION THERAPY HOSPITAL/CLINIC BASED MODEL	NUTRITION EDUCATION AND WELLNESS FOCUSED MODEL	HP NUTRITION OPTIMIZING THE WARFIGHTER
Energy Requirements	Modified food intake based on disease state: Overweight, obese, insulin resistance Hyperlipidemia (HLP) Hypertension (HTN) Diabetes (DM) Trauma/Burns	MDRI General: 2,300/3,400 calories [Females/Males] Exceptionally Heavy Activity: 3,000/4,700 calories [Females/Males]	14 – 60% increase in energy requirement above MDRI: SOF4,200+/- 600 calories daily average and training can require: 8 – 12,000 calories Varies due to training/deployment phases Specific distribution of macronutrients to enhance adaptation, recovery, and performance
Focus	Reactive: focusing on disease state or injury	Prevention-based approach Population health focusing on improvement in overall food and drink consumption/wellness Healthy weight to minimize MSK injury risk	Nutrition recommendations in concert with energy systems Enhancing performance/battlefield capabilities
Care Provided and Things to Consider	Individualized assessment and prescription provided to manage disease and/or achieve a health outcome Comorbidities	General recommendations for the population vs. individualized prescription Focus is on healthy weight vs. performance metrics Worksite interventions for large groups	Individualized task-specific recommendations Gut tolerance, stress hormones, tactical expedience/feasibility of recommendations Weight of fluid/food Field interventions for performance
Minimum Education Requirements	Registered Dietitian^a	Registered Dietitian^a	Registered Dietitian^a Board Certified Specialist in Sports Dietetics (CSSD)^b
Advanced Options	Master's degree: Clinical Nutrition Certified Diabetes Educator, Certified Nutrition Support	Master's degree: MPH Certified Health Education Specialist Weight Management Certification	Master's degree: Exercise Physiologist, Sports Nutrition Certified Exercise Physiologist Certified Strength and Conditioning Specialist
Example Patient	SM: Overweight pre-HTN, Pre-DM, HLP Focus on weight reduction, controlling calories, consistent carbs, limit sodium	SM: overweight, MSK injury, not meeting CDC's exercise standards. Focus on weight reduction, behavior change and/or nutrition environment change to benefit group	Warfighter: Normal body comp (not using BMI) and exceeds CDC's exercise standards. Focus on increasing calories, macronutrient distribution, electrolytes (increasing sodium) to optimize physical performance, gut tolerance with exercise

a: Registration accomplished through didactic degree program, period of supervised proactive, and registration exam. Academy of Nutrition and Dietetics (AND), USA

b: The only sports-related certification recognized by Commission of Dietetics Registration, the AND credentialling agency; requires RD credential, sport-related practice experience, passing board exam; included in military contract hiring agreements to ensure qualified personnel in this space

credentialing agency for the Academy of Nutrition and Dietetics (formerly the American Dietetic Association) (2). For consistency, this document will refer to performance nutrition experts as Performance Dietitians (PD).

Additionally, it is important to note that while the umbrella term "human performance optimization" can be linked to all human endeavors along the health continuum, the intent of this paper is to articulate the difference between the nutritional demands in a battlespace or tactical operation landscape and the needs of the conventional SM (Table 1).

The essential role of nutrition in the sports and performance arena is well established in the literature (44,73,97). More specifically, it is only in the last decade that, there have been several research studies and reviews focused on the application and impact of HP nutrition for SOF (40,45,49,148). A key premise to this guidance has been that "much of the nutrition information available to SOF is extrapolated from the following review will briefly discuss the evolution of performance nutrition and the current guidance available, and will explore technology integration, limitations, and future areas of opportunity.

EVOLUTION OF PERFORMANCE NUTRITION

The overarching mindset of performance nutrition over the past decade is a paradigm shift from a traditional clinical nutrition model to the mindset of fueling a human weapon system, with the addition of the full spectrum of clinical- and health-based parameters where needed. The PD's span of expertise now covers targeted fueling strategies for event-based performance and those to sustain and extend an individual's operational lifespan. Daigle and colleagues have offered a pivotal summary of the specificity of performance nutrition outcomes that can be expected when working with PDs (45). Focus metrics come from the following areas: body composition, biometrics, resting metabolic rate, metabolic efficiency/substrate utilization, hydration and the environmental, as well as operational and toxic exposures throughout a career. Ultimately, the aim is to lay the foundation for the warfighter to understand that the impact of their consistent behaviors of fueling, hydration, and sleep reach far beyond a pre-, during, or post-event benefit.

CURRENT RECOMMENDATIONS AND GUIDANCE JOINT POSITION STATEMENT ON NUTRITION AND ATHLETIC PERFORMANCE

The Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine suggest that,

"The performance of, and recovery from, sporting activities are enhanced by well-chosen nutrition strategies. These organizations provide guidelines for the appropriate type, amount, and timing of intake of foods, fluids, and supplements to promote optimal health and performance across different scenarios of training and competitive sport" (166).

The aforementioned joint position statement is one of the foundational documents for registered dietitians and board-certified specialists in sports dietetics (CSSD) practicing in the realm of nutrition for physical activity and athletic performance. The document provides guidance for the following themes:

- Theme 1: Nutrition for Athlete Preparation. Energy requirements, energy balance, energy availability
- Theme 2: Performance Nutrition: strategies to optimize performance and recovery for competition and key training sessions. Pre-, During, and Post-event Eating
- Theme 3: Special Populations and Environments
- Theme 4: Roles and Responsibilities of Sports Dietitians

INTERNATIONAL SOCIETY OF SPORTS NUTRITION POSITION STAND – NUTRIENT TIMING

Kerksick and colleagues emphasize the importance of nutrient timing for highly trained individuals as it relates to training adaptation, exercise performance and body composition (97). This is an important concept; a large portion of the military's efforts to address energy needs for high performing individuals focuses solely on the total energy and macro/micronutrients and does not account for the timing of any of these nutrients. Yet, supporting research in the sports realm suggests that micronutrient timing can have significant impact on performance (79). For example, Haakonssen and colleagues have shown that a calcium-ruck meal attenuates markers for bone resorption when consumed prior to a prolonged cycling event (79). Due to lack of nutrition research in the battlefield conditions, position stands and studies like these provide the basis for individualized nutrient timing recommendations for military specific tasks and conditions that can improve performance and ultimately may provide an advantage in the battlefield.

SCOPE OF PRACTICE AND STANDARDS OF PROFESSIONAL PRACTICE FOR SPORTS DIETITIANS

Although educational requirements throughout the world differ for PDs, it is important to note that the United States has unique standards of practice and standards of professional performance for dietitians specializing in sports nutrition and dietetics (157).

The paper entitled, "Academy of Nutrition and Dietetics: Revised 2021 Standards of Practice and Standards of Professional Performance for Registered Dietitian Nutritionists (Competent, Proficient, and Expert) in Sports and Human Performance Nutrition," outlines the key competencies and scope of practice for PDs. Though not all encompassing for the tactical environment, it does provide the foundation from which to adapt sports to tactical requirements (44). Table 1 provides further description of minimum requirements to work within military HP settings.

SOF NUTRITION PROGRAMING: FRAMEWORK FOR SOF PERFORMANCE NUTRITION PROGRAM

A foundational paper entitled, "Comprehensive Performance Nutrition for Special Operations Forces" emerged in 2015 (45). This was the first document that provided a framework that focused on integrating current sports-related principles into best practices for performance nutrition within the tactical operating environment.

Prior to this publication, PDs relied on limited documents, trial and error, and a small network of other like-minded specialists.

The "International Society of Sports Nutrition Position Stand: Tactical Athlete Nutrition" provides further guidance for nutrient timing, fluid needs, and supplementation to optimize human performance and occupational readiness (73). PDs in SOF or Aviation units must be adept at translating nutrition science into an operational language with relevant and individualized action steps. The development of nutrition technology to streamline common tasks has enhanced PDs' bandwidth to provide hands-on nutrition education and training such as cooking classes, knife skills, and grocery shopping. Having this specialized support in a unit allows for improved application of knowledge into practice, underpinning successful training adaptation and ultimately mission success.

KEY MILITARY REGULATIONS

Key guidance for military feeding can be found in the joint military publication entitled Nutrition and Menu Standards for Human Performance Optimization (84). This publication specifically, "… defines the nutrition responsibilities of the Surgeons General of the Army, Navy, Marine Corps, and the Air Force…" (84), and is the foundational document for the military dietary reference intakes (MDRI's), previously intakes, previously known as military recommended dietary allowances. This document also establishes in-garrison dining facility menu parameters and the component requirements for operational rations to include the Meal, Ready-to-Eat and the Close Combat Assault Ration. It is, in short, a culmination of a large body of ongoing research conducted by and for military personnel. Friedl and colleagues describe nutrition research as a matter of national security and links the discovery of effective fueling strategies provides warfighters with battlefield advantage (60). The primary "one-size-fits all" solution for military nutrition that emerges is the operational ration. However, in the SOF and Aviation communities, there are additional factors that may impact whether rations are consumed, including logistical (operational time constraints and priority of operational items over food) and physiological (depressed appetite, inability to carry more food) (73). Ongoing research and science application is critical and must be prioritized to keep pace with the current industry standard and the ever-changing operational landscape. More agile forces are required on today's battlefields, and refueling should match or exceed the capability of our adversaries (135).

Just as logistics are the backbone to a military's success in war, performance nutrition is the backbone to physical and cognitive performance superiority (114,133,134).

EMERGING AREAS IN PERFORMANCE NUTRITION: PRECISION/INDIVIDUALIZED NUTRITION

Nutrition models have previously focused on data and research using sample means, but an emerging trend in dietetics is nutrigenomics/personalized nutrition (40). Although there are predetermined key competencies and requirements to becoming a SOF operator, some of these baselines are set by historical precedence and some have changed based on the data analysis of success in SOF. Either way, many agree that SOF are not a homogenous population, thus, a more tailored approach is required. A 2024 review of HP nutrition in Military populations by Scott and Deuster suggests that the future development of precision nutrition will involve using machine learning algorithms to integrate genetic and multi-omics information with data on environmental exposures, health status, and lifestyle factors (148). The objective of this synthesis is to produce actionable interventions specifically designed to improve a SM's lethality (148). While the science has not yet caught up, the novel idea of individualized nutrition has a large market interest within SOF.

LIMITING FACTORS (LIMFACS)

SPEED OF TECHNOLOGY

Technology advancements today are not unique to HPO. From smart phones and watches to more advanced individual user platforms, the speed of and access to technology is at many individuals' fingertips. However, the development and marketing of these products and programs generally outpaces their research on reliability, consistency, and validity (63). Additionally, the security gaps that may result from using commercial off-the-shelf technologies make them less accessible for those in the business of discretion, anonymity, and National Security (63,131).

LOGISTICS AND PROCUREMENT USING MILITARY FUNDS

There currently is no legal process to purchase food or beverages for warfighters with caloric and nutrition needs that fall outside the scope of the MDRIs. These affected warfighters are required to fill the gap using their own out-of-pocket funds. There are many factors that preclude the ability to outfit our warfighters with the performance nutrition requirements that would optimize performance, the most significant is lack of regulation and policy for HP nutrition.

OUTDATED REGULATIONS AND NEED FOR HP REGULATIONS

Military regulations are the foundation of operations within the DoW. However, due to the size, scope, and depth of some of the regulations, updating them in real-time is not possible. Nutrient timing, logistics, and fiscal laws impose substantial limitations for performance nutrition professionals to supply warfighters with

the resources to support their nutrition needs and physiological mission demands. This is akin to trying to convince them that specialized protective clothing or ruck sacks are needed to meet the mission but relying on the member to take this information and utilize their own funds to procure the items. Key equipment and operational requirements needed for training and missions are funded and these supports should be extended to nutritional HP needs.

FUTURE OPPORTUNITIES

The unique and at times extreme demands upon SOF warfighters calls for a robust interdisciplinary approach to support performance—anytime, anywhere. The following recommendations, if employed, will amplify the benefit of HP Dietitians within a unit and expand the HP capabilities of the SOF warfighters (134). First and foremost, there must be a funding mechanism established to support the population specific nutrition needs of our warfighters (134). PDs at the unit level should be able to procure and distribute curated performance foods to the unit's population according to their operational and medical needs (107).

There is also an enduring need for more holistic integration of nutrition for cognition, brain health, mental health and well-being in addition to the physiological optimization of the SOF warfighters. Validated tools for tracking and assessment of biomarkers, cognitive performance, and other nutritionally relevant metrics are needed to inform nutrition strategies in support of the enduring high operations tempo of the SOF warfighter (134). Furthermore, dedicated research teams in support of SOF warfighters are needed to better describe the critical daily impact of nutrition for this population (134). Research from sports, conventional military forces, and/or trainees and cadets may not easily extrapolate to the advanced operational and medical readiness needs of the SOF warfighters. Studies including both males and females are critical to the further understanding of the sex-specific physiological needs of SOF warfighters to mitigate injury and illness and optimize strength, power, nutrition, cognition and behavioral/mental health outcomes while protecting their longevity and quality of life during and after military service.

PREHABILITATION AND REHABILITATION

MUSCULOSKELETAL INJURY AND READINESS

Musculoskeletal injuries (MSKIs) (88) are the most impactful medical condition facing the United States military, accounting for 2.4 million medical encounters, 25 million limited duty days and affecting over 900,000 active duty SMs each year (92,163). Furthermore, MSKIs are the top reason that SMs are unprepared to deploy and the principal cause for disability, leading to $548 million in direct patient care costs (163,164). In studies specific to Airmen in the United States Air Force Special Warfare (ASPECWAR), it has been shown that these warfighters sustain MSKIs at a higher rate than other U.S. Air Force career fields (104,175). Although these findings are not generalizable across all military Services, findings for MSKI rates across SOF are consistently high (1,163).

Studies specific to SOF operators have indicated that up to 76.9% of self-reported MSKIs in this population are preventable (1). Also, within the SOF community, these studies show that the majority of MSKIs occur during physical or tactical training, which could be modifiable given the appropriate setting (1,104,149). For the HP team, understanding intrinsic and extrinsic risk factors in this population can aid with injury reduction and maintaining operational readiness (164).

The literature notes multiple risk factors for MSKI, such as gender, previous injury history, age, poor aerobic capacity, slower run times, smoking, perception of future injury risk, training load and pain provocation during a Functional Movement Screen (FMS) (1,55,104,149,164,175). Although some of these risk factors are non-modifiable, it is important for the clinician to consider a holistic view of previous and current risk factors when implementing future injury reduction strategies. In addition to understanding risk factors for MSKI, HP professionals are interested in applying lessons learned and evidence-based human performance services in an attempt to reduce the burden on deployment readiness and disability. Although many traditional medical resources aim to introduce holistic care, HP providers with previous MTF experience note there is a noticeable gap in maximizing the opportunity to use rehabilitation providers in analyzing movement and applying evidence-based services in the military setting beyond the walls of a medical center.

MODIFYING THE IMPACT OF MSKI ON READINESS

Military training inherently includes high training loads due to operational demands. Traditional medical centers historically aim to provide holistic care but frequently fall short of providing preventive medical and HP services. Closing this gap first begins with defining what HP is and how rehabilitation experts can effectively close that gap, working on multidisciplinary HP teams. An effective HP team focuses on safely supporting the sustainment of this high level of workload and performance over the longevity of the warfighter's career. The musculoskeletal provider includes physical therapists, athletic trainers, occupational therapists, sports medicine physicians, and physical therapy assistants or technicians. The musculoskeletal provider's role on a HP team provides unique engagement with the warfighters served by developing evidence-based evaluation and treatment of musculoskeletal conditions specific to occupational integration, team dynamics, and unit deployment availability.

Regular analyses are required to assess performance measures and address factors leading to or residual from previous injuries in an effort to deter the effects of previous injury on performance. Potential injury reduction goes well beyond the clinic, training

room, or even generalized screening measures. In the military population, a portion of injury reduction can be accomplished through appropriate workload management while minimizing spikes in training and avoiding overtraining (13,55,88). In addition, consistent monitoring of current and previous injuries (88) and tailored S&C to meet physical training demands are key in reducing MSKI. Current evidence does not support a one-size-fits-all construct to injury risk reduction (50,52,53). Further implementation of a holistic approach to enhance performance and recovery, to include education on sleep, nutrition, and stress mitigation techniques are likely to further enhance injury reduction.

DISCIPLINES AND SPECIALTIES

Within DoW HP efforts, 'Sports Medicine' is a common term for team members that treat MSKIs among various additional pathologies (115). Other than Sports Medicine Physicians, the most common specialties working with injuries are ATCs, and Occupational Therapists (OTs). OTs are autonomous, credentialed, and privileged providers and have a broad scope of practice. Those with doctoral level education or ATCs with board-certified specialties in orthopedics or sports add another level of expertise to the overall management of musculoskeletal conditions in comparison to many other direct access specialties (38). Furthermore, those who are specialized in sports can often add another level of customization for injury prevention and performance enhancement (122).

According to the National Athletic Trainer Association (125), "athletic training encompasses the prevention, examination, diagnosis, treatment and rehabilitation of emergent, acute or chronic injuries and medical conditions" (125). ATCs render service under the direction of, or in clinical collaboration with a physician (125). However, some state licensures require either a physician or another health care provider for clinical oversight.

Strong backgrounds in performance allow musculoskeletal providers to comprehensively address warfighters needs. Many ATCs have also obtained a Certified Strength and Conditioning Specialist (CSCS) certification, improving their integration with the SCS. This can aid in optimizing return-to-duty timeframes by adjusting S&C workouts based on each warfighter's particular pathology and progressing into full, unrestricted S&C program participation. In addition to patient care, a clinician within a HP team can also track individual and mass injury trend analyses. From the data collected, the musculoskeletal provider can collaboratively incorporate evidence-based injury reduction strategies that can be personalized and implemented for the group. Examining injury relationships can assist with future preventative measures for reducing relative risk for future injury (169).

In a recent article involving United States Army trainees, one of the most common reasons trainees do not seek medical attention for MSKI is to avoid being placed on profile (39). Developing and maintaining trust for better reporting of injury may result in decreasing the severity of MSKI, reduced attrition in a training setting, and cutting subsequent medical expenses (39). Therefore, clinicians should expect to develop their interpersonal skills to promote trust within the HP team, senior leadership, and the patient population. Being a leader within the field of Sports Medicine and other HP specialties often provides the knowledge base and skillset to optimally treat warfighters.

At times, the skills utilized in patient care overlap between OTs and ATCs. The integration of roles between each discipline will largely be based on the scope of practice authorized at the local MFT, education level, experience, and the general need from the operational setting. Overall, having appropriate musculoskeletal providers with extensive knowledge and experience in their respective fields of practice is crucial for making on-the-spot decisions which may ultimately affect the warfighter's training and operational outcomes.

INJURY REDUCTION STRATEGIES

A readily available injury reduction strategy for the HP team is to use common pathological injury trends and evidence-based literature to target specific proprioceptive techniques, focused neuromuscular reeducation, and the targeting of specific movement patterns. Injury trends often have similar incidence rates across affected body regions in operational versus training settings, with lower extremity injuries most often outnumbering upper extremity or spinal pathologies (1,31,81,103,104,149). Although there is a high prevalence of overuse injuries in each setting, operational settings often have a higher incidence of acute or traumatic injuries compared to training settings (1,31,81,103,104,149). Working with an SCS, a clinician can advise on injury reduction strategies that can add significant value to a S&C program. Some of these approaches include injury trends, guidelines for training load progression and regression (67), and incorporating supplemental evidence-based strengthening and proprioceptive techniques. In a healthy population, this would ideally be placed within a warm-up in addition to precise loaded movements within an S&C program aimed at introducing a similar movement at lighter loads or intensity that closely resemble the movement patterns necessary in an activity. Overall, in order to reduce the burden and cost of MSKI in this population, a customized approach is needed (104).

REHABILITATION AND READINESS

It is important for clinicians to attempt to return warfighters to training as close to previous injury status or better. Research has shown that initial injury is a strong risk factor for the reoccurrence of a previous injury and subsequent injury at a different site (64,170). Additionally, providers within the HP team should

attempt to reduce further negative effects (i.e., reduced aerobic capacity) during the rehabilitative process by coordinating with SCS. This will not only assist with expediting return to duty but will also mitigate additional injury risk (82). Overall, full return to duty from injury is often a difficult multifactorial process (20) that is typically based on the specific pathology and recommended healing timeframe, return to duty timeline, and return to duty physical assessments.

MOVEMENT SCREENS

Providers often attempt to utilize a quick screen to identify injury risk or to quantify predictive injury rates. To date, a stand-alone screening test that reliably identifies individuals at risk for comprehensive MSKI across athletic or military populations does not exist. However, individual and clustered musculoskeletal tests identified to predict or identify risk factors, is a good starting point.

One such example of a musculoskeletal tool used to evaluate movement is the FMS, a screening tool consisting of seven tests used to assess fundamental movement patterns of an individual (53). Systematic reviews of the FMS, range in regard to utility throughout literature. A recent systematic review by Moran et al. (119), suggested that the FMS is not supported as an injury prediction tool. However, another systematic review noted the FMS has a relative risk (RR) = 1.51, or 51% more likely to be affected by injury for those classified as "high risk" by the FMS at a score of <13 – 14; though, the authors noted that the level of evidence is very low (53).

Marker-based and marker-less motion analysis procedures are time-consuming, cost-intensive, and require further high-quality research. The findings from these analyses require a biomechanical and medical knowledge foundation to even begin to interpret clinical relevance (50). Within an Air Force Special Warfare (AFSPECWAR) training population, an initial study using a marker-less motion assessment system was unsuccessful in identifying trainees at risk for suffering MSKI (81). Caution is advised for implementation until further scientific data is available. If utilized, there should be interdisciplinary discussion to assess these analytical data and determine significance based on the population tested.

PREHABILITATION DISCUSSION

Since MSKI is often complex and multifactorial, a specific population requires investigation to gather a comprehensive inventory of modifiable and non-modifiable risk factors (90). For injury reduction, it is recommended that the HP team start at the highest relative risk for likelihood of injury. Based on reported data, training load and previous injury history should be addressed prior to mass implementation of a standardized, stand-alone screen. Understanding these risks allows leaders to understand why it is imperative to introduce rehabilitation concepts and HP principles where the injuries are likely to occur and support a multi-disciplinary approach to rehabilitation. When addressing training load an overarching limitation within an operational model often depends on how much influence the HP team has on training demands. Overall, it has been shown that nontraditional military physical training can reduce MSKI risk while enhancing performance measures (152). In addition, much of the focus of prehabilitation will depend on the setting, population, resources, and overall time frame the HP team has to utilize and implement injury reduction strategies.

PREVIOUS INJURY

Currently, in SMs, prior injury has been well documented as a high-risk factor for reoccurrence and subsequent injury. Research by Toohey et al. (170) showed that any lower extremity injury leading to subsequent injury, relative risk (RR) = 1.14 – 2.25, 14% – 125% more likely to be affected by injury at a different site. In addition, a recent systematic review concluded that previous injury has consistent moderate evidence for increasing the risk of running-related injury (172). Within the military, previous injury is consistently a risk factor for MSKI (90) therefore it is imperative to reduce the risk of initial injury as this often leads to subsequent negative effects.

LOAD MANAGEMENT

The Acute to Chronic Workload Ratio (ACWR) is an index consisting of a calculated acute workload relative to the cumulative chronic workloads (13). In addition to the ACWR, general load management principles have come to the forefront of competitive team sports over the recent years, though less so in the military. Current suggested guidance has indicated an ACWR of 0.80 – 1.30, which proposes the lowest risk for injury (67,112). Most often, this ratio describes the most recent week's training load divided by a weekly rolling average of the chronic workload (most often over 4 weeks) (67). In a recent systematic review, it was found that advancing beyond the suggested ACWR of (0.80 – 1.30) resulted in an approximate RR = 2.0 to 8.5, or 100 – 750% more likely to be affected by injury among multiple studies (112). Even long recovery periods, greater than 5 days have been documented to have a RR = 1.8, or 80% increase in likelihood of injury (67).

Training load is a modifiable risk factor for injury, however it is unclear how it affects the tactical population as current research has not comprehensively explored this as a risk factor thus far (55). Although specific implementation should be done cautiously, existing studies can likely be generalized to the military population where there is a longstanding history of non-contact, overuse injuries. In addition, it has consistently been documented that rapid increases in training load are regularly met with higher injury rates (13,20,66,68,78).

WEARABLE TECHNOLOGY

Wearable technologies are often used to assist a HP team to assess and track athletes or warfighters cumulative training load, which consists of external load (the mechanical or locomotive stress) and internal load (physiological stress) (33). This means that wearable technologies can provide deeper insight for avoiding overreaching, under recovery, or maladaptation (87). However, further research needs to be performed on these wearable technologies to begin to understand the implications for injury reduction, and to formally validate many of the devices as many factors such as time of day affect readiness, performance, and self-reported sleep measurements (86,137). This is why it is important for an appropriate SME to determine which devices are utilized and how to interpret the gathered data.

Overall, wearable technologies can complement the HP team but are inadequate as a stand-alone replacement to SMEs. For instance, using technologies as a substitute for injury reduction purposes is likely resultant from an incomplete understanding of the complexities of injury (150). However, tracking injury related outcomes along with documented risk factors can aid the clinician and researchers in building a model for RR of injury for a specific population. Lastly, it is strongly advised that HP teams consult with legal offices with regard to wearable technology use and access to data for potential approval from Safety Review Boards.

MAINTAINING READINESS OVER TIME

Sustaining performance over time for warfighters should be the priority for the HP team. Avoiding setbacks in training, including those consequently from injury, can help warfighter achieve and maintain performance goals. Often, the difficulty of maintaining longevity is knowing when and where the next training or operational event will occur. In a training setting, where the HP team is heavily involved and the operational course standards remain consistent, a training plan can potentially be established to optimize the warfighter's response to physical demands while simultaneously reducing injury risk.

In operational settings, readiness becomes increasingly difficult as warfighters need to sustain high levels of performance while being prepared at a moment's notice. Individualized and strategic methods of periodized training can often provide stability in situations like these (43,102). Research in team sport athletes shows a protective value of having high chronic workloads greater than 18 weeks as developing physical qualities for training demands over an appropriate period of time can help reduce injury risk (67). Within the military population, the issue is often how quickly a person reached a high training load as compared to the high training load in and of itself. Therefore, it is recommended to gradually build to higher workloads through a staged program to build durable and resilient athletes (66), while consistently tracking performance and recovery measures, overall training load, to avoid training setbacks. In general, understanding the high physical and cognitive demands of training and operational events can help the HP team align programs to optimize performance and address injury risk.

RECOVERY AND REHABILITATION

In a HP team, the clinician should have a general understanding of the additional disciplines in order to holistically care for the warfighter. Several factors including physical, physiological, and psychosocial factors should be taken into consideration for recovery strategies (88). It is important for the musculoskeletal providers to work with the entire HP team and gather subjective and objective cues to assist with appropriate referrals to the desired specialty when necessary.

The use of manual therapy and therapeutic modalities are widely known to be used during the recovery process to aid with a variety of musculoskeletal conditions. However, optimizing recovery during the rehabilitation process goes well beyond what occurs in the clinic or training room. Multiple factors such as sleep, nutrition, and stress mitigation are examples of performance factors the HP team can assist with to optimize recovery (151).

SLEEP AND REHABILITATION

There are several negative effects of sleep deprivation on performance (174) and this can also be generalized to those recovering from injury. Sleep is widely considered to be essential for optimal performance and recovery outcomes (26) and it is recommended to sleep more than 9 hours per night for those recovering from sleep debt or illness (177). Even in healthy subjects, a meta-analysis confirmed that sleep restriction or deprivation (defined in 11 studies, ranging from 0 – 6 hours of sleep per night for 1 – 12 days) has a negative effect on pain perception (147). Therefore, it is vitally important for the warfighters to prioritize sleep during and even following the rehabilitation process. Rehabilitation experts should collaborate with CPPs to ensure tactical athletes receive expert advice on sleep performance.

NUTRITION AND REHABILITATION

Optimizing nutritional intake is an individualized process and it is important to avoid deficiencies in energy availability, protein, and micronutrients during the rehabilitation process (167). Although it is imperative for adequate nutrition intake to achieve optimal performance, the post-injury timeframe can be an opportunity to improve one's eating perception and behaviors (132). Improving each can assist with the healing process and successive performance initiatives once the rehabilitative process is complete. In the setting of energy restriction, such as the result of a significant injury or surgical intervention, it has been recommended that elevating protein intakes to 2.0 g/kg/day or higher can be valuable in reducing fat-free mass loss (92). Simultaneous carbohydrate and protein intake can further aid in diminishing muscle atrophy and ensuring adequate macronutrients

during rehabilitation, supports a crucial role in one's anabolism (92). However, since distinctive pathologies may respond differently to nutrient intake, the clinician should consult with the HP dietitian on specific recommendations for common injury trends or for more individualized nutritional advice.

STRESS MITIGATION AND REHABILITATION

Psychosocial factors can also influence recovery from an injury. Numerous factors can lead to increased stress, which can have a negative impact on the recovery process. Practicing mindfulness can assist with enhancing recovery and resilience during stressful situations (19). Booth-Kewley found that those who expressed initial high recovery expectations had approximately a five times higher recovery rate at follow up as compared to those with low expectations in a U.S. Marine population (27). Overall, psychosocial influence can be highly individualized, and it is important for the clinician to utilize the CPP or Operational Psychologist as appropriate during the rehabilitation process.

THE ROLE OF A MUSCULOSKELETAL PROVIDER ON A HP TEAM

In comparison to other medical facility clinical positions, the role of a musculoskeletal provider within a HP team is often notably different. Most team members are medical practitioners not requiring referrals from other direct access medical providers, as is common in an MTF. In a military setting, acquiring advanced privileges is needed to expedite the treatment of these warfighters. These advanced privileges for the PT include the ability to order advanced imaging, labs, and medications as allowable by a local MTF (57). Accuracy of diagnosis and efficiently working through differential diagnosis hypotheses are essential to accelerating the appropriate care for the warfighters. Additionally, fluctuations in patient care will require the clinician to quickly evaluate, diagnose, treat, and educate on prognosis in a condensed timeframe while maintaining a high level of care (162).

Direct access to care and increased appointment availability are benefits the warfighter receives when obtaining care from an embedded musculoskeletal provider on a HP team. However, access alone is not the distinguishing factor between services rendered in an embedded environment and those received in an MTF. The real differences fit into one or more categories non-typical to date in a traditional MTF: occupational integration, team dynamics, and unit deployment availability (Table 1).

PRACTICAL APPLICATION-INTEGRATING REHABILITATION EXPERTISE ON A HP TEAM

Occupational integration refers to the ability of a service rendered on the HP team to directly impact combat effectiveness. PTs and ATCs provide rehabilitation evaluation and treatment on-site in a unit's physical work center or on a traveling basis supporting the warfighter in a training environment outside of the unit. These providers integrate the warfighters occupation into the rehabilitation plan by incorporating physical objects (e.g., helmet, body armor, ropes, obstacles) into site specific settings (e.g., turf field, dirt field, rocky terrain, training gym, wind tunnel, pool). The provider gradually introduces objects and site specificity to simulate the environment the warfighter will return to. Musculoskeletal providers on a HP team understand the requirements for warfighters identified in their technical and tactical skills. These skills form the basis and requirements for readiness to deploy requirements for warfighters. For some warfighters, physical readiness requirements are specific for the career field and warfighters are required to pass an Occupationally Specific Physical Fitness Assessment (OSPFA). An OSPFA is based on mission-specific, physical duty requirements. It differs from a military service branch's specific physical fitness assessment in that the requirements are specific to the mission and extend beyond the health criterion and general fitness standards included in a military Service's specific physical fitness assessment. Musculoskeletal providers communicate daily with other members of the HP team to ensure warfighters train in areas of the OSPFA or other training requirements while navigating the rehabilitation process. It is common to find a musculoskeletal provider on a HP team providing mid-stage and end-stage rehabilitation in or near the physical training environment to mentally prepare the warfighters for return-to-duty.

In addition to the OSPFA, musculoskeletal providers on a HP team are well versed in the skills and environment necessary for a warfighter to perform his/her job. A musculoskeletal provider may be found working with a warfighter on the physical abilities necessary to enter and exit an aircraft, dismount a vehicle, ascend or descend a rope, navigate obstacles and various terrain, adapt to various hot and cold weather environments, implement rehabilitation practices into task specific activities such as combat finning, tactical skiing, swimming, and scaling a wall. For warfighters with skydiving or parachute jumping requirements, a musculoskeletal provider may be found evaluating the stresses and positioning of the body during freefall training in a wind tunnel or other simulated environments. For example, for a warfighter finishing his or her shoulder rehabilitation post-surgery, a physical therapist accompanies the warfighter in a wind-tunnel to ensure the warfighter is safe to return-to-training in this environment.

Also unique to a musculoskeletal provider's role on a HP team is the role this member plays on the HP team and in the warfighter's organization. The musculoskeletal provider becomes a "trusted agent" in the unit he or she serves in. The availability and understanding HP providers have about the members of a unit, their past and current medical and training history, companied with the trust gained from regular exposure in everyday training environments makes a musculoskeletal providers role different than that of a provider in a traditional MTF (Table 2). In addition, musculoskeletal providers communicate in regular meetings

TABLE 2. TRADITIONAL MTF INTEGRATED OPERATION SUPPORT (IOS), AND SOF HP DIFFERENCE IN REHABILITATION CAPABILITIES

	MEDICAL PHYSICAL THERAPY TRADITIONALLY MTF BASED MODEL	MSK EDUCATION-WELLNESS FOCUSED MODEL-IOS	PERFORMANCE BASED REHABILITATION- HP FOCUSED SOF
Focus	Reactive: focusing on post-injury evaluation/ treatment in the MTF	Preventative: On-site workplace population health focusing on movement screening, workplace injury mitigation, presence in the unit to direct care to the MTF	Occupation Centered: Integration prep and post injury in the occupational specific physical fitness assessments (OSPFA), occupying, entering, and exiting a helicopter, cockpit, aircraft, dismounting a vehicle, ascending/descending a rope, navigating obstacles and various terrain, adaptation to various climates, hot, and cold environments, combat finning, tactical skiing, swimming, scaling a wall, climbing, wind tunnel stresses on the body, stresses to the body and positioning during freefall and skydiving both in the training rehabilitation room and off-site training location. Performance Integration Activities: Pre-deployment, deployment, and/or post deployment MSK evaluation and treatment with the unit served, and participation in cohesion events designed to improve familiarity of services and support the biopsychosocial model for the operator and family
Education	Post-injury Healthy Back Clinic, Running Clinic	Workstation Ergonomics, Worksite injury mitigation techniques, equip0ment modification recommendations (i.e., wear of helmet, uniform) design and use to reduce injuries on the job	Occupational specific integration pre and post injury, Unit briefs on utilization of services, top injuries, leading training causes of injury, equipment modification recommendations (i.e., wear of helmet, uniform, rusk sack weight distribution, Back Health Clinics, Running Clinic, Injury mitigation of OSPFA
Considerations	Deployment cycle, units served, individualized evaluation and treatment approaches, evidence-based practice, comorbidities	General recommendations for the populations served, definite timeline serving various units with various missions, focusing on healthy force, worksite interventions for masses, evidence-based practice recommendations	Deployment cycle length and location, balance of services with teams deployed, TDY, and home station, field interventions for performance, individualized task specific recommendations, HP team composition, sports or tactical environment experience, fellowship training experience, site location on various military installations, acce33ss to integration and evidence based
Team Dynamics	Collaborate daily with the Patient, Physical Therapists, Physical Therapy Assistants, Physical Medicine Technician, Orthopedic Surgeon, Referring Primary Care Provider	Collaborate daily with the SM, Unit Commander, Unit Members	Collaborate daily with the Operator/Pilot, Physical Therapists, Athletic Trainers, Strength and Conditioning Specialist, Exercise Physiologist, Performance Dietitian, Operational Psychologist, Clinical Psychologist, Licensed Clinical Social Worker, Assistants and Technicians, Assigned Unit Concussion, Combative, Swim, and Running Coaches, Chaplain, Religious Affairs Airman, Unit Commander

TABLE 2. TRADITIONAL MTF INTEGRATED OPERATION SUPPORT (IOS), AND SOF HP DIFFERENCE IN REHABILITATION CAPABILITIES

	MEDICAL PHYSICAL THERAPY TRADITIONALLY MTF BASED MODEL	MSK EDUCATION-WELLNESS FOCUSED MODEL-IOS	PERFORMANCE BASED REHABILITATION- HP FOCUSED SOF
Minimum Education Requirements	Licensed Physical Therapist, entry-level Doctor of Physical Therapy	Licensed Physical Therapist, entry-level Doctor of Physical Therapy	Licensed Physical Therapist, entry-level Doctor of Physical Therapy, Board Certified in Sports Physical Therapy and/or Orthopedic Physical Therapy, or Licensed Athletic Trainer
Advanced Options	Fellowship Trained Sports or Orthopedic Physical Therapist Certified Strength and Conditioning Specialist Board Certified in Sports, Neurology, Orthopedics, Women's Health Physical Therapy	Licensed Physical Therapist, entry-level Doctor of Physical Therapy Certified Strength and Conditioning Specialist Board Certified in Sports, Neurology, Orthopedics, Women's Health Physical Therapy	Licensed Physical Therapist, entry-level Doctor of Physical Therapy Certified Strength and Conditioning Specialist Master's degree in Athletic Training
Example Patient	SM: regularly on a physical restrictive military profile, reports a high pain level, scores high on disability or pain scales, sedentary lifestyle, general service physical fitness assessment, minimal exposure to high physical related tasks, overweight, co-morbidities, recent ramp-up in training	SM: highly repetitive stresses to the body, standing/ bending regularly in occupation, varying physical lifestyle behaviors, general service physical fitness assessment, recent ramp-up in training	Warfighter: frequently ignores pain, has a high pain tolerance, scores low on a disability or pain scale, avoids seeking care in an effort to remain off a physical restrictive military profile, tests regularly on OSPFA, daily requirement for physical training in occupation, various physical requirements in occupation=climbing, jumping, rucking, parachute jumping, combat swimming, combat diving, high gravitational forces placed on the body, high risk and high impact physical activities

accompanied by other members of the HP team to ensure both on an individual level and team level that warfighters receive optimal care. Unique to the HP environment, collegiate, or sports setting, professionals in the operational psychology/ cognitive performance, performance dietetics, social work, SCS, and rehabilitation meet regularly to integrate care for every warfighter in the unit.

Finally, it is not unusual for part of musculoskeletal providers to serve deployed, some with warfighters in training off-site, and others serving in garrison. It is imperative for the musculoskeletal provider to provide a needs-assessment analysis with the remaining members of the HP team and unit Commander to determine the best use of expertise across these settings. Many HP teams will deploy one of the musculoskeletal experts with the warfighters in the unit to provide services downrange. When available, another musculoskeletal expert provides services at the home-station unit or in the training environment. It is also common to find musculoskeletal providers on a HP team provide evidence-based care and performance planning in the warfighter's unit and family cohesion events designed to prepare and return warfighters to garrison. Participation in these events is designed to improve familiarity of services and support the biopsychosocial model inherent for the operator and their family. The role of utilizing musculoskeletal providers deployed and in garrison serving the same group of service members is unique to the HP space.

COGNITIVE PERFORMANCE

COGNITIVE PERFORMANCE PRACTITIONERS

The terms "sport psychology" or more broadly "performance psychology" have signified a specialized approach to developing competent practitioners who are able to influence these cognitive aspects (74). Cognitive performance practitioners (CPPs) focused in this area require specialized knowledge, skills, and abilities drawn from multiple subdisciplines of psychology and kinesiology. Additionally, they tend to embrace a model of human thriving and strive for performance excellence as opposed to remediation

characteristics of a medical model (14). Certified Mental Performance Consultant through the Association for Applied Sport Psychology provides a commonly accepted credential for practice as a CPP, however they need to be aware of the specific cognitive elements relevant for HP (Table 3).

PSYCHOPHYSIOLOGICAL FOUNDATIONS OF PERFORMANCE EXCELLENCE

SLEEP

Sleep restriction (SR) impairs cognitive functioning (106), placing sleep quantity as a moderator for cognitive performance (153). Accruing less than seven hours of sleep decreases reaction time while impairing alertness, memory, and decision making (62). However, adding two hours of sleep per night (i.e., "sleep extension"; SE) has demonstrated cognitive performance improvements by increasing task vigilance, and improving reaction times, alertness, vigor, and mood (174). Research has documented SMs reporting they do not obtain the amount of sleep that they require for feeling well-rested and the implications for SR-induced performance errors in some instances can be catastrophic (141). Using research regarding SE and napping (98,105), CPPs can work to prioritize sleep hygiene with warfighters and leaders.

AUTONOMIC NERVOUS SYSTEM ALLOSTASIS

The autonomic nervous system's (ANS) response to demands placed on the mind and body provide insight into readiness to perform. This ANS response process, allostasis, is an attempt to return to homeostasis via adaptations in different ANS

TABLE 3. COGNITIVE PERFORMANCE PRACTITIONER AND PSYCHOLOGIST (CLINICAL/COUNSELING) DIFFERENCE IN CAPABILITIES

	COGNITIVE PERFORMANCE PRACTITIONER	PSYCHOLOGIST (CLINICAL/COUNSELING LICENSURE)
Focus	CPPs are mental performance professionals who work with psychologically healthy performance populations in teams, groups, or individual formats. CPPs leverage a proactive educational approach by teaching cognitive and behavioral skills for performance enhancement. The approaches a CPP takes can differ due to training and education. If possible CPPs leverage qualitative and quantitative assessments to inform intervention selection.	Licensed Psychologists (LPs) work with individuals who range from those with a psychological disorder (i.e., depression, anxiety, panic attacks, etc.) to the psychologically healthy but request targeted improvement. LPs can provide specialized treatment including psychotherapy or performance coaching. They also have advanced training in evaluation and statistics. Evaluation may include personality, mental health, and neurocognitive testing. LPs may seek additional board certifications in specialized areas.
Education	Cognitive performance strategies, psychophysiological self-awareness/regulation, performance routines, mental rehearsal, team cohesion, biofeedback, neurofeedback, psychological measurement, empirical research	Mental health disorders, neurocognitive differences, cognitive performance strategies, anxiety management, team cohesion, biofeedback, neurofeedback, behavioral change, talent identification, psychological measurement, empirical research
Team Dynamics	Consults with command leadership and typically integrated with health and performance teams to include strength and conditioning, dietitians, athletic trainers, physical therapists, sports scientists, and licensed mental health practitioners	Commonly consults and liaison with social workers, physicians, dietitians, command and unit leadership, researchers, chaplains, etc.
Minimum Education Requirements	Master's degree (MS or MA)	Doctorate degree (PhD or PsyD)
Advanced Options	Certified Mental Performance Consultant (CMPC), doctorate degree (PhD typically sport/performance psychology, educational psychology, or kinesiology-based), postdoctoral research in varying psychological disciplines	Board certification in health psychology, forensic psychology, neuropsychology, rehabilitation, and business and organizational psychology among others
Example Client	Psychologically healthy performers, teams, groups, or organizations. CPPs can also consult with coaches/leaders, additional health and performance staff, as well as parents of performers.	Those with mental health problems, individuals with performance goals, businesses and organizations, and groups.

mechanisms (95). Interestingly, high performance is more likely achieved when the warfighter has adequate recovery, resource restoration for homeostatic and biorhythmic balance, and counterbalance stress is placed on the body (85). Regarding a HP team, ANS status can be a catalyst for integration between SCS, PDs, PTs, ATCs, CPPs, and unit leadership for training individualization for an individual or subset of warfighters. While there is no agreement on a gold standard for assessing this recovery-fatigue continuum outside of high-stakes performance (80,144), allostasis disruption indicators such as heart rate (HR) and HR variability (HRV) can be assessed with individualized reference ranges for the customization of mental conditioning (29,126,138). Depending on the measurement tool available, one can use wearable technology to access HRV data during sleep or daily five-minute HRV recordings as they are considered meaningful monitoring tools for acute and chronic fatigue, adaptation, and readiness (29). For further reference, Schmitt, Regnard, and Millet (146) provide a detailed description of the complexity of possible HRV measurement indices, indicators of different fatigue types, and spectral analyses versus time-domain HRV indices.

COGNITIVE PERFORMANCE TRAINING ELEMENTS

PERIODIZATION OF COGNITIVE PERFORMANCE TRAINING FOR HIGH PERFORMANCE

Cognitive training is useful for supporting a unit's METL. Ideally, periodizing the cognitive training along with physical training for optimal readiness occurs following assessments and evaluations. This will likely minimize a unit's training and operational cycle (121). Periodization of cognitive training in tandem with military physical, technical, and tactical training potentially facilitates greater integration and acceptance of cognitive training. On a macro level, periodization allows for thematic focuses of cognitive training modalities for targeted performance outcomes over time. On a micro level, the periodization of cognitive training quantity can be adjusted dependent upon concurrent physical, technical, and tactical training demands.

LEARNING

Lachman defines learning as consistency of stimulus-response changes as an individual interacts with their environment (99). Thus, CPPs leverage ways to increase functional interaction with the training and performance setting via processes such as deliberate practice (DP) and implicit person theories (i.e., mindsets) with the mission to ultimately optimize skill acquisition and expertise. Eccles (54) notes that enhanced learning and performance expertise are explained by cognitive adaptations in mental representations and memory as well as improvement in cognitive efficiency following DP. Thus, DP (i.e., high motivation and high task-engagement coupled with monitoring, feedback, and task-orientation) can be considered a process for functional environmental interaction (93). Conversely, a growth mindset (i.e., belief that personal attributes are changeable) is predictive of a mastery orientation and goal achievement (30). Mindset and DP training are facilitated via pre- and post-performance briefings to include cognitive and behavioral planning and priming, performance feedback, and goal setting strategies to incur continued learning, growth, and improved performance.

PERCEPTUAL-COGNITIVE SKILLS

Another element that is important for performance optimization is an individual's perceptual-cognitive (PC) skills defined as the ability to locate, recognize, and integrate novel stimuli with existing knowledge to determine appropriate action (110). Although PC skills include processes such as gaze behavior, pattern recognition and recall, advanced cue recognition, and the ability to generate relevant outcome options, these skills combine to produce two judgments, anticipation and decision making (28,108). The most prevalent anticipation and decision-making training modalities include video analysis, eye tracking, and virtual reality (18) and their effectiveness relies upon the similarity, functionality, and action fidelity between training and field tasks Additional functions of using these modalities are to increase task familiarity, solidify performance strategy, and enhance overt training efficiency (184). Anticipation and decision-making training typically occur in high-speed and open-environment training simulations (28). Eye-tracking technology is more reliably used in video-based weapons training simulations or stable weapons range-based training where warfighters remain stagnant during performance (51). For further reading on this application, Basevitch and colleagues cover current trends in specific mobile technology and software applications in lower, higher, general, and specific order PC process training (18).

ATTENTIONAL SKILLS

Attention can be defined as a cognitive system that facilitates selection of stimuli for additional processing while simultaneously inhibiting processing of other stimuli (118), and is of high value for all SMs. Attention control has a long history of study in both cognitive psychology and behavior because the nature of high performance includes an automaticity element in well-learned tasks that differs from the attentional load required to learn novel tasks (145). For example, Wulf and colleagues state, "conscious attempts to control movements interfere with automatic motor control processes, whereas focusing on the movement effects allows the motor system to self-organize more naturally, unconstrained by conscious control" (181). Methods to train attention are numerous, including but not limited to simulation training, mental rehearsal, mindfulness training, virtual reality training, attentional cues, and routine development (59,159). Anecdotally, individualized training of attentional skills can be accomplished congruently with physical, technical, and tactical training. Awareness of attentional strengths, weaknesses, and effective or ineffective attentional patterns are valuable insights for cognitive training, as well as a consistent attentional training strategy through the use of attentional cues, typically those external to the individual (180).

MINDFULNESS

Mindfulness is the process of deliberately focusing in the present moment, without judgement (94). A direct impact of mindfulness includes the training of attentional skills. Baltzell and Summers (17) highlight that the mindfulness meditation cycle applies attention skills such as: a) awareness, b) span, c) drift or distraction, and d) deliberate refocusing. In addition, skills such as acceptance and emotional regulation are strengthened concurrently via the meditation cycle (70). A goal of mindfulness training is committing higher amounts of cognitive resources to the present task at hand while being able to efficiently accept and adapt to changing demands in your performance environment (70). If mindfulness training is successful at meeting this goal, the warfighter is equipping him or herself with higher cognitive bandwidth during performance. As performance demands placed on warfighters are higher than any other performance setting, approaches to reduce cognitive load (e.g., mindfulness and acceptance) may provide enough cognitive bandwidth for warfighters to remain mentally agile and perform at levels near their authentic ability. However, mindfulness training varies significantly either by theoretical approach or training of the CPP. Additionally, awareness of military culture and incorporation of command leadership has been identified as integral for successful implementation of mindfulness training (91).

IMAGERY

Imagery can generally be defined as "creating, or recreating, the entirety of an experience in one's mind," (123). Imagery is a skill with endless applications. The strengths of training imagery include its positive links to performance (42), and its ability to incorporate and consolidate other mental skills (123). Thus, imagery training can be efficiently effective when incorporated into training breaks (e.g., live fire ranges, weapons simulations, field training, etc.) and leveraged when preparing for expensive, resource-consuming training modalities. CPPs often work with warfighters to maximize imagery skill and use for outcomes such as physiological activation control, successful rehearsal of performance tactics or execution, rehearsal of contingency plans of action, as well as indirect benefits such as increases in confidence and motivation.

MOTIVATION

To attain and sustain high levels of HP, leveraging different types of motivation that naturally vary in strength and quality is essential (143). Due to the hierarchical structure of leadership within the military, self-determination theory (47) has become an applicable framework to help leaders develop autonomy-supportive environments and facilitate proactive engagement and psychological growth (155), however more theories and applications that exist to enhance motivation (139). Examples of CPP interventions include educating and helping to support leaders to expand psychological needs satisfaction of a) autonomy by helping leaders provide greater individual choice to subordinates, b) competence with managing performance challenge levels and optimizing feedback, and c) relatedness through methods of team building and effective communication (155).

LEADERSHIP

In practice, leadership support from CPPs typically has two aims: 1) support leadership high performance in relation to their unique tasks, and 2) support and augment the robust leadership training that exists within the DoW. While the facilitation of psychological need satisfaction (142) and an effective motivational climate (100) are areas for leadership development, contemporary research is exploring servant leadership and emotional intelligence applications (178). In enhancing cadre effectiveness, training related to content delivery (e.g., communication, scaffolding, dual channel processing, critical thinking) and the content area itself (e.g., motor control and learning) can be leveraged to maximize training and instruction, and ultimately maximize readiness for when it matters most.

BREATH TRAINING

Breath training, mostly forms of diaphragmatic breathing (DB), has been a central tenet of relaxation training for high performance with SMs as DB is a key tenant in almost all relaxation or restorative techniques (136). The gross mechanisms of DB are parasympathetic activation and attentional distraction away from stress-inducing stimuli (72). With the adoption of additional coping strategies such as acceptance, reappraisal, and challenge perception, there seems to be a shift away from dampening arousal and toward functionally reshaping how arousal is perceived prior to and during performance. However, with the rising application of biofeedback training, DB is a popular training modality used to increase HRV and adaptive responses to stress (171). Therefore, CPPs instruct DB as a foundational skill that impacts sleep (158), ANS allostasis (182), and advanced performance management (136). Within the DoW, DB is often taught during technical training with weapons systems, during physical training for recovery purposes, as well as for psychological and physiological stress reduction training.

BIOFEEDBACK AND NEUROFEEDBACK

Biofeedback training (BFT) is a training intervention that leverages immediate feedback to facilitate a performer's awareness and regulation of biological signals (37). Neurofeedback training (NFT) is a congruent process yet applies to the feedback of neural activity within the brain. The basis of BFT/NFT is principally rooted in the notion that physiological change is associated with cognitive process or emotional state change (75). CPPs have success with BFT/NFT modality use with SMs due to the immediacy of tangible data provided through the training, although BFT has a longer history of application with SMs compared to NFT (56).

PERIODIZATION OF BIOFEEDBACK AND NEUROFEEDBACK TRAINING FOR HIGH PERFORMANCE

Similar to mental skills training, practitioners using BFT/NFT have adopted a periodized approach (22,25). Blumenstein and Orbach (22) note that practitioners should take into account the performance discipline, demands, and conditions when choosing a BFT/NFT modality. When applying these approaches to unit METL calendars, BFT/NFT stages such as education, performance analysis, and familiarity should be conducted as early as possible with consistent training and application building up to high priority performance evaluations (24). In practice, BFT/NFT training occurring directly prior to overt performance field training takes advantage of natural breaks in training activity but also provide self-awareness of current emotional and physiological states and primes self-regulation going into overt training.

Although biofeedback protocols such as the Wingate Five-Step (W5SA) (23) and the Learning-Modification-Application (LMA) (21) approaches extend their final BFT stages to be used for peak competition/performance, it is suggested to taper BFT/NFT training prior to cumulative training events or deployment. This tapering can include consistent observation and feedback to facilitate greater autonomous enhanced performance for the SM. Cheng and Hung (37) indicate the most common BFT modalities include HRV, electrodermal activity (163), electromyography muscle activity, respiration rate, and blood pressure. NFT is dominated by neural activity measured via electroencephalography. Peake, Kerr, and Sullivan provide a critical review of contemporary trends of wearable technology, mobile applications, and equipment for BFT (137).

COGNITIVE PERFORMANCE SUMMARY

The elements described within this section are foundational mechanisms to consider for optimizing brain health and aiding performance. What is of particular interest to HP teams is the overlap of performance impacts from multiple HP domains. For instance, movement (i.e., exercise) reveals physical changes in brain structure characteristic not only of short and long-term physical fitness, but also improved motor performance, cognitive functioning, daily activities, and autonomy (183). This is supported by a meta-analysis based on 79 studies concluded movement has a positive effect on cognitive performance, including aspects such as attention, information processing, executive function/working memory capacity, and crystallized intelligence in the general population (35). Additionally, optimal cognitive functioning requires optimal fuel and maintenance. Glucose facilitation has been linked to improved long-term memory (161) and improved listening span (120). Conversely, fasting or calorie restriction has been associated with impaired central executive functioning (96), impaired vigilance, memory, and reaction time (77) and slower cognitive planning (76). A meta-analysis of 33 studies concluded dehydration, particularly at water deficits of greater than 2% body mass, significantly impaired cognitive tasks requiring attention, executing function, and motor coordination (179). Thus, if antecedents to optimize performance (i.e., strength, conditioning, nutrition, cognitive performance) are interrelated, this supports the notion of employing integrated HP teams with different technical skill area SMEs collaborating for comprehensive performance support.

SPIRITUAL DOMAIN

As part of the HP enterprise, the spiritual domain is seamlessly integrated into training to address the warfighter's holistic needs. This focus on spiritual development equips warfighters to endure the rigors of tactical training, complete their pipeline, and potentially excel in future missions. Spiritual fitness, as defined by CJSI 3405.01 (154), is the capacity to uphold beliefs, principles, or values essential for mission success. Regardless of whether a warfighter follows religious or secular practices, spiritual training builds a resilient core of principles that prepares them for combat and instills a life of hope, meaning, and faith in something transcendent (7). The Chaplain Corps embeds tailored spiritual lessons into training, such as at the Special Warfare assessment and selection (SWAS) courses (Table 4). As candidates progress through each instructional block, new lessons reinforce prior concepts, establishing a spiritual foundation to sustain them in training, on the battlefield, and beyond (7). Progress is tracked using a questionnaire-based spiritual baseline, administered initially and throughout training, to evaluate evolving beliefs and refine course development for optimal outcomes.

Neglecting the spiritual domain can carry profound risks, potentially undermining personal well-being and operational effectiveness. Spiritual fitness has the potential to bolster combat readiness and aligns with civilian research linking it to positive medical outcomes (36). The Special Warfare Chaplain Corps prepares warfighters for high-stress environments where trauma and worldview challenges emerge, introducing critical concepts like Moral Injury (MI) (7). MI training helps individuals identify trauma-related symptoms affecting their core beliefs, a vital step since unaddressed MI can lead to Post-Traumatic Stress Disorder and heightened suicide risk among Active-Duty Military and Veterans (12). By prioritizing spiritual fitness, the Chaplain Corps aims to mitigate stressors like anxiety, depression, and isolation—both in combat and civilian life (7). This proactive approach has the potential to cultivate stronger leadership, enhance empathy, and foster composure, which may help in building resilience and easing the transition to post-military life.

DOMAIN INTEGRATION

To effectively integrate spirituality into warfighter training, specialized lessons have been meticulously designed to enhance readiness and resilience. From the initial phases of the SWAS course and through advanced apprenticeship training, spiritual instruction has been seamlessly interwoven with relevant training days to reinforce subject matter comprehension and personal development. These courses include:

TABLE 4. TRADITIONAL CHAPEL OPERATIONS COMPARED TO HP

	TRADITIONAL	HP CHAPLAIN CORPS
Focus	To provide for the free exercise of religion and provide pastoral, spiritual care including religious accommodation, spiritual fitness, and leadership advisement	To be a conduit for spiritual growth to every SM, preparing them to be a warfighter, walking alongside them in austere environments, mentoring each warfighter to be resilient while mastering their METL, and remaining spiritually resilient during training, deployment, or home
Education	No additional requirements aside from AFSC required items	Each chapel staff member is required to attend Academic Instructor's Course (AIC) or Instructor's Qualification Course (IQC) in order to develop and teach spiritual curriculum about Moral Living, Truth, Identity, World Views, Just War, Life Outside of SOF, Moral Injury, Foundational Values, and Spiritual Intel for Operators
Physicality	No additional requirements to DAFMAN 36-2905	Physical attributes required in order to ruck, participate in physical training with students and/or cadre, overcome fears and participate in situations that involve tall heights, rappelling, skydiving, swimming, and pool diving
Team Dynamics	Commonly coordinates with squadron leaders and mental health per AFI 44-153	Commonly consults with and coordinates with HP personnel to include but not limited to physicians, mental health, dietitians, social workers, research teams, and leadership
Educational Requirements	No additional requirements aside from AFSC required items	AIC or IQC

- Truth, to focus on logic and reasoning
- Spiritual Intel for Operators, giving opportunity for students to explore the transcendent
- Identity, to aid in finding purpose and meaning in life
- Foundational Values, focusing on virtues and morals
- Moral Living, enabling students to explore ethical ideals, behaviors and developing their moral compass
- Just War Theory, engaging in conversation about what makes war just
- Moral Injury, gaining insights to prevent and understand moral injury
- World Views, gaining insights on different worldviews and discovering their own
- Life Outside of being a Warfighter, focusing on life at home and after war.

This integration includes one-hour sessions that follow a structured training plan, conducted as informal yet thought-provoking lectures. Through interactive discussions, candidates will be challenged to critically examine their core beliefs, solidify their ethical foundations, and cultivate the principles that will define them as warfighters. This holistic approach ensures that spiritual resilience becomes an integral component of their operational and personal effectiveness.

SPIRITUAL PROFILE ASSESSMENTS

In the Special Warfare Assessment and Selection (SWAS) training environment, each candidate will fill out a spiritual assessment that incorporates the Consortium for Health and Military Performance/SOCOM Spiritual, Fitness Metrics Survey, also known as the SOCOM Spiritual Fitness Scale (SSFS) (8,9). This metric utilizes a questionnaire to ascertain a warfighters' spiritual vertical or transcendent connection that connects a service member to something greater than themselves that provides a sense of higher purpose and the horizontal or social connectedness they have that provides a sense of community. In addition to the SOCOM SSFS, the chaplain team added questions that assist them in determining the progress of spiritual growth throughout the training process for each candidate. The assessment begins at the point of initial entry of a training and is designed to create a baseline using the SOCOM 18 question Likert scale survey along with ten open ended questions designed for training which will create a profile for each candidate to measure growth/change over time, identify trends or high-risk behaviors/thoughts, and validate curriculum being taught within the HP construct. The assessment is done in three phases: 1) initial entry, 2) a monthly survey update showing any progress with four open-ended questions from phase one, and 3) an exit survey which is an accumulation of all blocks and previous responses. The assessment is conducted utilizing a data management system as the engine to collect the data for analysis.

SPIRITUAL PREPARATION FOR COMBAT

The overarching goal is to prepare future warfighters for the rigors of combat and its aftermath by equipping them with spiritual tools to guide decision-making and resilience. Experiencing live fire downrange demands not only tactical expertise but also the spiritual fortitude to cope with ambiguity and loss—existential challenges inherent in the unpredictability of survival and the grief of losing comrades. Spiritual fitness, may provide an anchor when traditional structures falter, potentially helping warfighters to process the moral gray areas of modern warfare, such as civilian casualties or uncertain outcomes CJCSI 3405.01 (154). For instance, lessons in Just War Theory equip warfighters with tools to help navigate ethical dilemmas, while MI training offers insights to mitigate the psychological and wounds to the soul that linger post-combat (101). Beyond the battlefield, this spiritual baseline facilitates post-combat reintegration, addressing the identity crises and loss of purpose that contribute to veteran suicide rates—currently averaging 17.5 deaths per day (4). A warfighter grounded in faith (religious or non-religious) and driven by conviction is better prepared to transition home, fostering hope and meaning that strengthen family ties and civilian life. Strategically, spiritual fitness provides a defense against hostile ideologies by strengthening a service member's sense of purpose. This is critical in any conflict where the battle of narratives and ideological strength is a major factor for mission endurance (89). Backed by neuroscience showing that spiritual practices enhance emotional regulation and cognitive flexibility (127), this preparation increases the likelihood that warfighters emerge ready for mission challenges and life upon returning home.

STRENGTH AND CONDITIONING

S&C who work in the military setting enables and sustains the warfighter's physiological profile to optimize the warfighter's performance of his or her technical and tactical skills (or METLs). To achieve this, SCSs train the physiological capabilities of the warfighter to return to or continue the fight while simultaneously mitigating the potential for injury/re-injury. The mitigation of injury/re-injury is completed by having the ability and expertise to make timely decisions to change or modify workouts and access to a HP team of SMEs (e.g., PTs and ATCs) (113). Physiological qualities can be established or verified by the utilization of appropriate testing of power, strength, muscular endurance, and aerobic and/or anaerobic energy systems (65). The physiological qualities can then be developed with a periodized S&C plan. The S&C plan is most effective when based on a needs analysis of the METLs and takes into consideration the location and date of the next deployment, tactical training schedule, previous or current injury status, and other personal stressors that the warfighter may be under (e.g., family sickness).

NEEDS ANALYSIS

Needs analysis of the METLs and deployment location can inform the SCS of the baseline physiological qualities needed to be assessed and developed for a potential successful predeployment (10). Part of the needs analysis should include common military movement patterns, as well as maneuvers specific to the mission. The SCS should also take into consideration the warfighter's history with exercise, tactical training, and prior injury. A warfighter's history may vary from their peers and should be taken into consideration when developing a warfighter's S&C plan; however, the SCS and musculoskeletal provider should also monitor the common/trending injury sites and explore possible mechanisms.

PLANNING STRENGTH AND CONDITIONING SESSION WITH TACTICAL TRAINING

The date of the next deployment can give the SCS an end date to complete the S&C plan for the deployment by capitalizing on the use of micro-, meso-, and macro-cycle planning techniques within the S&C plan. This will also allow the SCS to integrate assessment checkpoints to increase the likelihood that the physiological performance qualities are maintained or improved, and perhaps provide an opportunity to gather additional contextual insight into performance outcomes (e.g., intersession recovery, injury rehabilitation) (80). These insights could also assist decision-makers in understanding some of the nuances impacting overall readiness throughout a given training cycle.

A well-devised tactical training schedule allows SCS to develop a complementary performance plan with appropriately bolstered recovery methods based on the tactical training being completed. Anecdotally, monitoring physiological and psychological stressors during tactical training can enhance performance and recovery protocols. The tactical training schedule planned through an operations shop as commonly known between different military branches as G3, A3, J3, and S3. The operations shop works in coordination with curriculum developers (e.g., schools, assessment and selection, etc.), and/or with team leaders provides an SCS the opportunity to periodize the S&C training for delivering appropriate stimuli. Obtaining a copy of the military tactical training plan is one of the simplest ways for the SCS and the rest of the HP team to intentionally program physical training and recovery interventions which also leverage the METLs needs analysis.

INJURY ANALYSIS

Previous or current injury status of an individual or a common/trending injury site can inform the SCS (with the help of musculoskeletal providers) to know which pre-rehabilitative exercises should be taken into consideration in the development of the S&C plan (124). Having an interdisciplinary HP team with the ability of referring to an embedded musculoskeletal providers is a vital building block for HP injury/re-injury mitigation. Referrals are critical for supporting the continuum of care from injury back

to performance (sometimes referred to as a "bridge program"), which relies on the cooperation of Sports Medicine and the entire HP team to decrease chances of re-injury and optimize the non-injured physiological qualities in a methodical and purposeful manner. The bridge program's integration of a PD for modification of fueling strategies and a CPP for ensuring performance-related confidence is maintained, is a vital part of completing a rapidly successful healing and transition from warfighter injury.

SOCIAL AND ENVIRONMENTAL STRESSORS

In terms of other cognitive and performance considerations, social and environmental stressors also have an impact on training. It is commonly recognized that stress can come in many forms (34). These social environmental stressors should be monitored as they potentially have an impact on the central nervous system (CNS) as seen in collegiate football with an increase of injuries during finals week when most testing takes place. Similarly, this can apply to SMs, but instead of worrying about win/losses, the real concern is for life and death. The CNS can impede on the ability to physically train, recover, and could increase the potential for injury (109). SCSs collaboration with CPPs is imperative and can help identify and assist the SMs with mitigation the stressors that may impede on physical training and recovery.

SPECIFICITY OF TRAINING

The aforementioned information is often the gateway for the SCS on the HP team to consider METL-specific S&C. Specificity should not be viewed merely as replicating tactical movements in full gear, but as designing training that reflects the broader physical and operational demands. Specificity is the movement classification, energy systems involved, strength qualities, primary joint angles and force vectors, external stimuli, and common injuries (173). As an aside, it should also be noted that SCSs are not tactical specific skill experts, but rather movement and energy system experts. This is not to say that replicating movements cannot take place, but rather it may be done in such events as a culmination of stress events (i.e., shooting under stress), obstacle courses, or testing of tactical abilities with warfighters and SCS working together towards the intended outcomes.

MOVEMENT ANALYSIS AND TESTING

To better understand training specificity, movement and physiological qualities can be evaluated with greater detail. This includes analyzing and testing movements, physiological capacities, and energy systems that inform a comprehensive strength and conditioning plan. These assessments can also provide meaningful data for occupational preparedness. An important consideration, though beyond the scope of this paper, is the need for individualized assessment that addresses all elements of the needs analysis and energy system analysis. While validity and reliability matter, their value may diminish if the assessment does not align with occupational specificity or METL. The following areas should be considered:

MOVEMENT ANALYSIS (10,34,176)

Movement Screen: Analysis of fundamental movements that allows for the detection of movement and stability deficits

Flexibility: Tests that assess various muscles and/or muscle groups for appropriate levels of range of motion

PHYSIOLOGICAL QUALITIES (11,34,116)

Muscular Strength: Measuring the ability of muscles or muscle groups to produce force

Power: Measuring how muscle, muscle groups or the human body exerts force per unit of time

Muscular Endurance: Measuring the ability of the muscle to repeatedly exert a submaximal force

Cardiovascular Endurance: Measuring how well a person can keep moving for a long period of time using the aerobic system, which supports moderate to hard activities that challenge the heart and lungs.

Agility: Measuring the ability to rapidly change direction

Acceleration: Measuring the ability to change velocity

Speed: Measuring the rate at which someone can proper their body over a specified distance

ENERGY SYSTEMS (117)

Phosphocreatine (ATP-PCr system): The ATP-PCr system gives the SM quick energy for fast explosive movements. It uses phosphocreatine to quickly refill ATP, but this energy runs out very fast. This system powers short bursts like 3 – 5 second rushes or changing direction suddenly. ATP-PCr works best for efforts that last about 1 – 6 seconds.

Anaerobic Glycolysis (glycolytic system): The glycolytic provides the SM with energy for medium length, high intensity movements lasting up to about 90 seconds. It uses blood glucose and stored muscle glycogen as fuel. This system supports short, hard efforts such as running 400 to 800 meters. It produces lactic acid, which can cause fatigue, so managing this system is important when transitioning into the aerobic system for longer efforts.

Oxidative Phosphorylation (aerobic system): The aerobic system uses stored carbohydrates and fats for energy. It supports lower intensity movements like walking, jogging, and rucking. It also helps the body recover the faster energy systems used during higher intensity efforts.

PERIODIZATION OF THE STRENGTH AND CONDITIONING PLAN

When developing physiological qualities and supporting energy systems for the warfighter, the SCS will need to develop a well-rounded and large physiological qualities as the METLs are typically all-encompassing of strength, power, and endurance supported by aerobic (oxidative phosphorylation) and anaerobic (glycolytic and phosphocreatine) energy systems. However,

if the mission/deployment is a specific event or activity (e.g., dive school, mountaineering school, etc.) then a more specific physiological profile may need to be developed (e.g., muscular endurance and aerobic energy system).

Once METL specificity is understood, a SCS can start the development of the periodized S&C plan to develop physiological qualities and supporting energy systems. Many forms of periodization may be effective for warfighters. The similarities across these periodized plans are found within the capability of the SCS to track volume (e.g., upper and lower, pushes and pulls), intensity, distances (e.g., loadbearing, running, and alternative low impact energy systems development), and pull/push ratios and load management (e.g., ACWR) (67). This information can be pre-planned to increase the likelihood that safety practices, goals and objectives can be met by developing an assessment protocol.

TRACKING TRAINING

Prior to and during the workout the SCS has the knowledge and ability to make last minute modifications based upon other stressors (e.g., sleep, hydration, lack of fueling, injury) or movement qualities. In addition, during the workout the SCS can track heart rate, tonnage, distances traveled and rate of perceived exertion (RPE) through both low cost (e.g., questionnaires, self-assessed pulse, etc.) and more expensive commercial products (e.g., wearable technology, smart phones, etc.) depending on the funding available. Tracking these items pre-, during, and post-workout will assist the SCS in plan development and improvements. During the delivery of the S&C plan it is also imperative that the SCS educate each warfighter and team lead on how to read the program, understand proper and improper techniques, and explain the simple "why" behind the programing variables the warfighter is completing. This allows the warfighter to be more efficient at self-sustaining at times when no SCS is available or on deployment, which is vital to continual success of an SCS within a fully operational HP program.

PHYSIOLOGICAL PROFILE ASSESSMENTS

Performance assessments are foundational elements from which the SCSs can plan to meet intended outcomes of the HP program and for the warfighters and their respective command to understand the individual or collective physical readiness implications for meeting the mission (e.g., Middle East mountain top vs. low altitude desert). When developing an assessment protocol for a large population, it is important to maintain simplistic and cost-effective assessment methods to utilize within a program and to monitor progress. For example, a force plate could be more technically advanced than a broad jump to measure lower body power but, it may become an equipment choke point and a large expense, thus potentially making the assessment a burden on the system. When developing assessment batteries, it is also imperative to strategically place the assessments throughout the S&C periodized plan. The SCS must avoid the potential of too many assessments which may lose the focus/intent of the training cycle. Additionally, developing a physiological profile assessment is not an assessment of who can and cannot do the job, but rather amplified insight (e.g., physiological, technical/tactical and psychological) for supplementing potential deployment or tactical training strategies for the warfighters.

SCOPE OF PRACTICE AND CREDENTIALS FOR STRENGTH AND CONDITIONING

It should be noted, the SCS must stay within their scope of practice as outlined by a nationally accredited certified body on strength and conditioning (e.g., NSCA). Additionally, the SCS must stay within the Performance Work Statement (PWS) of the position for which they are hired at the DoW unit where they work.

A recommended place to start with certifications is dependent on SCS's role on the HP team. If the SCS is a peer trainer (non-commissioned officer training his or her team) it is recommended to start with the NSCA Tactical Strength and Conditioning Facilitator (TSAC-F) certification (113). A person with the TSAC-F applies scientific knowledge to physically train military, fire and rescue, law enforcement, protective services, and other emergency personnel to improve performance, promote wellness, and decrease injury risk. They conduct needs analyses and physical assessment sessions, design and implement safe and effective S&C programs, provide general information regarding nutrition, and fast-track referrals to other HP teammates and resources internal/external to the command. Recognizing their area of expertise is separate and distinct. TSAC-F consult with and refer those they train to other professionals when appropriate. If the SCS is hired specifically for S&C, it would be recommended that they have the NSCA CSCS certification. Those with a CSCS are professionals who apply scientific knowledge to train athletes (to include warfighters) for the primary goal of improving performance. They conduct sport (or METL)-specific testing sessions, design and implement safe and effective strength training and conditioning programs and provide guidance regarding nutrition and injury prevention. Recognizing that their area of expertise is separate and distinct, CSCSs consult with and refer athletes (or warfighters) to other professionals when appropriate (Table 5).

TABLE 5. PERSONAL TRAINER, EXERCISE PHYSIOLOGIST, AND STRENGTH AND CONDITIONING SPECIALIST - DIFFERENCES IN CAPABILITIES

	PERSONAL TRAINER	EXERCISE PHYSIOLOGIST	STRENGTH AND CONDITIONING SPECIALIST
Focus	Personal Trainers are health and fitness professionals who use an individualized approach to assess, motivate, educate, and train clients regarding their health and fitness needs. Personal trainers design safe and effective exercise programs, guide clients in achieving their personal health and fitness goals	Exercise Physiologists work with healthy clients and those with medically controlled conditions to establish safe, healthy, and effective exercise and lifestyle behaviors	Strength and Conditioning Specialists conduct METL-specific assessments and apply scientific knowledge to train warfighter's performance improvement and sustainment, often in a team setting. They also implement specific training sessions to mitigate new injury and/or avoid reinjury in warfighters.
Education	Fundamental lifts, baseline fitness assessments, exercise programming, health and wellness topics, basic principles of nutrition, principles of resistance training, flexibility, mobility, basic cardiovascular training, and goal setting	Fundamental lifts, technical fitness assessments, exercise programming, principles of resistance training, flexibility, mobility, advanced cardiovascular training, principles of anatomy and physiology, and basic principles of nutrition, body composition, health, wellness, and goal setting	Advanced lifts, Olympic-style lifts, advanced physical assessments, exercise programming, principles of resistance training, flexibility, mobility, advanced cardiovascular training, principles of anatomy and physiology, goal setting, plyometrics, speed, agility, periodization, endurance training, power training, and basic principles of nutrition, body composition, health, wellness, and fitness, as they relate to focusing on performance
Team Dynamics	Collaboration and referrals to/from other performance and healthcare professionals can be accomplished, though is often reliant upon relationships and interpersonal arrangements	Collaboration and referrals to/from other performance and healthcare professionals can be accomplished, though is often reliant upon relationships and interpersonal arrangements	Collaboration and referrals to/from other performance and healthcare professionals is a frequent and expected practice. Engaging across domain and disciplines may be streamlined through regularly scheduled events and proximity of workspaces (i.e., the embedded model)
Minimum Educational Requirements	High school diploma	Bachelor's degree	Bachelor's degree
Credentials	Basical levels of credentials vary widely among many competing organizations. Advanced credentials exist through organizations with higher industry standards such as regular continuing education to retain the credential	Basic credentials are available among a few organizations that require minimum specialized education prior to qualifying for exams. Advanced credentials exist which are specific to areas of emphasis (i.e., cardiorespiratory, special populations, etc.)	Basic credentials are available among a few organizations that require minimum specialized education prior to qualifying for exams and require ongoing education to retain the credential
Example Client	SM: for whom generalized health and wellness is a challenge or seeking specific personal benefits not specially related to military duties	SM participating in research study	Warfighter training for performance improvements and/or sustainment, particularly as related to on-duty performance

IMPORTANCE OF INTEGRATION WITH OTHER SMES

An SCS is only one part of an interdisciplinary HP team of professionals that are in place to increase readiness. The HP team will need to work together for optimal improvement for the warfighter. This integrated approach can allow for true peak HP for the warfighter.

For example, an integrated HP workout session may include the following:

- During the workout planning phase, the SCS consults with the Chaplain to integrate spiritual performance checkpoints throughout the workout at anticipated rest intervals.
- The PD informs the warfighter of fueling strategies for before and during future workouts (2 minutes).
- The PT/ATC leads a rehabilitative session based on prior evaluation to provide limitation-specific modification instructions (5 – 10 minutes).
- The SCS leads the workout from movement preparation (i.e., "warm-up"), through full-intensity, to recovery (time varies depending on intent of training session).
- During pre-planned intervals of higher HR or CNS demand, the CPP leads cognitive challenges or mental resiliency skills development (time varies depending on intent of training session).
- The PD completes the training session by instructing the fueling strategy for the rest of the warfighter's day.

The SCS often serves as the first SME available to identify a performance need and direct the warfighter to the appropriate HP team member when coordinating the dynamics of daily training sessions. For example, if the PDs cannot make the workout session or if it is not the best use of the PD's time once the warfighters have been onboarded to the internal HP training and maintenance process, the SCS can read the week's pre-planned fueling strategies to the warfighter. If a warfighter reports an occupational or individual life stressor, the SCS can encourage the warfighter to seek assistance with the behavioral health team. Just as the SCS works within their specific scope of practice and does not provide nutrition instruction, so he/she does not provide treatment, medical advice, nor psychological counseling.

CONCLUSION

DoW HPO initiatives and programs have varied for decades in their implementation, funding, and understanding across their respective chains of command. Persistent differentiation among the elements of health, wellness, fitness, and performance is vital to successful programmatic management and tactical level implementation with shared understanding of the scope supporting embedded HPO services to DoW SMs. Further deliberate effort is needed to manage embedded clinical services within an HPO team, particularly so that Sports Medicine staff can work in and alongside embedded HP personnel in the HP Training Centers, providing rapid and direct access to care. Supporting the embedded HP model and maintaining awareness of funding factors and program success determinants gives every HP team member the opportunity to enhance internal and external communication in support of our nation's warfighters.

TABLE 6. ACRONYMS

Air Force Special Warfare	AFSPECWAR
Acute to Chronic Workload Ratio	ACWR
Autonomic Nervous System	ANS
Biofeedback Training	BFT
Central Nervous System	CNS
Certified Athletic Trainer	ATC
Board Certified Specialist in Sports Dietetics	CSSD
Certified Strength and Conditioning Specialist	CSCS
Cognitive Performance Practitioners	CPP
Current Procedural Terminology	CPT
Defense Health Agency	DHA
Deliberate Practice	DP
Department of War	DoW
Diaphragmatic Breathing	DB
Functional Movement Screen	FMS
General Purpose Forces	GPF
Headquarters	HQ
Heart Rate	HR
Heart Rate Variability	HRV
Holistic Health and Fitness	H2F
Human Performance	HP
Human Performance Optimization	HPO
Integrated Operation Support	IOS
Major Force Program	MFP
Military Dietary Reference Intakes	MDRI
Military Treatment Facility	MTF
Mission Critical Occupation	MCO
Mission Essential Task List	METL
Moral Injury	MI
Musculoskeletal Injury	MSKI
National Defense Authorization Act	NDAA
National Strength & Conditioning Association	NSCA
Neurofeedback Training	NFT
Occupationally Specific Physical Fitness Assessment	OSPFA
Occupational Therapist	OT
Office of the Chief of Naval Operations Instruction	OPNAVIST
Perceptual-Cognitive	PC
Performance Dietitian	PD
Performance Work Statement	PWS
Phosphocreatine	PCr
Physical Therapist	PT
Post-Traumatic Stress Disorder	PTSD
Preservation of the Force and Family	POTFF
Program of Record	PoR
Rate of Perceived Exertion	RPE
Relative Risk	RR
Relative Value Units	RVU
Service member	SM
Sleep Extension	SE
Sleep Restriction	SR
SOCOM Spiritual Fitness Scale	SSFS
Special Operations Forces	SOF
Special Warfare Assessment and Selection	SWAS
Strength & Conditioning Specialist	SCS
Strength and Conditioning	S&C
Subject Matter Expert	SME
Tactical Strength and Conditioning Facilitator	TSAC-F
United States Army Special Operations Command	USASOC
United States Special Operations Command	USSOCOM

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