



Holistic Health and Fitness (H2F): Quick Guidance for Aviation Unit Leaders

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14. ABSTRACT
Musculoskeletal injury (MSKI), overweight and obesity, and mental illness reduce readiness. The catalyst for Holistic Health and Fitness (H2F) H2F aims is to address the underlying causes implicated in these conditions by taking a holistic approach to Total Army (active duty, reserve, and Army National Guard components) readiness. Five pillars support H2F: mental readiness, sleep readiness, nutritional readiness, physical readiness, and spiritual readiness [1]. The aim of this document is to summarize the most relevant information from FM 7-22 Holistic Health and Fitness for the aviation community. The document provides guidance to unit-level leadership on the implementation of H2F and its concepts during its transition period. Much of the information in this report is a curated compilation of aviation relevant guidance from ATP 7-22.01, ATP 7-22.02., and FM 7-22. In addition to the H2F guidance selected from ATP 7-22.01, 7-22.02, and FM 7-22, we present additional resources currently available from the US Army's ecosystem of services. H2F provides Soldiers with education, coaching, mentoring, and outreach in an immersive environment to improve, restore, maintain readiness, build resilience, and enhance performance [1].

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14. Abstract (continued)

The H2F program is tailored to the demands of specific military occupational specialties at the unit level and delivered as an immersive experience through standardized Soldier Performance Readiness Centers (SPRCs). The rollout of H2F is a phased multi-year Project. As it expands across the Total Army, installations can take steps to implement some of its concepts and standards using existing resources available across the ecosystem of Army services. From Morale, Welfare, and Recreation (MWR) facilities and programs to Army Wellness Centers (AWCs), components of H2F are available to Soldiers currently. However, these components are not currently operating in a unified manner uniformly across the Army.

In addition to updated standards for physical training (Holistic Health and Fitness Drills and Exercises) and physical training assessment (ATP 7-22.01. Holistic Health and Fitness Testing)—which are already available—and the new facilities and professionals coming in FY22 and beyond, FM 7-22 Holistic Health and Fitness directs leaders and Soldiers to become unit-level experts on the physical and nonphysical components of Soldier readiness. FM 7-22 emphasizes the importance of professional military education's role in the development of a deep understanding by military leadership of this doctrine.

Implementation guidance of H2F is outlined in the following Army publications:

- AR 350-1. Army Training and Leader Development. 10 December 2017.
- ATP 7-22.01. Holistic Health and Fitness Testing. 01 October 2020.
- ATP 7-22.02. Holistic Health and Fitness Drills and Exercises. 01 October 2020.
- FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.
- DODD 1308.1. DoD Physical Fitness and Body Fat Program. 30 June 2004.
- DODI 1308.3. DoD Physical Fitness and Body Fat Programs Procedures. 05 November 2002.
- The U.S. Army's System for Enhancing Soldier Readiness and Lethality in the 21st Century. Washington, DC: Department of the Army. 2020.

Unit leaders must fully understand all H2F topics to include the physiological and psychological foundations of the H2F programs in their units. Command teams and their Soldiers must know and understand the tasks, conditions, and standards described in this doctrine and how to develop and execute periodized training programs [4].

Executive Summary

Musculoskeletal injury, excessive body weight and obesity, as well as mental illness reduce readiness. The catalyst for Holistic Health and Fitness (H2F) aims is to address the underlying causes of these conditions by taking a holistic approach to Total Army (active duty, reserve, and Army National Guard components) readiness. Five pillars support H2F: mental readiness, sleep readiness, nutritional readiness, physical readiness, and spiritual readiness [1]. The aim of this document is to summarize the most relevant information from Field Manual (FM) 7-22 Holistic Health and Fitness for the aviation community. The document provides guidance to unit-level leadership on the implementation of H2F and its concepts during its transition period. Much of the information in this report is a curated compilation of aviation-relevant guidance from Army Techniques Publication (ATP) 7-22.01, ATP 7-22.02., and FM 7-22. In addition to the H2F guidance selected from ATP 7-22.01, 7-22.02, and FM 7-22, this document presents additional resources currently available from the U.S. Army's ecosystem of services.

H2F provides Soldiers with education, coaching, mentoring, and outreach in an immersive environment to improve, restore, maintain readiness, build resilience, and enhance performance [1]. The H2F program is tailored to the demands of specific military occupational specialties at the unit level and is delivered as an immersive experience through standardized Soldier Performance Readiness Centers (SPRCs). The rollout of H2F will be phased over multiple years. As it expands across the Army, installations can take steps to implement some of its concepts and standards using existing resources available. From Morale, Welfare, and Recreation (MWR) facilities and programs to Army Wellness Centers (AWCs), components of H2F are available to Soldiers currently. However, these components are not currently operating in a unified manner uniformly across the Army.

In addition to updated standards for physical training (Holistic Health and Fitness Drills and Exercises) and physical training assessment (ATP 7-22.01. Holistic Health and Fitness Testing), which are already available, and the new facilities and professionals slated to become available in fiscal year 2022 (FY22) and beyond, FM 7-22 Holistic Health and Fitness directs leaders and Soldiers to become unit level experts on the physical and nonphysical components of Soldier readiness. FM 7-22 emphasizes the importance of the role of professional military education to the development of a deep understanding by military leadership of this doctrine.

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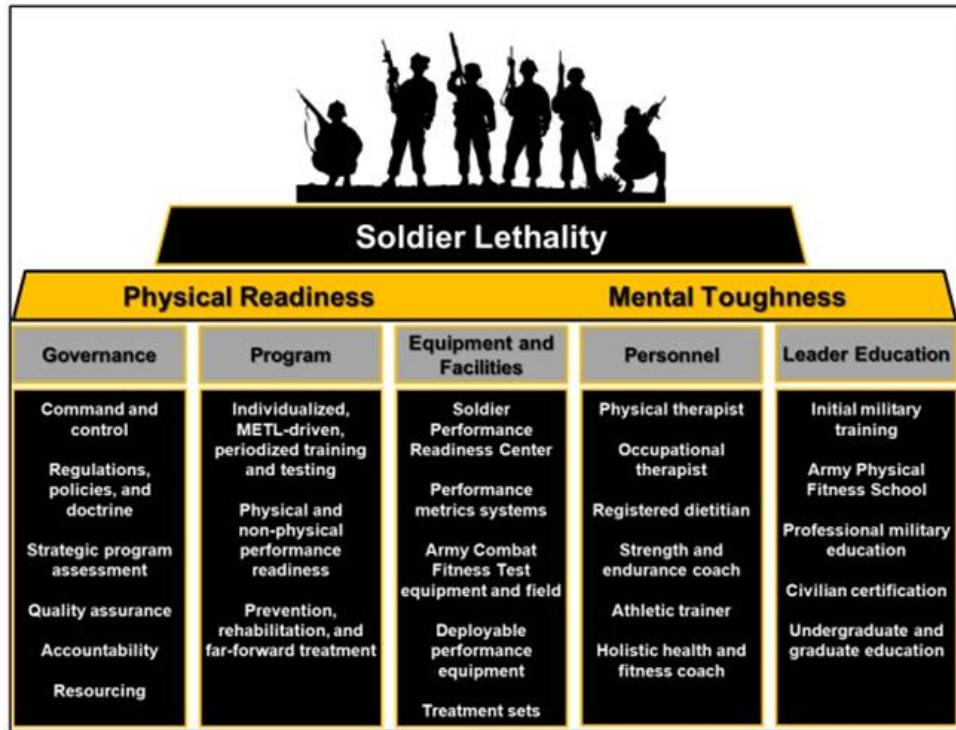


Figure 1. Overview of H2F System and its components. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

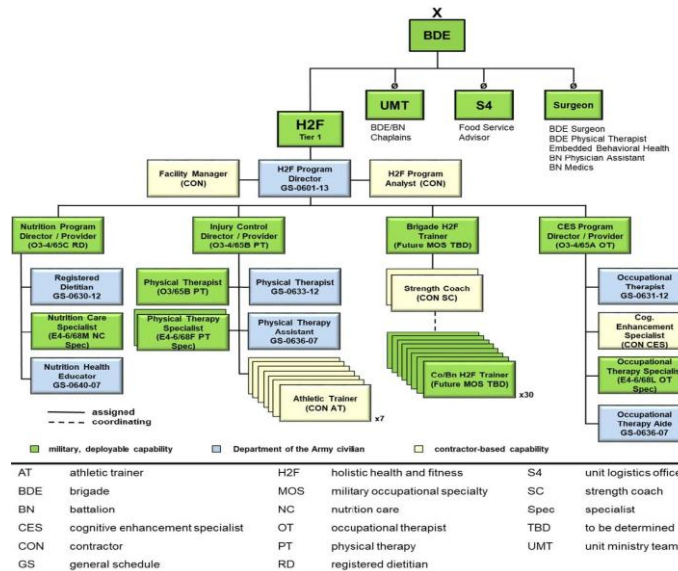


Figure 2. H2F leadership and performance team structure. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

The Five Pillars of H2F and Top Level Recommendations

Physical Readiness.

The training paradigm for ensuring physical readiness is shifting from an industrial-scale approach to an individualized training approach with the H2F system. Evidence-based methods ensure that Soldiers are prepared to optimize movement lethality. Movement lethality is the ability to apply and sustain the optimal amount of strength, endurance, and speed to meet the demands of training and combat physical tasks [4]. FM 7-22 provides a periodized training program that everyone is encouraged to follow in order to optimize readiness and reduce the risk of injury. Leadership is discouraged from deviating from the provided program.

Physical fitness can help mitigate against the impact of vibration, acceleration, cockpit ergonomics, and head-worn equipment [11, 12]. Aviators require cardiorespiratory endurance, strength, flexibility-stability-mobility, agility, balance, coordination, power, reaction time, and speed to effectively pilot aircraft [12]. Due to the awkward seated position required by the cockpit's design, pilots can lose flexibility of the musculature in the lower half of their bodies (i.e., hamstrings, pelvis, and lumbar). This loss of flexibility can lead to restricted movement of the lower back and pelvis and increase mechanical stress on the low back leading to pain [11].

Recommendations.

- **A physical training program that prioritizes core strength and flexibility can mitigate head, neck, and back pain.** The following exercises from ATP 7-22.02. Holistic Health and Fitness Drills and Exercises support core strength and or flexibility.
 - The Preparation Drill has 10 exercises: bend and reach, rear lunge, high jumper, rower, squat bender, windmill, forward lunge, prone row, bent-leg body twist, and push-up (illustrations are available in Appendix B).
 - Recovery Drill exercises include the overhead arm pull, rear lunge, extend and flex, thigh stretch, single-leg over, groin stretch, calf stretch, and hamstring stretch (illustrations are available in Appendix B).
- **Encourage utilization of existing Army physical facilities (Army Wellness Centers, MWR Fitness Centers and Aquatic Centers, outdoor programs and facilities) through familiarization and unit activities.**
- **Support Master Fitness Trainer Course attendance by non-commissioned and commissioned officers.**

Nutritional Readiness.

Nutritional readiness is the ability to recognize, select, and consume food and drink that meets the demands of any duty or combat position [4]. Nutritional readiness promotes and supports optimal physical, mental, spiritual, and sleep readiness as well as prevents nutrition deficiency, chronic disease, and immune system compromise while fueling the Soldier during activities and events. Proper nutrition is important in the treatment of illness, injury, or other medical conditions to return the Soldier to full duty. Barriers to achieving optimal nutrition are both individual and environmental. It is widely recognized within public health and community planning research that the ability to make healthy choices and achieve optimal nutrition is impacted by the food environment in which one lives [16, 17]. The food environment is the physical location of where an individual accesses food.

Personal barriers such as a lack of time for food shopping, preparation, and eating are impacted by how easy and affordable it is to acquire acceptable, healthy food. Time restrictions and poor food environments in the workplace are common barriers to healthy eating for pilots, crew, and maintainers; workload and unpredictable/alternating work schedules (day/night) are major barriers to nutritious food procurement, preparation, and eating. Unaccompanied personnel housing (UPH) dwelling Soldiers may not always be able to access the dining facility (DFAC) due to unpredictable work schedules and feel that they have very little control over what they can eat due to cost, convenience, and availability at the time when they have to eat [19, 20].

Recommendations.

H2F offers nutritional guidance and will offer the intensive resources to Soldiers make better choices in the SPRCs, but without changes to the food environment, Soldiers may continue to struggle to adopt better nutrition.

- **Unit leadership should work with the DFAC and MWR to find alternative ways to bring low-cost, nutritious meals to the unit on a schedule that works with mission requirements.**
- **Ensure that fresh fruit, healthy snacks, healthy frozen lunches, and low-calorie beverages are available in the workplace.**

Spiritual Readiness.

Spiritual readiness is the ability to endure and overcome times of stress, hardship, and tragedy by making meaning of life experiences [4]. An individual's purpose, core values, beliefs, identity, and life vision make up the spiritual dimension. Independent of religion, which can be intertwined with deep social and political affiliations and fraught with controversy, spirituality as a broad and inclusive concept matters for the Warfighter because its relationship to "moral injury" is well documented. Moral injury (MI) is the result of events that occur, frequently within the execution of military or operational duties, that conflict with ones values, beliefs, and expectations causing emotional physical, emotional, social, and spiritual impacts [26]. MI can be the result of traumatic events that were perpetrated on or by the Service Member and/or based in a sense of betrayal or violation of trust by institutions meant to provide fair or protective treatment [33]. This is especially relevant for the Army community because it is heavily reliant on a code of conduct and indoctrination of the shared Army values of loyalty, duty, respect, selfless service, honor, integrity, and personal courage. Violations of this framework from within the organization can lead to betrayal-based MIs.

A number of harmful outcomes have been connected to MI, such as intrusive thoughts, impulsivity, suicidal ideation, sleep disturbances, or substance use as well as trigger maladaptive coping and harmful behaviors [26, 34]. Moral injury due to warfighting that cannot be reconciled spiritually can lead to a loss of meaning, shame, anger, and guilt [26, 33, 34]. Studies have found that severe depression, suicidality, and posttraumatic stress disorder (PTSD) symptoms were associated with perceptions of institutional betrayal related to military sexual trauma [36, 37]. More recently, the role of racism and racial trauma is being explored as a source of MI and has been linked to PTSD [38]. A recent review of radicalization literature found that MI could make Service Members and veterans vulnerable to radicalization or extremist views [39].

Recommendations.

- **Send Soldiers to Master Resilience Training and reinforce training periodically.**
- **Provide time for and encourage Soldiers to engage in spiritual activities, but do not mandate religious observances.**
- **Utilize the chaplain's services but engage other resources to provide spiritual support as well.**
- **Pursue unit activities that support spiritual development outside of a religious framework.**
- **Build trust/ensure an equitable and fair command climate.**

Sleep Readiness.

Sleep readiness is the ability to recognize and implement sleep principles that support optimal brain function [4]. Deficits in quality sleep can impair Soldiers' cognitive ability and readiness. Improved judgement, problem-solving, situational awareness, mood, resilience, and well-being occur with greater amounts of sleep [4]. The three components of sleep readiness are duration (amount of sleep), timing (ability to initiate and maintain sleep), and continuity (extent of undisturbed sleep). Soldiers should get 7-9 hours of sleep nightly or sleep debt will begin to accumulate and affect performance. Individuals who maintain consistent sleep-wake schedules derive maximum benefits from circadian rhythm and experience optimal alertness during the day [4]. Fatigue caused by a lack of sleep degrades physical and cognitive performance as well as aircrew judgement. Aviation mission sets may increase sleep disruptions due to work shift changes, cumulative sleep loss, and circadian rhythm disruptions. The use of night vision goggles compound the impact of sleep disruptions and can induce physical, mental, and visual fatigue [12].

Recommendations.

- **Educate on maintaining a good sleep environment and establishing a consistent pre-sleep routine and sleep schedule.**
- **Encourage Soldiers to practice self-regulation activities such as relaxation exercises and guided meditations.**
- **Educate Soldiers on the optimal use of caffeine.** The use of 2B-Alert Web can assist individuals in determining the most effective times to use caffeine.
<https://2b-alert-web.bhsai.org/2b-alert-web/login.xhtml>
- **Leaders should always aim to optimize Soldiers' sleep to the greatest extent possible, given operational constraints.** Leadership should make plans for periods of insufficient sleep based on mission demands, by encouraging naps and caffeine as fatigue countermeasures [4].

Mental Readiness.

Mental readiness is the capacity to adapt to risk and adversity [4]. Mental readiness reduces mistakes and errors in judgement. Character, behavior, resilience, cognitive skill, and social acuity are factors of mental readiness [4]. The demands of flying an aircraft are predominantly cognitive and aircrew are exposed to high cognitive workloads during missions. To aid aircrew in meeting the complex cognitive demands of flying, it is critical to include cognitive enhancement programs delivered by trained specialists.

Soldiers have a variety of stressors related to their service that potentially create a challenge to their mental health. The training and military operational tempo (OPTEMPO) requirements for aviators, such as day/night flight schedules, irregular hours, and frequent training events or deployments may also act as amplifiers for some of these stressors. COVID-19 has amplified some of these challenges.

It is important to note that challenges to mental readiness may exhibit themselves as discipline/antisocial behaviors and with support or treatment, may resolve without a long-term negative impact on a Soldier's career. For example, Service Members who suffered a sexual assault were 1.4 times more likely to have been discharged for "failure to adhere to standards or expectations" [51]. Drinking is another common cause of disciplinary issues and can be a sign of mental health issues. The link between binge and heavy alcohol drinking and combat exposure and/or combat related brain injury is well established [54, 55]. The 2018 Health Related Behaviors Survey found binge drinking was high across all services. The Army reported 30.5% of Soldiers binged within the past 30 days; Warrant Officers 1-5 had a rate of 30.4%. Service Members across all branches returning from a recent deployment report increased binge drinking and substance use [56].

Recommendations.

- **Use the Goal, Plan, Do, Check strategy.** Goal setting is an effective tool for maintaining positive emotions. By defining short- and long-term goals, small accomplishments are recognized along the way to overall achievement. Leaders should develop plans to accomplish the goal. The plan should consist of the way a Soldier will be coached to include the tactics, techniques, and procedures used to promote or optimize the development of the mental readiness.
- **Help Soldiers develop cognitive skills.** Cognitive skills training uses various methods to optimize responses to cognitive load. These methods include limiting divided attention, breaking down new information into parts, and using visual and auditory strategies. This report outline some specific strategies.

Acknowledgements

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Background

The Holistic Health and Fitness (H2F) program aims to optimize human performance and improve force readiness throughout the Army (active duty, reserve, and Army National Guard components) [1]. The aviation community's first encounter with H2F will be when the program is rolled out to the Combat Aviation Brigades (CABs) in 2022.

H2F is a holistic approach to readiness supported by five pillars: physical readiness, nutritional readiness, spiritual readiness, sleep readiness, and mental readiness [1]. H2F is based on evidence and experience gained over a decade of success in the U.S. Army Special Operations Command's Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning (THOR3) program, now referred to as the Human Performance and Wellness (HPW) program. HPW employs a dedicated staff of program coordinators, strength and conditioning coaches, cognitive enhancement specialists, physical therapists, and dietitians. These resources are similar to the resources professional sports athletes have [2, 3]. H2F builds off this successful model to create a new approach to readiness for the Army that is more holistic [2, 3].

The H2F program aims to improve physical, nutritional, spiritual, sleep, and mental readiness to optimize Warfighter performance and overall readiness. Soldiers will be provided with education, coaching, mentoring, messaging, and outreach to improve, restore, and maintain readiness, resilience, and performance [1]. The H2F program will occur at the unit level and will be tailored to a Soldier's military occupational specialty (MOS). This immersive experience will take place in standardized Soldier Performance Readiness Centers (SPRCs). To support H2F, the Army plans to build 100 SPRCs beginning in fiscal year 2023.



Figure 3. A rendering of Zone 2 in a proposed Soldier Performance Readiness Center. Source: MILCON Requirements, Standardization, and Integration. Site accessed at URL: <https://mrsi.erdc.dren.mil/cos/hnc/sprc/>

The facilities will be approximately 40,000 square feet and staffed by H2F performance professionals (physical therapists, nutritionists, cognitive enhancement specialists, certified athletic trainers, strength and conditioning coaches, and occupational therapists). Each SPRC will have four zones for Soldiers to move through; Zone 0 = prep and warm up; Zone 1 = resistance training; Zone 2 = accessory muscle group training; and Zone 3 = work capacity/agility training as well as rehabilitation and cognitive performance areas and administrative/class/team rooms. Field Manual (FM) 7-22 paragraph 1-41 states "Company or

platoon-sized units rotate into the building several times per week to receive H2F education, individual programming, specialized training and coaching from H2F performance team members"[4]. The expansion of H2F to the total Army is a novel concept and is designed to improve operational readiness and reduce the human and fiscal costs of injuries and degraded performance over time [1, 4].

The roll out of H2F will be phased over multiple years. As H2F expands across the Army, installations can take steps to implement some of its concepts and standards using existing resources available across the eco-system of Army services. From Morale, Welfare, and Recreation (MWR) facilities and programs as well as Army Wellness Centers (AWCs), components of H2F are available to Soldiers currently. However, these components are not currently operating uniformly across the Army. However, the U.S. Army Center for Initial Military Training has an ongoing pilot to assess installation resources (AWC, MWR, Military Treatment Facility [MTF]) working together like an H2F team.

In addition to updated standards for physical training (*Holistic Health and Fitness Drills and Exercises*) and physical training assessment Army Techniques Publication (ATP) 7-22.01. *Holistic Health and Fitness Testing*), which are already available, and the new facilities and professionals coming in fiscal year 2022 and beyond, FM 7-22 *Holistic Health and Fitness* directs leaders and Soldiers to become unit-level experts on the physical and non-physical components of Soldier readiness. FM 7-22 emphasizes the importance of professional military education to the development of a deep understanding by military leadership. Leaders must fully understand all H2F topics to include the physiological and psychological foundations of the H2F programs in their units. Command teams and their Soldiers must know and understand the tasks, conditions, and standards described in this doctrine and how to develop and execute periodized training programs [4].

The aim of this report is to summarize the most relevant information from FM 7-22 Holistic Health and Fitness for the aviation community as well as to provide guidance on how to implement H2F during its transition period. Much of the information presented in this report is a curated compilation of information relevant to aviation of the evidence-based guidance from ATP 7-22.01, ATP 7-22.02., and FM 7-22. In addition to the H2F guidance selected from ATP 7-22.01, 7-22.02, and FM 7-22, we present additional resources currently available from the U.S. Army's ecosystem of services and recommendations for unit level leadership on the implementation of H2F and its concepts during the interim.

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Holistic Health and Fitness Overview

The goal of optimizing physical and mental health are the catalyst for H2F. Musculoskeletal injury (MSKI), excessive body weight and obesity, and mental illness reduce readiness. H2F aims to address the underlying causes of these conditions by taking a holistic approach to total Army readiness [1].

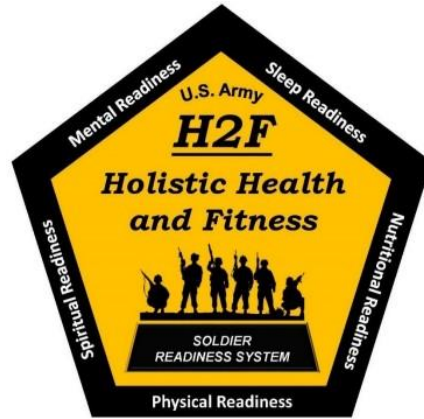


Figure 4. Holistic Health and Fitness soldier readiness system. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

The H2F program provides Soldiers with education, coaching, mentoring, and outreach to improve, restore, and maintain readiness, resilience, and performance. The expansion of H2F to the total Army aims to improve the operational readiness of Soldiers and reduce the human and fiscal costs of degraded performance and injury over time [1, 4]. H2F has five goals:

1. Enhance Soldier lethality and readiness
2. Optimize physical and non-physical performance
3. Reduce injury rates (e.g., MSKI over use rates)
4. Rapidly rehabilitate and recondition Soldiers following injury
5. Improve overall Soldier and unit morale and effectiveness

Leadership is key to the successful implementation of H2F. Leaders must understand the H2F concepts intimately and be able to implement them down to the operator level. Command teams and their Soldiers must know and understand the tasks, conditions, and standards described in FM 7-22: Holistic Health, and Fitness, and are responsible for executing them. This section provides an overview of concepts critical to understanding H2F. The implementation of H2F may improve access to resources needed to match the capabilities of HPW. The H2F program will consolidate various Army health promotion programs including Performance Triad, Go for Green, Soldier Fueling Initiative, Fit for Performance, Ready and Resilient, Global Assessment Tool, Army Center for Enhanced Performance, and Army Wellness Center. It is unclear how these resources will be affected at locations, such as Fort Rucker, that are not receiving H2F resources.

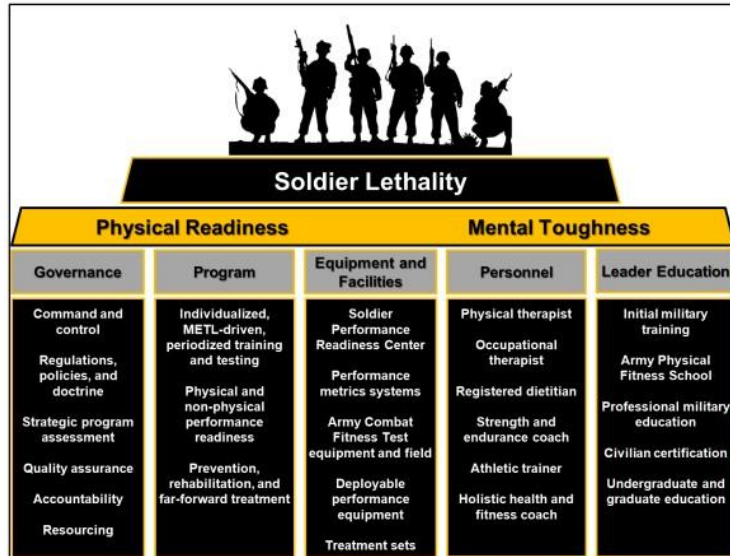


Figure 5. Overview of H2F System and its components. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

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- ATP 7-22.01. Holistic Health and Fitness Testing. 01 October 2020.
- ATP 7-22.02. Holistic Health and Fitness Drills and Exercises. 01 October 2020.
- FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.
- Department of Defense Directive (DODD) 1308.1. DoD Physical Fitness and Body Fat Program. 30 June 2004.
- Department of Defense Instruction (DODI) 1308.3. DoD Physical Fitness and Body Fat Programs Procedures. 05 November 2002.
- The U.S. Army's System for Enhancing Soldier Readiness and Lethality in the 21st Century. Department of the Army. 2020.

The Five Pillars of H2F

Physical Readiness.

The training paradigm for ensuring physical readiness is shifting from an industrial-scale approach to an individualized training approach with the H2F system. Evidence-based methods ensure that Soldiers are prepared to optimize movement lethality. Movement lethality is the ability to apply and sustain the right amount of strength, endurance, and speed to meet the demands of training and combat physical tasks [4]. The fixed facility architecture and the framework of training concepts reflect an immersive environment that help Soldiers make better readiness choices. Highly trained strength and conditioning specialists develop, coordinate, execute, and manage individualized strength and conditioning programs focused on unit mission and individual Soldier tasks. Four master fitness trainers per battalion will support physical training. Forty H2F master trainers will be provided to each battalion (eight per company).

Physical therapists and athletic trainers provide injury screening, evaluation, diagnosis, and treatment of injuries. FM 7-22 provides a periodized training program that everyone is encouraged to follow in order to optimize readiness and reduce the risk of injury. Leadership is discouraged from deviating from the provided program.

Nutritional Readiness.

Nutritional readiness is the ability to recognize, select, and consume food and drink that meets the demands of any duty or combat position [4]. Nutritional readiness will be established through performance dietary guidelines that are mission- and individual-specific. Nutritional readiness promotes and supports optimal physical, mental, spiritual, and sleep readiness. The Nutrition Programs section coordinates nutrition education and training programs, providing individual and group nutrition counseling and education to enhance the combat performance of Soldiers in training and missions [4]. Brigades will have a food service advisor. Nutritional readiness prevents nutrition deficiency, chronic disease, immune system compromise while fueling Soldiers during activities and events. Proper nutrition is also important in the treatment of illness, injury, or other medical conditions to return the Soldier to full duty.

Spiritual Readiness.

Spiritual readiness is the ability to endure and overcome times of stress, hardship, and tragedy by making meaning of life experiences [4]. An individual's purpose, core values, beliefs, identity, and life vision make up the spiritual dimension. Spiritual readiness practices include regular individual meetings with people of similar values, service and charity, hospitality, journaling, mediation, prayer and chanting, religious education, and belief-based reading and reflection. Spiritual readiness also includes formal counseling services (e.g., suicide prevention or mental health) that are available to all Soldiers. All operational brigades already have a unit ministry team on their Modified Table of Organization and Equipment. Each brigade that receives H2F resources will have a dedicated Brigade Unit Ministry Team that consists of a chaplain and religious affairs specialist.

Sleep Readiness.

Sleep readiness is the ability to recognize and implement sleep principles that support optimal brain function [4]. Deficits in quality sleep can impair Soldiers cognitive ability and readiness. Improved judgement, problem-solving, situational awareness, mood, resilience, and well-being occur with greater amounts of sleep [4]. The three components of sleep readiness are duration (amount of sleep), timing (ability to initiate and maintain sleep), and continuity (extent sleep is undisturbed). Soldiers should get 7-9 hours of sleep nightly or sleep debt will begin to accumulate and effect performance. Individuals who maintain consistent sleep-wake schedules derive the maximum benefits from the circadian rhythm of alertness and experience optimal alertness during the day [4]. Soldiers should be educated on maintaining a good sleep environment and establishing a consistent pre-sleep routine and sleep schedule. Leadership should make plans for periods of insufficient sleep based on mission demands by implementing naps and caffeine as fatigue countermeasures [4].

Mental Readiness.

Mental readiness is the capacity to adapt to risk and adversity [4]. Mental readiness reduces mistakes and errors in judgement. Character, behavior, resilience, cognitive skill, and social acuity are factors of mental readiness [4]. In the H2F system, occupational therapists and

cognitive enhancement specialists (sports psychologists) implement cognitive enhancement programs. The goal of cognitive enhancement programs is to improve cognitive performance skills, mental and emotional skills, and interpersonal skills to optimize Soldier performance. The demands of flying an aircraft are predominantly cognitive and aircrew are exposed to high cognitive workloads during missions. To aid aircrew in meeting the complex cognitive demands of flying, it is critical to include cognitive enhancements specialists.

Leadership Responsibilities

H2F is designed for implantation by leadership from the battalion commander down through the chain of command. Commanders are expected to model, participate in, and manage the H2F program through policies, regulations, and program quality controls. Meanwhile, junior leaders with the support of their H2F performance team are expected to build an aviator-athlete culture within the unit. In addition to scheduling and supervising the program, they are responsible for coaching, teaching, and mentoring the key principles of the H2F system [1].

Leaders will be required to understand the tenets and best practices to implement H2F. Training will be embedded in all Army institutional training, leader development schools, unit-professional development, and pre-command courses. In addition, individualized professional development courses will also be offered to compliment institutional and operational training [1].

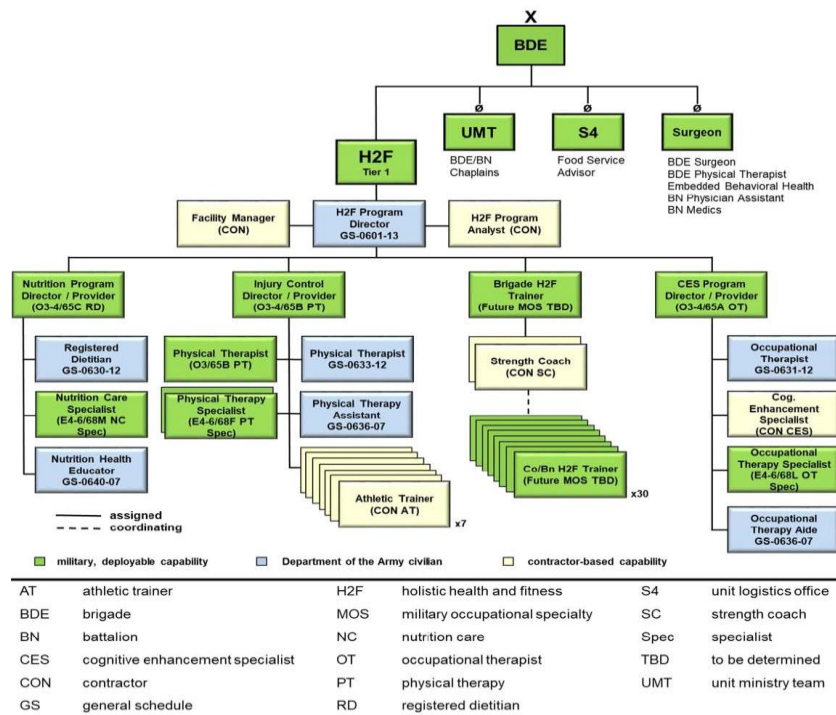


Figure 6. H2F leadership and performance team structure. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

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Challenges and Opportunities in Army Aviation

Pilots face many of the same challenges of Soldiers of other MOSs, but there are some challenges unique to the Army aviation population. In particular, aviators face unique physical challenges. These challenges, unique and similar to Soldiers of other specialties, are explored below. Descriptions of challenges, opportunities for strengthening readiness, as well as recommendations and resources for leaders to support Soldiers are provided below. Leaders may have to draw from the breadth of Army community services to support the implementation of H2F.

Physical Readiness

Challenges.

Aviators face a number of physical challenges, including exposure to a significant amount of vibration and acceleration [5, 6], prolonged, static, hunched, seated position due to cockpit ergonomics [7] as well as extended use of helmets and head-worn equipment that can contribute to head, neck, and back strain [8, 9] and are responsible for the large prevalence of back, neck, head pain and disability in aviators [7, 9, 10]. Beyond the cost of care associated with injury, these challenges pose a risk to readiness. Cancelled missions, lost duty time, and flight performance are examples of the negative effects of physical challenges and decreases in readiness caused by injuries sustained as a result of routine helicopter operation [7].

Physical fitness can help mitigate the impact of vibration, acceleration, cockpit ergonomics, and head-worn equipment [11, 12]. Additionally, aviators require cardiorespiratory endurance, strength, flexibility-stability-mobility, agility, balance, coordination, power, reaction-time, and speed to effectively pilot aircraft [12]. A physical training program that prioritizes core strength and flexibility can mitigate head, neck, and back pain and injuries. Due to the prolonged seated position of aviators, required by the cockpit's design, pilots can lose flexibility of the musculature in the lower half of their bodies (i.e., hamstrings, pelvis, and lumbar). This loss of flexibility can lead to restricted movement of the lower back and pelvis and can increase mechanical stress on the lower back leading to pain [11].

Opportunities.

ATP 7-22.01 and ATP 7-22.02 offer a guidance on creating physical training drills and conducting assessments. Based on their increased risk for head, neck, and back pain, a number of exercises that focus on core strength and/or flexibility are summarized below from ATP 7-22.02.

Preparation Drill.

Preparation Drill (PD) is a battery of exercises intended to decrease the likelihood of suffering a musculoskeletal injury during the execution of more rigorous physical training such as the Army Combat Fitness Test (ACFT). The PD consists of 10 exercises including the bend and reach, rear lunge, high jumper, rower, squat bender, windmill, forward lunge, prone row, bent-leg body twist, and the push-up (illustrations are available in Appendix B). PDs should be performed prior to training; modifications for each exercise are provided in ARN33179-ATP_7-22.01-001. Modified exercises should be performed if a Soldier has an injury or reports pain during any exercise. It is important that complaints of pain not be ignored because traditional performance of an exercise that causes pain could exacerbate existing injuries. Further, leadership should ensure that exercises are performed with proper form to prevent injuries from occurring. An important aspect of the H2F program is that injured Soldiers perform training with

their unit to promote team cohesion and prevent an injured Soldier from being socially isolated.

The U.S. Army Center for Initial Military Training's YouTube channel features playlists of preparation drill exercise videos at:

<https://www.youtube.com/c/usarmycenterforinitialmilitarytraining>

Recovery Drills.

Recovery drills target a range of movements that require structural strength, stability, flexibility, and mobility. Modifications of each exercise exist and should be performed by Soldiers who are reconditioning from an injury, who are de-conditioned, or who are new to the Army. Recommended exercises include the overhead arm pull, rear lunge, extend and flex, thigh stretch, single-leg over, groin stretch, calf stretch, and hamstring stretch (illustrations are available in Appendix B).

The Central Army Registry (common access card [CAC]-required) website provides video demonstration drills by name at:

https://atiam.train.army.mil/catalog/search?current=true&search_terms=video%20demonstration%20recovery%20drills.

Army Combat Fitness Test Events Relevant to Aviators.

The Army Physical Fitness Test (APFT) is sunseting in 2022. In April 2022, the Army will fully implement the ACFT. The ACFT consists of six events: three repetition maximum deadlift, standing power thrust, hand release push-up arm extension, spring-drag-carry, leg tuck or plank, and two mile run. The Army Combat Fitness Test website (<https://www.army.mil/acft/#overview>) provides detailed descriptions and instructional videos for each testing event.

Recommendations.

1. Train for Flight

- Based on their increased risk for head, neck, and back pain, incorporate exercises that focus on core strength and/or flexibility (summarized above from ATP 7-22.02).

2. Encourage Army Wellness Center utilization

- Share details about the program with Soldiers.
- Allow Soldiers to schedule appointments to AWC during work hours (mission permitting).
- Invite AWC professionals to provide unit level trainings.

3. MWR facility/program utilization

- Share details about MWR programs with Soldiers.
- Allow Soldiers to do individual physical training (PT) at MWR facilities.
- Mix it up; schedule unit PT at the pool, fitness center, or another MWR facility.

4. Support fitness-related training for Soldiers

- Send Soldiers to the Master Fitness Course.
- Dedicate regularly scheduled educational briefs to fitness topics (e.g., Sergeant's Time, Town Halls, etc.).

Resources.

While SPRCs are not yet online, there are a number of resources available to aviators and

Soldiers, individually and to their units, that provide the different services that will be found in the SPRCs.

Army Morale, Wellness, and Recreation.

<https://www.armymwr.com/programs-and-services/sports-fitness>

Army MWR provides numerous opportunities for physical fitness. Aquatic training centers, fitness centers, and intramural sports offer opportunities for individuals and units to improve their fitness and performance. MWR fitness centers also offer unit-level group instruction for organized physical training sessions [13].

Army Wellness Centers.

<https://p3.amedd.army.mil/my-army-wellness-center/locations>

AWCs provide services that promote healthy lifestyles. Their program features health assessment reviews, physical fitness, healthy nutrition, stress management, general wellness education, and tobacco education. AWCs are open to active duty Service Members, adult family members, retirees, and Department of the Army civilians. Among the services available are exercise testing (aerobic fitness, aerobic capacity [V_O2 submax], body fat percentage, muscular fitness, and flexibility) and exercise prescription, body composition analysis (BOD POD®, ultrasound, bioelectrical impedance, and skinfold calipers), as well as weight management and metabolic testing. AWCs also offer biofeedback using emWave® to help reduce and learn to control heart rhythm pattern [14].

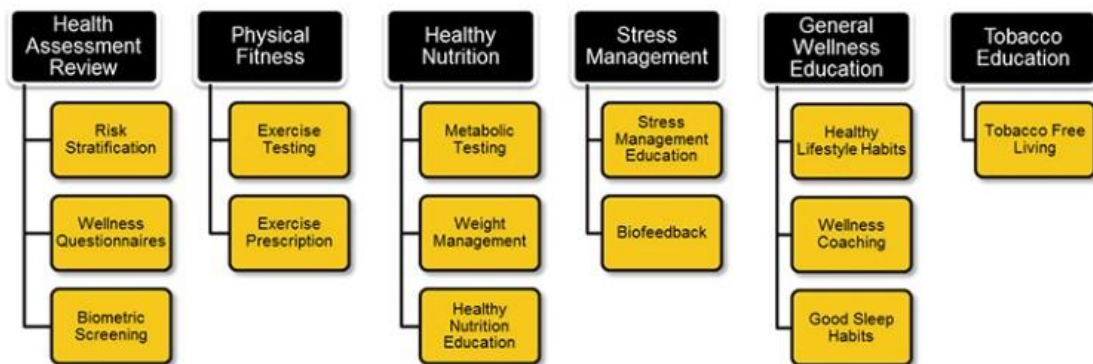


Figure 7. AWC Core Programs. Source: <https://p3.amedd.army.mil/my-army-wellness-center/about>

Master Fitness Trainer Course.

<https://www.benning.army.mil/Tenant/WTC/MFTC.html>

The Master Fitness Trainer Course trains non-commissioned and commissioned officers in the Army's Physical Readiness Training (PRT) system. Participants complete 60 hours of distributed learning and a 76-hour resident course on the exercises and drills. Upon graduation, Soldiers receive an additional skill identifier and can act as PRT advisors and monitors for their units [15].

Online Resources.

- Uniformed Services University CHAMP – Human Performance Resources
<https://www.hprc-online.org/physical-fitness/training-performance>
- Performance Triad
<https://p3.amedd.army.mil/performance-learning-center/activity>

Nutritional Readiness

Challenges.

Barriers to achieving optimal nutrition are both individual and environmental. It is widely recognized within public health and community planning research that the ability to make healthy choices and achieve optimal nutrition is impacted by the food environment in which one lives [16, 17]. The food environment is the physical location of where an individual accesses food. It is influenced by the larger food system—a complex system that influences how a person is connected to food and whether the food that is available is affordable, desirable, convenient, and healthy [18].

Personal barriers, such as a lack of time for food shopping, preparation, and eating are impacted by how easy and affordable it is to get acceptable, healthy food. A recent study found that cost, limited nutritious options in the work environment (vending machines), amount and proximity of fast food, especially on-post, and time constraints were identified as the main barriers to adopting healthy eating habits [19]. The study also found the dining facility (DFAC) was not considered an acceptable dining choice because of a perception that the portions were too small and unappealing in spite of the affordable price [19]. In addition, it was noted that the limited hours of operation of the DFAC was a barrier for lower-enlisted Soldiers who live in unaccompanied personnel housing (UPH), may have limited food storage and preparation facilities, and have lower incomes. These Soldiers must rely on the DFAC, but may not always be able to access the DFAC during its hours of operation due to unpredictable work schedules. As a result, UPH-dwelling Soldiers may then be forced to spend additional funds on food and feel that they have little control over the foods they consume due to cost, convenience, and availability [19, 20]. While most pilots do not have this particular barrier (due to their rank) to healthy eating, maintenance and aircrew personnel may. Time and poor food environments in the work place are common barriers to healthy eating for pilots, crew, and maintainers; workload and unpredictable and alternating work schedules (day/night) are barriers keeping Soldiers from nutritious food procurement, preparation, and consumption.

Opportunities.

The Army's comprehensive Performance Nutrition Program concept and framework consists of three components: proactive, active, and reactive. The proactive component, or foundational nutrition, focuses on chronic disease prevention and immune system enhancement. The active component, or operational nutrition, focuses on occupational and environmental task-specific nutrition, particularly event fueling, post-event recovery, and arduous environment preparedness. The reactive component, or therapeutic nutrition, focuses on specific nutritional interventions to treat (as opposed to prevent) an illness, injury, or condition. Managing calorie intake is fundamental to achieving and maintaining calorie balance, the balance between the calories taken in from foods and the calories expended from metabolic processes and physical activity. Nutrient timing involves proper fueling strategies before, during, and after physical

training sessions and other strenuous activity. Strategies to prevent energy deficits and aid in recovery exist and are outlined below [4].

Dietary Recommendations of Nutritional Readiness.

A Soldier's diet should include:

- A variety of vegetables from all subgroups: dark green, red and orange, legumes (beans and peas), and starchy (potatoes, corn, and winter squash). Each vegetable subgroup contributes different combinations of nutrients, making it important for Soldiers to consume vegetables from all the subgroups
- Fruits, especially whole fruits
- At every meal, strive to make half of the plate fruits and vegetables
- Grains, at least half of which are whole grains
- Brown rice, quinoa, oats, oatmeal, popcorn, breads, cereal, and pasta
- Fat-free or low-fat (1 percent) dairy, including milk, yogurt, cheese, and fortified soy beverages, or a combination of these
- A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products
- Oils high in polyunsaturated and monounsaturated fats
- Oils supply calories and help absorb the fat-soluble vitamins A, D, E, and K
- Less than 10 percent of calories per day from added sugar
- Added sugars include syrups and other caloric sweeteners
- Less than 10 percent of calories per day from saturated fats
- Less than 2300 milligrams per day of sodium
- Limited alcohol consumption. In the strictest sense, alcohol is not a performance nutrient. If Soldiers consume alcohol, it should be in moderation, up to one drink per day for women and up to two drinks per day for men.

Nutrition for Weight Loss.

It is important to evaluate the amount of food and calorie-containing beverages consumed each day and to reduce the total number of calories per day to reduce body fat. It takes dedication to adjust eating habits, portion sizes, food choices, physical activity, sleep hygiene, and stress management. Nutritional tips for weight loss include:

- Track food intake using a daily food log.
- Focus on an eating plan that consists of nutrient rich, lean sources of protein, including fish, poultry, beans, nuts, and dairy products; incorporate whole grains, fruits, and vegetables.
- Choose low calorie beverages such as water, low-fat milk (or soy milk), and unsweetened beverages with and between meals to stay hydrated.
- Be mindful of hunger and fullness cues, keeping in mind that it takes 20 minutes to feel full, so eating slowly and mindfully is helpful to prevent eating more calories than intended.
- Keep a food log to stay aware of the number of calories consumed and to know whether the calorie goal is met or exceeded.
- Stay hydrated and do not starve yourself. Keep a balance in caloric consumption and expenditure to achieve weight loss while not affecting physical performance.

Nutrition for Weight Gain.

The most effective method to increase muscle mass is to encourage a positive energy balance, for example, by consuming more calories than required to maintain current body weight. Theoretically, consuming an additional 250–500 calories per day would result in a gain of one half to one pound per week. Daily protein consumption should increase to 1.2–2.0 grams/kilograms (~0.55–0.9 ounces/pound) body weight. Tips for weight gain are provided below:

- Eat frequently. Plan to eat or drink a food or beverage that provides nutrition to the body every few hours, especially after a workout.
- Consume protein-rich foods. The best sources of protein come from whole foods such as lean meats, poultry, fish, beans, nuts, eggs, and low-fat dairy.
- Try smoothies, shakes, or soups.
- Add healthful fats. Use avocado or nut butter in sandwiches or smoothies, and add a little extra olive oil, canola oil, or oil-based spreads during meal preparation.

Operational Nutrition.

<i>Time Between Eating and Performance</i>	<i>Suggested Pre-Exercise Meals</i>
1 hour or less before exercise	Choice of: Fresh fruit such as apples, watermelon, peaches, grapes, oranges, or a sports energy bar <i>and/or</i> ½–1 ½ cups (4–12 ounces) of carbohydrate electrolyte beverage
2–3 hours before exercise	Choice of: Fresh fruit, 100-percent fruit or vegetable juices <i>and/or</i> Breads, bagels, English muffins with limited amounts of butter or margarine or cream cheese, yogurt, oatmeal, pancakes with limited amounts of butter and syrup, or a sports energy bar <i>and/or</i> 2–4 cups (16–32 ounces) of carbohydrate electrolyte beverage
3–4 hours before exercise	Choice of: Fresh fruit, 100-percent fruit or vegetable juices <i>and/or</i> Breads, bagels, baked potatoes, cereal with milk, yogurt, sandwiches with a small amount of peanut butter, lean meat, or cheese, spaghetti with a tomato sauce <i>and/or</i> 4–7 ½ cups (32–60 ounces) of carbohydrate electrolyte beverage

Figure 8. Pre-exercise meal recommendations. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

<i>Type of Activity</i>	<i>Recommended Carbohydrate Intake</i>
Exercise lasting less than 45 minutes	None necessary or practical
High-intensity exercise lasting 45 to 75 minutes	Small amounts of sports drink or carbohydrate-rich snacks or foods
Endurance and intermittent, high intensity exercise lasting 1 to 2.5 hours	30–60 grams per hour
Endurance and ultra-endurance exercise lasting 2.5 to 3 hours or longer	80–90 grams per hour

Figure 9. Recommended carbohydrate intake during exercise. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

	Recommendation
Before	Drink at least 8–16 oz. (1–2 cups) of fluid 2 hours prior to exercise. Drink at least 4–8 oz. (1/2–1 cup) of fluid immediately prior to exercise. Drink 1–2 mL per pound body weight (for example, 2/3—1 ¼ cups for 150 lb.) 2 hours prior to exercise.
During	Drink at least 4–8 oz. (1/2–1 cup) of fluid every 15–20 minutes during exercise. Do not exceed 1.5 liter (~6 cups) per hour.
After	Drink at least 8–16 oz. (1–2 cups) of fluid after exercise. For rapid rehydration, drink ~3 cups of fluid per lb. of body weight lost.
L	liter
lb	pound
mL	milliliter
oz	ounce

Figure 10. Fluid recommendations before, during, and after exercise. Source: FM 7-22. Holistic Health and Fitness. 01 October 2020. Change 1 dated 08 October 2020.

Build a Healthier Food Environment.

Research suggests that effective dietary programs that use theoretically based/behavioral change techniques and standardized guidelines coupled with sustained, intense support and increased access to healthy food, was more effective in the short term [21]. H2F offers nutritional guidance and will offer intensive resources to Soldiers to help make better choices in the SPRCs, but without changes to the food environment, Soldiers may continue to struggle to adopt better nutrition.

While leaders can advocate for a reduction in fast food options on-post, those policy decisions are generally out of the hands of individual units. However, leaders could encourage activities to that increase the time Soldiers have to access healthy food and ensure healthier options are available. For example, commanders can work with the unit’s dining facility to make healthy food available at convenient hours for their Soldiers. DFACs are an important resource for providing affordable, healthy options to Soldiers. Some commanders are experimenting with ways to increase access to more nutritious foods in partnership with the DFAC. At Fort Stewart, GA, the Commander of 3rd Sustainment Brigade partnered with the DFACs to bring DFAC food trucks to the unit at lunchtime. Meanwhile, at Schofield Barracks, HI, the DFAC modelled a program after the 160th Special Operations Aviation Regiment’s THOR3 model to provide nutritionist-designed meal preparations to Soldiers and their families at reduced prices [22, 23].

Recommendations.

- 1. Work with the DFAC to find alternative ways to bring low-cost, nutritious meals to the unit on a schedule that works with mission requirements.**
- 2. Ensure that fresh fruit, healthy snacks, healthy frozen lunches, and low-calorie beverages are available.**
 - Fridge Funds, Potlucks, and Unit Lunches
Many units have a “fridge fund” or “grab and go” system for snacks and beverages. One way to ensure that healthier options are available is to ensure that fresh fruit, healthy snacks, healthy frozen lunches, and low-calorie beverages are available.
 - Price healthy options competitively (or make them free).
 - Reduce the availability of sodas and energy drinks in the Fridge Fund and

at events.

- Leave healthy options out and in sight; put less healthy options out of sight.
- Work with the unit's Family Readiness Group (FRG) to schedule regular healthy potlucks.
- Involve the FRG in health education around nutrition. Families can play a role in supporting healthy choices.

Resources.

- The Uniformed Services University Human Performance Resources offers a wealth of information and strategies for improving eating environments relevant to Warfighters. <https://www.hprc-online.org/nutrition/eating-environments>
- The Operation Supplement Safety website provides easy access to materials and databases for Soldiers to stay informed and make healthy dietary supplement choices. <https://www.opss.org/>
- The Army Public Health Center site has information on nutrition and dietary supplements. <https://phc.amedd.army.mil/topics/healthyliving/n/Pages/default.aspx>
- Army Wellness Center Services – Army Public Health Center <https://phc.amedd.army.mil/topics/healthyliving/al/Pages/ArmyWellnessCenters.aspx>
- Military Nutrition Initiatives – Army Public Health Center <https://phc.amedd.army.mil/topics/healthyliving/n/Pages/HealthyEatingEnvironment.aspx>

Spiritual Readiness

Spiritual fitness was formally introduced to the Army as a component of readiness in the Comprehensive Fitness Program (CFP) in 2008. In 2012, this program was expanded to include family members as well as civilian Army personnel and was named “Comprehensive Soldier and Family Fitness.” The intention was to build resilience in the face of high rates of depression, posttraumatic stress disorder (PTSD), domestic abuse, and suicide as a result of the long-running wars in Iraq and Afghanistan [24]. This shift offered a non-religious context and services for resilience building, previously held under the purview of the chaplain.

The use of the word “spirituality” is strategically ambiguous in order to be inclusive of a wide range of beliefs or non-beliefs. It is critical to note that there is significant diversity within the military around religious and spiritual beliefs. While 2019 DOD administrative data indicated that 70% of Service Members were of assorted Christian religions; 24% were reported as “other/unclassified/unknown” and 2% were reported as Atheist or Agnostic [25]. This data indicates an approach to spirituality separate from religiosity, in order to better accommodate the breadth of belief systems within the military, is needed.

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Challenges.

Spirituality in the Military Context.

The military has long recognized that some injuries are not physical, but moral, and that it is critical to buffer against the effects of warfighting by building resilience to these moral injuries [24, 26, 27]. Since its inclusion in CSF, the Army views the development of spirituality, in whatever form is supportive to the Soldier, to be a crucial component of readiness. It is one of the five pillars of H2F [1, 4, 24].

Spirituality is the way in which people seek meaning, purpose, connectedness, and in some cases, transcendence. Spirituality is expressed through beliefs, values, traditions, and practices. It most frequently falls under three categories: 1. God-oriented, 2. World-oriented, or 3. People-oriented [28]. Spirituality can exist independently or in concert with religion; many people are spiritual, but not religious [29, 30]. Religion can be a road map toward spiritual goals, offering rituals, symbols, and prescriptive behaviors in the search for the sacred. Typically, religion acknowledges the existence of a relationship between humans and a power greater-than-human [28]. Key components of religion typically include validation, support, and acceptance by a recognized social group [28, 30]. Both spirituality and religion are complex constructs that develop across the lifespan and help humans find meaning, purpose, and order in life [28].

In the context of the U.S. military, religious affairs are the commander's responsibility and the goals are two-fold. The first goal is to support the first amendment right to free expression of faith and/or religious practice (or the right to observe no religion at all) as well as guard against discrimination of any kind. Showing preference to one particular religion or proselytizing is expressly prohibited by law [31]. The second goal is to develop situational awareness of the impact of religion on operations in both the area of operation as well as within their ranks [31].

A religious support team consisting of at least one chaplain and an enlisted religious affairs person implements the commander's religious program. The western concept of military chaplains can be traced to Roman or even biblical times. Most militaries had an officer dedicated to religious duties and armies frequently called upon a higher power or spiritual entities to give them strength to defeat their enemies and protect their Soldiers [27]. In 1775, the U.S. Army Chaplain Corps was founded as part of the U.S. Army and served in every American conflict [32]. Contemporary chaplains are an integral part of a unit's mental health support system and often serve as a confidential source of counseling on a variety of issues, including those not directly related to spiritual or religious beliefs, such as marriage counselling, drug/alcohol abuse, and work conflicts [27].

Moral Injury and its Negative Expressions.

Independent of religion, which can be intertwined with deep social and political affiliations and fraught with controversy, spirituality as a broad and inclusive concept, matters for the Warfighter because its relationship to "moral injury." Moral injury (MI) is the result of events that occur, frequently within the execution of military or operational duties, that conflict with one's values, beliefs, and expectations causing emotional physical, emotional social, and spiritual impacts [26]. MI can be the result of traumatic events that were perpetrated on or by the Service Member and/or based in a sense of betrayal or violation of trust by institutions meant to provide fair or protective treatment [33]. This is especially relevant for the Army community

because it is heavily reliant on a code of conduct and indoctrination of the shared Army values of loyalty, duty, respect, selfless service, honor, integrity, and personal courage. Violations of this framework from within the organization can lead to betrayal-based MIs.

A number of harmful outcomes have been connected to MI, such as intrusive thoughts, impulsivity, suicidal ideation, sleep disturbances, or substance use and MIs have been documented as a trigger for maladaptive coping and harmful behaviors [26, 34]. Moral injury, because of warfighting that cannot be reconciled spiritually, can lead to a loss of meaning, shame, anger, and guilt [26, 33, 34]. A study of 867 active duty Marines found that betrayal-related MI can lead to PTSD not related to combat exposure [35]. Additional studies found that more severe depression, suicidality, and PTSD symptoms were associated with a perceptions of institutional betrayal related to military sexual trauma [36, 37]. More recently, the role of racism and racial trauma is being explored as a source of MI and has also been linked to PTSD [38].

A recent review of radicalization literature found that MI can make Service Members and veterans vulnerable to radicalization or extremist views [39]. Frequently, radical or extremist ideology is wrapped in a religious worldview, which reorders the values, beliefs, and expectations that were fractured by the MI. It proposes a righteous or religiously ordained answer to the anger, betrayal, or loss of purpose prior to the MI and in some cases, actions one can take to restore order. Extremist organizations also offer a meaningful identity within a purposeful social group which share and validate those grievances [40, 41].

Opportunities.

Spiritual readiness develops the personal qualities a person needs in times of stress, hardship, and tragedy. These qualities come from religious, philosophical, or human values and form the basis for character, disposition, decision-making, and integrity. It applies to both religious and non-religious persons and concepts. Leaders play an active role in creating and fostering a climate that encourages individual spiritual readiness according to their respective worldviews, while at the same time communicating respect and dignity for diversity in a pluralistic setting (See AR 600-63 for more on spirituality). Identifying one's purpose, core values, beliefs, identity, and life vision defines the spiritual dimension. These elements, which define the essence of a person, enable one to build inner strength, make meaning of experiences, behave ethically, persevere through challenges, and be resilient when faced with adversity. People enhance their spiritual readiness through reflection and practice of a lifestyle based on the personal qualities they need during times of stress, hardship, and tragedy. When their actions deviate from their stated values, then they may experience inner conflict. Those struggling for integrity and congruity often only find inner peace after overcoming the struggle. They develop spiritual readiness by studying, connecting with, and understanding the value systems that mold their personal qualities. As their spiritual readiness grows, they become a leader of character and build the resilience necessary to navigate crises [4].

Development of Spiritual Readiness.

- Regular meetings to receive instruction, observe tenets of belief, and gather with people of similar values.
- Service to others for the sake of both charity and understanding one's relationship to other human beings and the transcendent.
- Hospitality is more intimate in nature since providing hospitality takes place in-person and generally involves engaged social interaction between the host and guest.

- Journaling often involves an individual maintaining a written record of thoughts, prayers, feelings, beliefs, and reflections on life, philosophy, or other matters.
- Meditation is the practice of contemplation and reflection by an individual or group.
- Religious people tend to practice prayer and chanting to address one or more god, deity, divine being, or spirit.
- Leaders ask subordinates what space, time, and materials they require to facilitate individual prayer practices.
- Belief-based education often occurs during group gatherings, but it also occurs as part of an individual's study habit.
- In the immediate area surrounding military installations, several civilian religious and secular organizations often provide spiritual readiness education and direction.

Role of Leadership in Spiritual Readiness.

- Leaders ask subordinates what space, time, and materials they require to facilitate individual prayer practices.
- Effective leaders facilitate dialogue and flexibility regarding free exercise of spiritual readiness practices.
- Unit leaders foster spiritual readiness by providing space in schedules, battle rhythms, and training plans for individual self-development to include the spiritual dimension. Unit and organizational leaders can encourage spiritual readiness by discussing the spiritual dimension or spiritual development goals in developmental counseling, individual development plans, or their leadership philosophies.
- Generally, leaders are not expected to be experts on spiritual and religious practices, nor should they function as such. Assistance from qualified staff enables leaders and individuals to focus time and energy on primary Army functions while building and maintaining their personal spiritual readiness.

Recommendations.

- 1. Send Soldiers to Master Resilience Training and reinforce training periodically.**
- 2. Provide time and encourage Soldiers to engage in spiritual activities, but do not mandate religious observances.**
 - Ensure Soldiers know about and feel comfortable using spiritual support resources.
 - Dispel myths around seeking spiritual or mental health assistance.
- 3. Utilize the Chaplain's services but engage other resources to provide spiritual support as well.**
 - Military Family Life Counselors
 - Behavioral Health services at local military facilities or within the community
 - Organizations that provide non-religious support through therapeutic art, animals, etc.

4. Pursue unit activities that support spiritual development outside of a religious framework.

- Volunteer days
- Morale building events
- Unit-specific cultural activities (Spur rides, etc.)
- Artistic and music events
- Support retreats for couples, families, and single Soldiers.

5. Build trust/ensure an equitable and fair command climate.

- Take Army programs related to sexual assault, equal opportunity, and anti-extremism seriously.
- Look out for Moral Injury.

Resources.

- Army Public Health Center Spiritual Health Resources
<https://phc.amedd.army.mil/topics/healthyliving/bh/Pages/SpiritualHealth.aspx>
- Uniformed Armed Services Human Performance Resources Spiritual Fitness Resources
<https://www.hprc-online.org/mental-fitness/spiritual-fitness>
- Military Health System Spiritual Fitness Resources
<https://www.health.mil/Military-Health-Topics/Total-Force-Fitness/Ideological-and-Spiritual-Fitness>
- National Military Family Association Retreats
<https://www.militaryfamily.org/programs/operation-purple/>
- Military OneSource Confidential Help and Resources
<https://www.militaryonesource.mil/confidential-help/>
- Defense Suicide Prevention Office
<https://www.dspo.mil/>
- U.S. Army Combating Extremism
<https://www.army.mil/standto/archive/2021/03/15/>
- Army's Sexual Harassment/Assault Response and Prevention Program (SHARP) Program
<https://www.armymwr.com/programs-and-services/resources/sharp>

Sleep Readiness

Challenges.

Fatigue caused by a lack of sleep degrades physical and cognitive performance as well as aircrew judgement. Aviation mission sets may increase sleep disruptions due to work shift changes, cumulative sleep loss, and circadian rhythm disruptions. The use of night vision goggles compound the impact of sleep disruptions and can also induce physical, mental, and visual fatigue [12].

Sleep timing is critical because the brain's internal clock strongly influences the ability to initiate and maintain sleep as well as maximize the amount of sleep obtained. The extent to which sleep is undisturbed by arousals and awakenings, sleep continuity, is important because it influences both the duration and the depth of sleep, with deeper sleep being more restorative.

Cognitive ability and readiness vary as direct functions of the amount of sleep obtained. The more sleep Soldiers get, the greater their mental acuity, with faster response times, fewer errors, and fewer lapses in attention. Most Soldiers need 7 to 9 hours of sleep every 24 hours to maximize health and sustain performance. The relationship between sleep duration and cognitive readiness (and thus, military effectiveness) is best thought of as a continuum, with more sleep always producing improved performance. If one gets less sleep (for example, six hours per night during the duty week), then a “sleep debt” accrues. In such cases, it is better to sleep-in on off-duty days and pay down the sleep debt, rather than sacrificing sleep to try to maintain a consistent sleep-wake schedule and strengthen the circadian rhythm of alertness. Maintaining a consistent sleep-wake schedule on both duty and non-duty days has the benefit of strengthening and reinforcing the internal wake- and sleep-promoting processes controlled by the brain’s internal clock [4].

Opportunities.

Leadership Behaviors to Promote Proper Sleep Hygiene.

Leadership behaviors that target sleep can improve the sleep habits of unit members and the unit’s overall sleep culture. Sleep leadership behavior includes promotion of sleep awareness and the development and implementation of local policies that facilitate the ability of subordinates to practice good sleep hygiene. An example of sleep awareness is ensuring that subordinates understand the importance of sleep for health and readiness, as well as the negative consequences of sleep loss. Such practices (for example, moving physical readiness training from morning to the afternoon or starting the duty day later, both of which allow Soldiers to sleep later) result in improved subordinate sleep, enhanced health (reduced sick call and accident rates), and improved unit climate. Effective leaders consider sleep an item of logistical resupply like water, food, fuel, and ammunition. Planning for sleep in training and tactical environments is a leader competency. Sleep management optimizes Soldiers’ performance in austere conditions. Sleep is a force multiplier. In healthy persons, there is no such thing as too much sleep. The goal in all operational scenarios should be to maximize sleep duration because more sleep always results in greater alertness, resilience, and mental acuity, which in turn relates to increased readiness.

When mission requirements do not allow for adequate sleep, the goal becomes twofold: to optimize alertness and performance during waking periods and to maximize the ability of Soldiers to take advantage of any opportunities for sleep that do occur. Factors that determine the extent to which alertness and performance are impacted by sleep loss include:

- Individual differences in sensitivity and resistance to the effects of sleep loss.
- Individual sleep history—those who habitually sleep more tend to be more resistant to sleep loss.
- Length of continued wakefulness—the longer the period of sleep loss, the worse the performance.
- Time of day or night—the brain’s circadian rhythm of alertness exacerbates the effects of sleep loss during the early morning hours, and partially mitigates the effects of sleep loss during the daytime or early evening hours

Optimizing Sleep.

- Sleep duration and continuity are optimized in environments that are quiet, dark, and

maintained at a comfortable ambient temperature (65–72 °F). Bright lights and excessively hot or cold environments can disrupt sleep continuity and reduce the restorative value of sleep. Sleeping quarters should be located as far away from noisy areas (such as airfields, generators, and fueling stations) as possible. The effects of remaining uncontrollable, intermittent, random noises should be masked with a white noise generator.

- Pre-sleep routines that promote winding down, such as listening to soothing music, reading, or taking a warm shower or bath, 30–60 minutes prior to bedtime tend to facilitate the transition to sleep. These routines will maximize sleep duration. Conversely, activities such as watching television, playing video games, chatting online, and similar interesting or engaging activities tend to arouse the brain and delay sleep onset.
- Adequate performance is best achieved by Soldiers who consistently get adequate sleep (7–8 hours) on a nighttime sleep-daytime wakefulness schedule aligned with the brain's natural circadian rhythm of alertness. Both sleep duration and sleep continuity are maximized on such schedules. However, military operations are often continuous (24-hours per day) and influenced by random and unpredictable events and requirements.
- Sleep and living areas for Soldiers should be segregated by the shifts worked. This minimizes sleep disruptions caused by waking activities of those working other shifts.
- Soldiers should avoid full, heavy meals within 2–3 hours of initiating sleep. High-fat, fried, or spicy foods tend to affect sleep negatively. If Soldiers need to eat just prior to bedtime, their best options include a balanced snack or meal that includes fruits, vegetables, whole grains, fat proteins, and foods low in added sugar. Foods that rarely disturb sleep include Greek yogurt or cottage cheese with fruit, peanut butter on whole grain toast, cheese and crackers, milk with a small bowl of whole grain cereal, and protein bars.
- Soldiers should consume no more than one alcoholic drink one hour before bedtime, no more than two drinks two hours before bedtime, and so on. However, abstinence is the best strategy when a good night of sleep is especially important for next-day activities or missions.

Maximizing Mission Sleep.

Soldiers cannot be trained to perform better on less sleep. Soldiers do become accustomed to a reduced level of alertness. Sleep banking is achieved by significantly extending the nightly time in bed to more than eight hours per night. Soldiers must bank sleep for multiple consecutive nights prior to embarking on a mission that is likely to result in inadequate sleep. The extra sleep they obtain in this manner creates a bank of sleep they use to sustain alertness and performance during subsequent sleep loss (acute sleep deprivation or chronic sleep restriction). This is because the brain saves (or banks) sleep that it does not use the next day, and it expends that sleep during future periods of sleep loss. Increasing the amount of sleep prior to a mission improves performance during that mission and, as a bonus, reduces the amount of sleep subsequently needed to recover from that mission. When possible, leaders should provide Soldiers the opportunity for extended sleep (10 hours in bed per night may be optimal) for several consecutive nights (for at least one week, if possible) prior to missions likely to involve significant sleep loss.

Before
Two weeks prior, get 8 or more hours of sleep per night.
Stop caffeine and alcohol consumption at least 6 hours prior to scheduled sleep.
During
Take naps whenever possible to accumulate 7-8 hours of sleep in every 24 hour period.
Caffeine can be used to reduce grogginess on awakening.
Separate day and night shift sleep areas.
After
To reduce sleep debt or deprivation, plan on additional sleep time.
Increase sleep to 8 hours every 24 hours to return to optimal alertness and performance.

Figure 11. Strategies for maximizing mission sleep.

Leaders have a planning decision aid to help plan missions and predict the effects of any sleep-wake schedule on performance. This scientifically developed mission planning decision aid, the 2B-Alert Web, is available at <http://sleep.bhsai.org>. This tool can predict the effects of any sleep-wake schedule on vigilance performance, as well as the efficacy of applying both naps and caffeine as fatigue countermeasures at any point during a mission.

Caffeine.

For many missions some degree of sleep loss is unavoidable. In these cases, Soldiers may best accomplish short-term sustainment of alertness and performance with judicious use of a non-sleep (stimulant) intervention. For a variety of reasons (including its wide availability, its familiarity to Soldiers, and its relative safety and effectiveness), caffeine is recommended for this purpose. For most individuals under most circumstances, the optimal dose of caffeine is 200 milligrams. Caffeine only temporarily helps restore alertness and performance. It does not replace sleep. Nor does it fully restore all the cognitive abilities decremented by sleep loss.

Type of sleep challenge	Dose
Sustained operations	<ul style="list-style-type: none"> • 200 mg at midnight • 200 mg again at 0400 and 0800 if needed • Use during daytime (1200 and 1600) only if needed
Night operations with daytime sleep	<ul style="list-style-type: none"> • 200 mg at start of night shift • 200 mg again 4 hours later • Late dose: at least 6 hours prior to start of daytime sleep
Restricted sleep (6 hours of sleep)	<ul style="list-style-type: none"> • 200 mg upon awakening • 200 mg again 4 hours later • Last dose: at least 6 hours prior to sleep period
mg	milligram

Figure 12. Caffeine dose for optimal alertness.

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Recommendations.

1. **Encourage Soldiers to practice self-regulation activities such as relaxation exercises and guided meditations.** DOD and the Department of Veterans Affairs developed available applications, and the Human Performance Resources by CHAMPS (<https://www.hprc-online.org/>) has various self-regulation activities: visualization or guided imagery exercises, meditation or mindfulness exercises, and mental focusing exercises.
2. **Educate Soldiers on the optimal use of caffeine including the use of 2b-Alert.**
<https://2b-alert-web.bhsai.org/2b-alert-web/login.xhtml>
3. **Leaders should always aim to optimize the Soldier's sleep to the extent possible given the existing operational constraints.** Toward this end, commanders consider the following two principles: Strive for consistency for individual Soldiers by rotating shifts no more often than twice per month. Always rotate shifts in a forward direction.
 - Address work-related and other sources of stress for Soldiers that may be interfering with sleep.
 - Implement duty schedules that optimize nighttime sleep and daytime alertness.
 - Emphasize sleep in remarks during Recovery Drills or other unit formations and functions.
 - Encourage Soldiers to look for signs of sleep problems regularly.
 - Give Soldiers permission to nap when circumstances allow, and encourage naps when appropriate, especially during continuous operations.
 - Ensure Soldiers have enough time to attend to their personal matters while still getting sufficient sleep.
 - Consider having Soldiers perform less complex tasks in the early morning before 0900 and tasks that are more complex in the late morning and early afternoon. Work performed between 2300 and 0800 hours is generally less efficient.

Resources.

- Walter Reed Army Institute of Research Investigator's Dispatch—Sleep
https://www.wrair.army.mil/sites/default/files/2019-06/Behavioral_Health_and_Sleep.pdf
- Walter Reed Army Institute of Research Investigator's Dispatch—Tactical Napping
https://www.wrair.army.mil/sites/default/files/2020-11/tactical_naps_final_112020.pdf
- Walter Reed Army Institute of Research Fact Sheet—Caffeine and Performance Infographic
- https://www.wrair.army.mil/sites/default/files/2021-03/Caffeine_and_performance_infographic.pdf
- Uniformed Armed Services Human Performance Resources Sleep & Stress Resources
<https://www.hprc-online.org/mental-fitness/sleep-stress>

Mental Readiness

Challenges.

Soldiers have a variety of stressors related to their service that potentially create a challenge to their mental health. The training and military operational tempo (OPTEMPO) requirements for aviators such as day/night flight schedules, irregular hours, and frequent training events or deployments may also act as amplifiers for some of these stressors. COVID-19 has amplified some of these challenges.

It should be noted that there are not any quality of life studies in the literature specific to Army pilots or the Army aviation MOSs more broadly. The majority of the research available is related to quality of life issues for military families (not single Soldiers) across branches. However, in spite of a lack of Army aviator-specific data, the data related to military families is likely relevant to military aviators as approximately 81.4% of Warrant Officers (WO)1-WO5 are married [42] and approximately 70% of Army pilots are Warrant Officers [43].

Personal Challenges.

According to the Department of Defense, 41.2% of Army Active Duty Families have children and 73.1% of those children are under 12 years of age. Approximately 23,700 Soldiers are single with children [42]. Similarly, 36.8% of Army reserve families have children; 45.7% under 12 years [42]. A recent report by Blue Star Families [44] listed the top ten stressors for military families (Table 1).

Table 1. Blue Star Families 2020 Study Top Ten Stressors for Military Families

	Active-duty Families (n = 4,397)	National Guard Families (n = 366)	Reserve Families (n = 343)
Civilian Spouse’s Employment Challenges	44%	12%	18%
Isolation from Family/Friends	43%	16%	25%
Financial Issues/Stress	39%	39%	40%
Deployments	38%	45%	43%
Relocations	36%	6%	16%
Emotional/Mental Health Issues	23%	29%	25%

Marital or Relationship Issues	18%	24%	28%
Job Stress	25%	32%	28%
Impact of Military Life on Children	29%	34%	30%
Separation due to Military Service, not Deployment	21%	31%	29%

It is important to note that many of these stressors such as job stress, frequent relocation, and deployments may interact. For example, military spouse employment is an issue that is caused in part by a Soldiers' frequent relocation and/or deployment (as well as irregular schedules), but also amplifies other issues like financial stress. A 2014 report by the University of Syracuse Institute for Veterans and Military Families found that 90% of female spouses were underemployed and there was a 28% income gap between their non-military spouse counterparts [45]. According to the DOD, in 2019 prior to COVID-19, 7% of spouses were unemployed (compared to the 3.5% national average) and 22% were not in the labor force [42]. In addition to the career impact, there is an enormous financial impact. Military spouses are chronically un/underemployed due to frequent moves and a general lack of affordable, high quality childcare [44]. While a lack of affordable, high quality childcare is a barrier to spouse employment, dual-military and single-parent Soldiers are especially impacted by a lack of childcare. Relocation also affects finances; with each move, many spouses find themselves without income, compounding financial instability. As a result, many military families are heavily dependent on a single source of income, undercutting their financial stability.

Housing is another issue that may amplify financial stress for Soldiers. The Blue Star Families survey found 77% pay out-of-pocket monthly for housing costs over and beyond what the DOD projects as their fair share responsibility and that financial stress increases with greater out-of-pocket expenses [44]. Hot housing markets supercharged by COVID-19 are making the problem worse. Many duty stations are experiencing high rents, high home prices, and a general lack of inventory. This year many families found themselves in bidding wars or paying significantly over their basic allowance for housing (BAH) [46]. The situation was so bad in some housing markets that the DOD authorized a temporary increase in BAH for 56 housing areas [47]. Coupled with the ongoing issues in beleaguered on-post privatized housing [48], many military families are paying too much and/or struggling to find safe and adequate housing.

Financial instability can lead to food insecurity, which affects the ability to maintain nutritional readiness [44]. According to a 2020 Blue Stars Family report, the COVID-19 pandemic has exacerbated both spouse unemployment and food insecurity among Service Members, especially among lower enlisted [44].

Work Challenges.

Retention research illustrates a number of issues facing Service Members throughout their careers. While the focus of this research is retention, it shines a light on issues that drive dissatisfaction with Army life. A 2021 Rand study found that command climate was critical to whether or not first term Soldiers completed their assignment. In particular, the study found that a mix of senior non-commissioned officers within the battalion were predictive of first term Soldier attrition. However, the study also found that when the non-commissioned officer left, the issue persisted in the battalion [49]. The following issues were identified as driving early attrition:

- Command climate at the battalion
- Toxic/poor unit level leadership
- Job dissatisfaction due to poor fit
- Perceived hierarchy of MOSs with a bias in favor of combat-related jobs
- Monotonous, purposeless, or tasks unrelated to MOSs
- Unpredictable work hours and obligations/limited time outside work
- Lack of ability to use education benefits due to a lack of time or unpredictable schedule
- Training Cycles
 - Lack of understanding about the importance of training
 - Poor communication about training schedules, which made it hard to plan around
 - Lack of time for mentorship due to compressed training schedules
 - Burnout and family stress
- Barracks location, conditions, and quality
- Lack of social supports from non-commissioned officers (especially in junior enlisted Soldiers)

Also related to command climate is the issue of sexual harassment and sexual assault. Another Rand Study found that where rates of sexual harassment are high, Service Member sexual assault risk is increased, even when controlling for other factors. Almost all installations housing aviation units had an increased risk of sexual assault for women in 2018 [50]. This finding suggests that command climate, unit dynamics, and/or local cultural norms likely play a role. The study also found career management field and deployment OPTEMPO was associated with higher risk. The aviation career management field for women had a sexual assault risk of approximately 7% while men had a less than 0.5% risk in 2018 [50]. Rand also found that the services are losing 16,000 manpower years prematurely every year as Service Members who are sexually assaulted are twice as likely to leave the military; this is especially true for men [51]. Sexual harassment and sexual assault are associated with a number of mental health issues such as PTSD, anxiety, depression, and suicidal ideation [52, 53].

Challenges to mental readiness may exhibit themselves as discipline/antisocial behaviors and with support or treatment may resolve without a long-term negative impact on a Soldier's career. For example, Service Members who suffered a sexual assault were 1.4 times more likely to have been discharged for "failure to adhere to standards or expectations" [51]. Another common cause of disciplinary issues, drinking can be a sign of mental health issues. The link between binge and heavy alcohol drinking and combat exposure and/or combat-related brain

injury is well established [54, 55]. The 2018 Health Related Behaviors Survey found binge drinking was high across all services. The Army reported 30.5% of Soldiers binged within the past 30 days; W01-W05 had a rate of 30.4%. Service Members across all branches returning from a recent deployment report increased binge drinking and substance use [56].

Cognitive Workload.

Unlike the challenges described above, cognitive workload is of particular concern to the aviation community due to the complexity of the mission and the aircraft pilots face when in the air. Cognitive workload (CW) is the necessary mental processing effort needed to engage in a task or set of tasks. CW requires the combination of known facts held in long-term memory, awareness of the current situation, and information processing through working memory. The amount of CW capacity differs between individuals and is task dependent. Van Acker, Parmentier [57] described mental workload as “*a subjectively experienced physiological processing state, revealing the interplay between one’s limited and multidimensional cognitive resources and the cognitive work demands being exposed to.*”

CW is defined by the interaction between an individual human operator and a specific task. Operators with larger working memories, specific personalities, and propensities for anxiety, higher emotional intelligence, and different cognitive styles experience cognitive overload effects differently and have a different set of workload management tools. In addition, day-to-day, individual-level drivers of cognitive overload perception include operator-level or mission-level set criteria, motivation, strategies, sleep deprivation, and experience [58]. Because CW is specific to the individual (as a multi-faceted and complex being) and the task, performance is enhanced with high mental readiness.

Opportunities.

Mental readiness is an individual or team’s ability to think, feel, and act in a manner that optimizes performance in a demanding environment or with occupational and combat-specific tasks. Mental readiness includes the ability to integrate cognitive, emotional, and interpersonal capabilities. Mental readiness is difficult to standardize and measure. Mental readiness doctrine provides tools, techniques, and resources for Soldiers and teams engaged in the development, sustainment, or restoration of mental readiness. Soldiers must possess exceptional mental flexibility and endurance, morals and ethics, self-initiative, and an ability to operate within the commander’s intent. Mentally ready Soldiers can leverage protective factors against physical and environmental stressors typically encountered in complex military environments [4]. Leadership has an important role in creating a command climate that supports both individual and unit mental readiness.

Recommendations.

- 1. Use the Goal, Plan, Do, Check strategy.** Leaders should develop plans to accomplish the goal. The plan consists of the way a Soldier will be coached to include the tactics, techniques, and procedures used to promote or optimize the development of the mental capability.
 - Goal setting is an effective tool for maintaining positive emotions. By defining short-term and long-term goals, small accomplishments are recognized along the way to overall achievement.

2. Help Soldiers develop cognitive skills. Cognitive skills training uses various methods to optimize cognitive load. These methods include limiting divided attention, breaking down new information into parts, and using visual and auditory strategies.

- Soldiers must optimize short-term memories to create long-term memories, which is referred to as optimizing cognitive load.
- Cognitive load overwhelms the Soldier when the incoming information is greater than the available cognitive resources. Soldiers forget the new information resulting in poor performance.
- Soldiers can improve intrinsic load by reducing or simplifying tasks, using learning cues, or applying memory cues such as an acronym.
- Personal reflection allows Soldiers to understand why or how they react to certain triggers or feelings and to construct a response that allows improved performance. Spending several minutes each day reflecting on triggers, beliefs, and reactions can improve the ability to sort through sensory input.
- Application of mental performance training during intense physical training improves Soldiers' abilities to pay attention and make better decisions when under physical duress.
- A routine can help Soldiers improve their attention.
- Intentional breathing can influence heart rate. By inhaling for a five- to seven-second count and exhaling for a five- to seven-second count, Soldiers can slow heart rate, and increase time for increased oxygen exchange to take place in the lungs. Soldiers can repeat this slow inhalation and exhalation for a few repetitions several times per day.
- Performance imagery is a mental readiness skill. It is the mental rehearsal or re-creation of an occupational task or experience to improve performance of that task.

Resources.

- Military OneSource – Mental Health – The Essentials
<https://www.militaryonesource.mil/health-wellness/mental-health/mental-health-support/mental-health-support-the-essentials/>
- U.S. Department of Veteran's Affairs Mental Health Website
<https://www.mentalhealth.va.gov/>

References

1. Department of the Army, *The U.S. Army's System for Enhancing Soldier Readiness and Lethality in the 21st Century*. 2020, Department of the Army: Washington, DC.
2. Kelly, T., et al., *An Assessment of the Army's Tactical Human Optimization, Rapid Rehabilitation and Reconditioning Program*. 2013: RAND Corporation.
3. Whalen, S., *Interview with 160th Human Performance and Wellness Program director*, H. Plummer, Editor. 2021: Fort Rucker, AL.
4. Department of the Army, *Field Manual 7-22: Holistic Health and Fitness*, Headquarters, Editor. 2020, Department of the Army: Washington, DC.
5. Shender, B., et al., *Determination of Head and Neck Loads and Moments During Tactical and Rotary Wing Maneuvering Acceleration*. 2001.
6. Ballard, M., A.M. Madison, and V. Chancey. *Human Response Effects to Whole Body Vibration in Aviation: A Brief Review*. 2020.
7. Gaydos, S.J., *Low back pain: considerations for rotary-wing aircrew*. *Aviat Space Environ Med*, 2012. 83(9): p. 879-89.
8. Amoroso, P., et al. *A Baseline Historical Analysis of Neck and Back-Related Morbidity in the U.S. Army: Occupational Risks Potentially Related to Head-Supported Mass*. 2005.
9. Walters, P., et al. *Prevalence of Neck and Back Pain amongst Aircrew at the Extremes of Anthropometric Measurements*. 2012.
10. Walters, P., et al. *Spinal Pain and Occupational Disability: A Cohort Study of British Apache AH Mk1 Pilots*. 2013.
11. Pelham, T.W., et al., *The etiology of low back pain in military helicopter aviators: prevention and treatment*. *Work*, 2005. 24(2): p. 101-10.
12. Maresh, R.W., A.D. Woodrow, and J.T. Webb, *Handbook of Aerospace and Operational Physiology*. 2016, Air Force Research Laboratory: Wright-Patterson AFB, OH.
13. U.S. Army Morale, W., and Recreation,. *MWR Sports and Fitness*. 2021 12/17/2000; Available from: <https://www.armymwr.com/programs-and-services/sports-fitness>.
14. Army Performance Triad. *About Army Wellness Centers*. 2021 8/31/2021 9/13/2021]; Available from: <https://p3.amedd.army.mil/my-army-wellness-center/about>.
15. U.S. Army ARNG Warrior Training Center. *Master Fitness Trainer Course*. 2021; Available from: <https://www.benning.army.mil/Tenant/WTC/MFTC.html>.
16. Harvard T.H. Chan School of Public Health. *Healthy Food Environment*. 2021 9/16/21]; Available from: <https://www.hsph.harvard.edu/obesity-prevention-source/obesity-prevention/food-environment/>.
17. Hodgson, K., *Planning For Food Access and Community-Based Food Systems: A National Scan and Evaluation of Local Comprehensive and Sustainability Plan 2012*, Robert Wood Johnson Foundation, .
18. Downs, S.M., et al., *Food Environment Typology: Advancing an Expanded Definition, Framework, and Methodological Approach for Improved Characterization of Wild, Cultivated, and Built Food Environments toward Sustainable Diets*. *Foods* (Basel, Switzerland), 2020. 9(4): p. 532.
19. Chukwura, C.L., et al., *'Nutrition is out of our control': soldiers' perceptions of their local food environment*. *Public health nutrition*, 2019. 22(15): p. 2766-2776.
20. Delgado-Howard, C., *Better Barracks for Single Soldiers: An Exploratory Study of Unaccompanied Personnel Housing at Fort Hood, TX*. 2018, State University of New York at Buffalo.

21. Malkawi, A.M., et al., *Dietary, physical activity, and weight management interventions among active-duty military personnel: a systematic review*. Military Medical Research, 2018. 5(1): p. 43-43.
22. Baltos, C., *Army Finding New Ways to Feed Soldiers, Bring Nutritious Food to Installations* in *Army.mil*. 2021, U.S. Army: Online.
23. Calvert, T., *Warrior Inn DFAC Meal Prep Program*, t.I.D. 2nd Infantry Brigade Combat Team, Editor. 2020, Department of Defense Videos.
24. Weitzman, S., *Strategic Spirituality: Positive Psychology, the Army, and the Ambiguities of "Spirituality Fitness"*. Journal of the American Academy of Religion, 2021. 89(1): p. 240-271.
25. National Academies of Sciences, E. and Medicine, *Strengthening the Military Family Readiness System for a Changing American Society*, ed. K.W. Kizer and S. Le Menestrel. 2019, Washington, DC: The National Academies Press. 384.
26. Brémault-Phillips, S., et al., *Spirituality and Moral Injury Among Military Personnel: A Mini-Review*. Frontiers in Psychiatry, 2019. 10(276).
27. Seddon, R.L., E. Jones, and N. Greenberg, *The role of chaplains in maintaining the psychological health of military personnel: an historical and contemporary perspective*. Mil Med, 2011. 176(12): p. 1357-61.
28. Hill, P.C., et al., *Conceptualizing Religion and Spirituality: Points of Commonality, Points of Departure*. Journal for the theory of social behaviour, 2000. 30(1): p. 51-77.
29. Puchalski, C., et al., *Improving the quality of spiritual care as a dimension of palliative care: the report of the Consensus Conference*. J Palliat Med, 2009. 12(10): p. 885-904.
30. Saunders, D., et al., *Varieties of Religious (Non)Affiliation: A Primer for Mental Health Practitioners on the "Spiritual but Not Religious" and the "Nones"*. J Nerv Ment Dis, 2020. 208(5): p. 424-430.
31. Joint Chiefs of Staff, *Religious Affairs in Joint Operations*. 2018, Joint Chiefs of Staff,.
32. The Army Historical Foundation. *U.S. Army Chaplain Corps*. 2021 9/21/21]; Available from: <https://armyhistory.org/u-s-army-chaplain-corps/>.
33. Drescher, K.D., et al., *An Exploration of the Viability and Usefulness of the Construct of Moral Injury in War Veterans*. Traumatology, 2011. 17(1): p. 8-13.
34. Hall, N.A., et al., *Moral injury, mental health and behavioural health outcomes: A systematic review of the literature*. Clin Psychol Psychother, 2021.
35. Jordan, A.H., et al., *Distinguishing war-related PTSD resulting from perpetration- and betrayal-based morally injurious events*. Psychol Trauma, 2017. 9(6): p. 627-634.
36. Andresen, F.J., et al., *Institutional betrayal following military sexual trauma is associated with more severe depression and specific posttraumatic stress disorder symptom clusters*. J Clin Psychol, 2019. 75(7): p. 1305-1319.
37. Monteith, L.L., et al., *Perceptions of Institutional Betrayal Predict Suicidal Self-Directed Violence Among Veterans Exposed to Military Sexual Trauma*. J Clin Psychol, 2016. 72(7): p. 743-55.
38. Williams, M., A. Heany, and S. Holmes, *Posttraumatic Stress Disorder and Racial Trauma*, National Center for PTSD, Editor. 2021, National Center for PTSD,: White River Junction, VT.
39. Williamson, V., et al., *The Relationship between of Moral Injury and Radicalisation: A Systematic Review*. Studies in Conflict & Terrorism, 2021: p. 1-27.
40. Witt, L.A. and N. Fedorowicz, *The Psychological Processes Underlying Political and*

- Ideological Extremism*. 2021, Directorate of Research Development and Strategic Initiatives,; Patrick AFB, FL.
41. Vitali, J.D., *Fueling The Fire: An Examination of Right-Wing Extremism In The United States Over the Last Decade*. 2020.
 42. Department of Defense, *2019 Demographics of the Military Community*. 2019, Department of Defense.
 43. Randel, B. *The Army Needs a Better Solution for its Pilot Shortage*. 2020 6/25/20 [cited 2021; Available from: <https://mwi.usma.edu/army-needs-better-solution-pilot-shortage/>].
 44. Strong, J.D., et al., *2020 Military Family Lifestyle Survey Comprehensive Report*; . 2020.
 45. Maury, R. and B. Stone, *Military Spouse Employment Report*. 2014, The Institute for Veterans and Military Families,; Syracuse, NY.
 46. Jowers, K., *Many military families, caught in a housing crunch, are suffering this PCS season*, in *Military Times*. 2021, Military Times: Washington DC.
 47. U.S. Department of Defense, *DoD Authorizes a Temporary Increase to 2021 Basic Allowance for Housing Rates for Certain Locations*. 2021, U.S. Department of Defense,; Washington DC.
 48. Kime, P. *Senate Panel Takes Military Housing Companies to Task for Failing Their Tenants*. 2019 02/14/2019 [cited 2021; Available from: <https://www.military.com/daily-news/2019/02/14/senate-panel-takes-military-housing-companies-task-failing-their-tenants.html>].
 49. Marrone, J.V., et al., *Organizational and Cultural Causes of Army First-Term Attrition*. 2021, Santa Monica, CA: RAND Corporation.
 50. Matthews, M., et al., *Organizational Characteristics Associated with Risk of Sexual Assault and Sexual Harassment in the U.S. Army*. 2021, Santa Monica, CA: RAND Corporation.
 51. Schell, T.L., et al., *The Relationship Between Sexual Assault and Sexual Harassment in the U.S. Military: Findings from the RAND Military Workplace Study*. 2021, Santa Monica, CA: RAND Corporation.
 52. Kimerling, R., et al., *Military-related sexual trauma among Veterans Health Administration patients returning from Afghanistan and Iraq*. *American journal of public health*, 2010. 100(8): p. 1409-1412.
 53. Suris, A. and L. Lind, *Military sexual trauma: a review of prevalence and associated health consequences in veterans*. *Trauma Violence Abuse*, 2008. 9(4): p. 250-69.
 54. Bray, R.M., J.M. Brown, and J. Williams, *Trends in Binge and Heavy Drinking, Alcohol-Related Problems, and Combat Exposure in the U.S. Military*. *Substance Use & Misuse*, 2013. 48(10): p. 799-810.
 55. Adams, R.S., et al., *Frequent binge drinking after combat-acquired traumatic brain injury among active duty military personnel with a past year combat deployment*. *The journal of head trauma rehabilitation*, 2012. 27(5): p. 349-360.
 56. Meadows, S.O., et al., *2018 Department of Defense Health Related Behaviors Survey (HRBS) Results for the Active Component*. 2021: Santa Monica, CA.
 57. Van Acker, B.B., et al., *Understanding mental workload: from a clarifying concept analysis toward an implementable framework*. *Cognition Technology & Work*, 2018. 20(3): p. 351-365.
 58. Vogl, J., et al., *Annotated Bibliography: Cognitive Workload of Aviators with Various Levels of Experience*. 2021: Fort Rucker, AL.

Appendix A. Acronyms and Abbreviations

ACFT	Army Combat Fitness Test
AWCs	Army Wellness Centers
BAH	Basic Allowance for Housing
BCTs	Brigade Combat Teams
CSF	Comprehensive Fitness Program
DFAC	Dining Facility
FRG	Family Readiness Group
H2F	Holistic Health and Fitness
HPW	Human Performance and Wellness
MI	Moral Injury
MOS	Military Occupational Specialty
MSKI	Musculoskeletal Injury
MWR	Army Moral, Wellness, and Recreation
NVGs	Night Vision Goggles
OPTEMPO	Operational Tempo
PD	Preparation Drill
PRT	Physical Readiness Training
PT	Physical Training
PTSD	Posttraumatic Stress Syndrome
SOF	Special Operations Forces
THOR3	Tactical Human Optimization, Rapid Rehabilitation, and Reconditioning
UPH	Unaccompanied Personnel Housing
USAARL	U.S. Army Aeromedical Research Laboratory

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Appendix B. Selected Illustrated Exercises

Preparation Drill Exercises



Figure B1. Bend and reach. Prepares the soldier for more intense exercises such as squatting, rolling, and climbing. 5-10 repetitions are recommended.



Figure B2. Rear lunge. Promotes flexibility, strength, and balance in the hips and legs. 5-10 repetitions are recommended.



Figure B3. High jumper. Promotes the development of explosive strength. 5-10 repetitions are recommended.



Figure B4. Rower. Promotes improvements in abdominal strength and total body coordination. 5-10 repetitions are recommended.



Figure B5. Squat bender. Promotes improvements in strength, endurance, and flexibility in the lower back and thigh muscles. 5-10 repetitions are recommended.



Figure B6. Windmill. Promotes improved flexibility of the spine and shoulders. 5-10 repetitions are recommended.

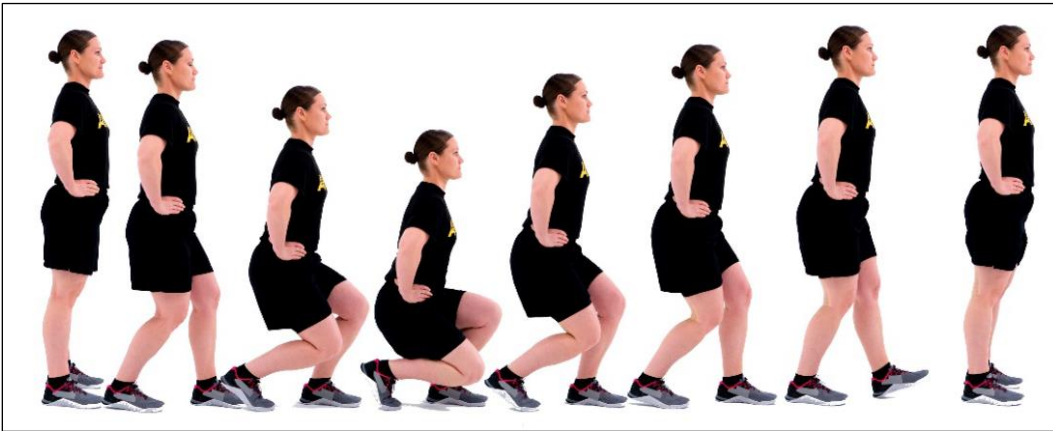


Figure B7. Forward lunge. Develops balance and leg strength. 5-10 repetitions are recommended.

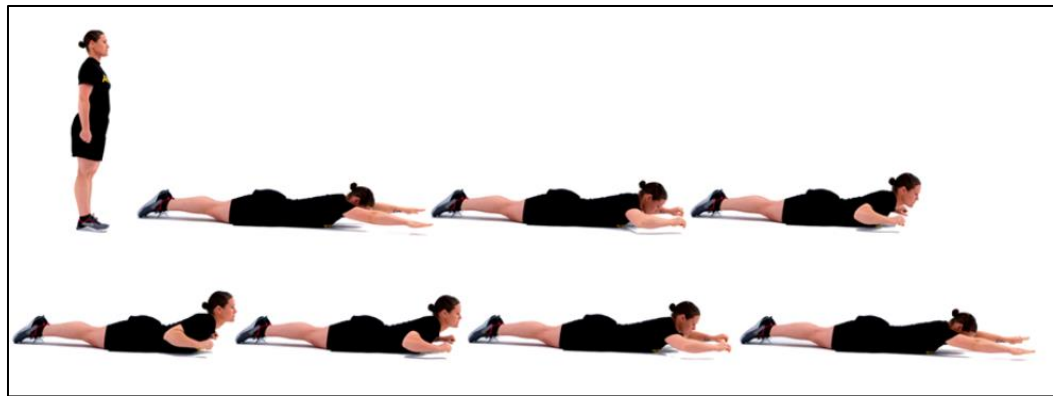


Figure B8. Prone row. Develops strength of the neck, upper back, and shoulders. 5-10 repetitions are recommended.

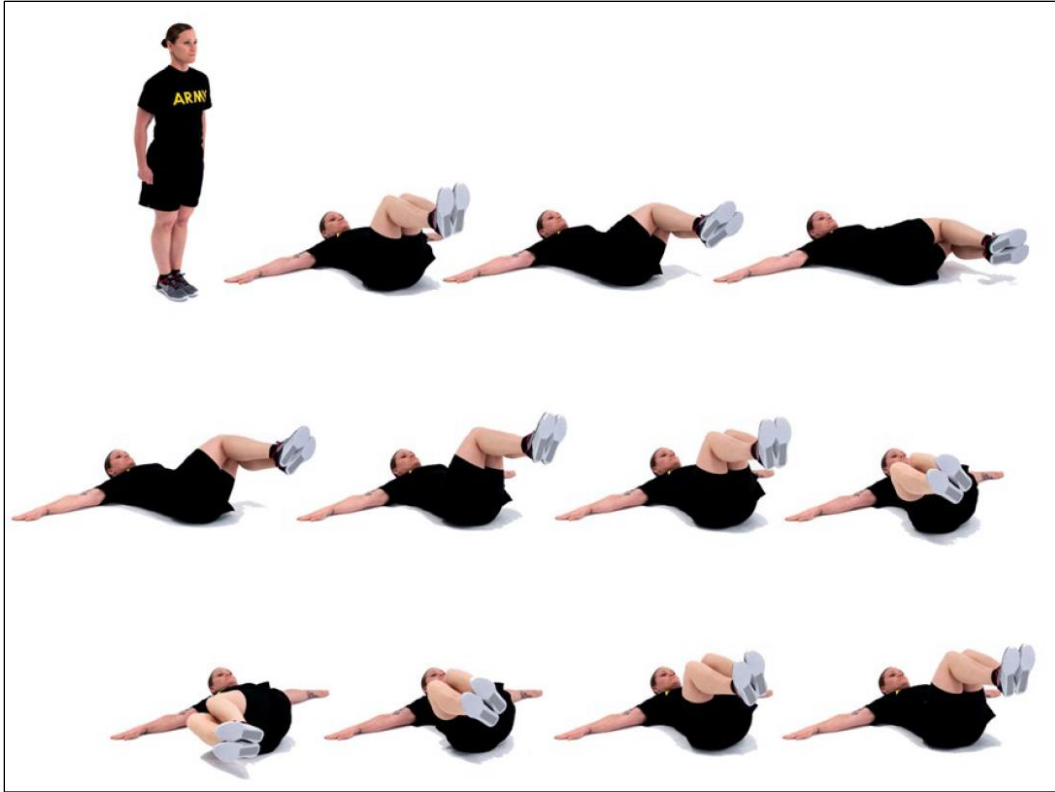


Figure B9. Bent-leg body twist. Promotes strengthening of the trunk and hip muscles and flexibility of the trunk. 5-10 repetitions are recommended.

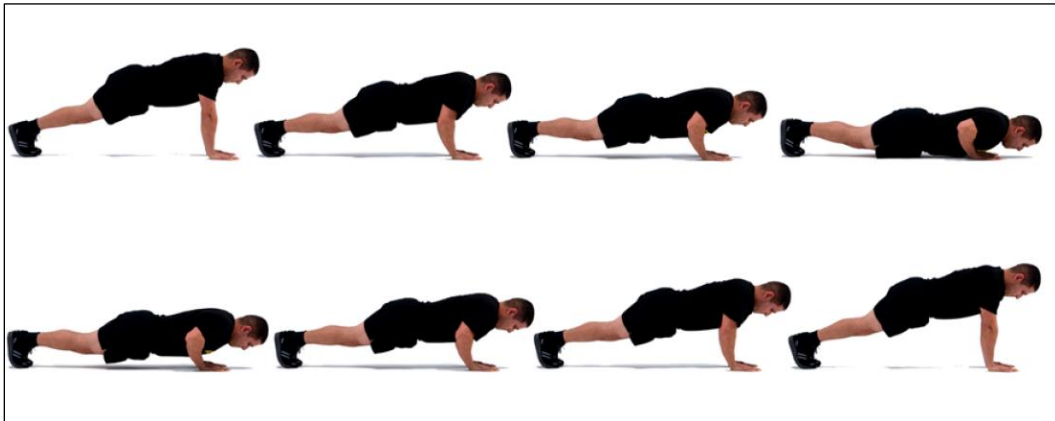


Figure B10. Push-up. Develops strength in the muscles of the chest, shoulders, arms, and trunk. 5-10 repetitions are recommended.

Recovery Drills

Recovery drills target a range of movements that require structural strength, stability, flexibility, and mobility. Modifications of each exercise exist and should be performed by Soldiers reconditioning from an injury, who are deconditioned, or are new to the Army.



Figure B11. Overhead arm pull. Develops flexibility in the arms, shoulders, and trunk. The overhead arm position should be held for 20-30 seconds.

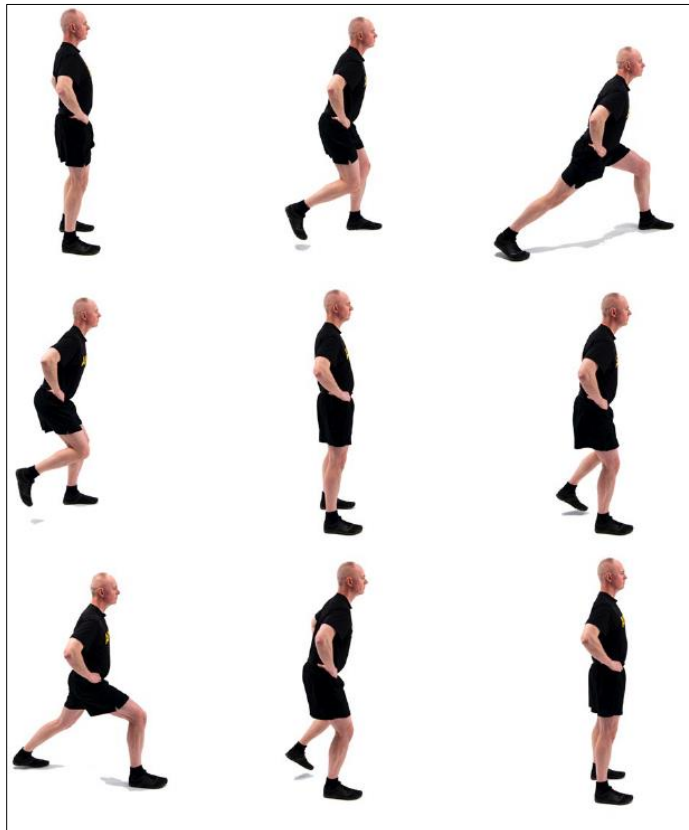


Figure B12. Rear lunge. Promotes flexibility of the hip musculature. The lunge position should be held for 20-30 seconds.



Figure B13. Extend and flex. Promotes hip and abdominal muscle flexibility. The downward and upward positions should be held for 20-30 seconds.



Figure B14. Thigh stretch. Develops flexibility in the quadriceps and hip flexor muscles. The stretch should be held for 20-30 seconds.

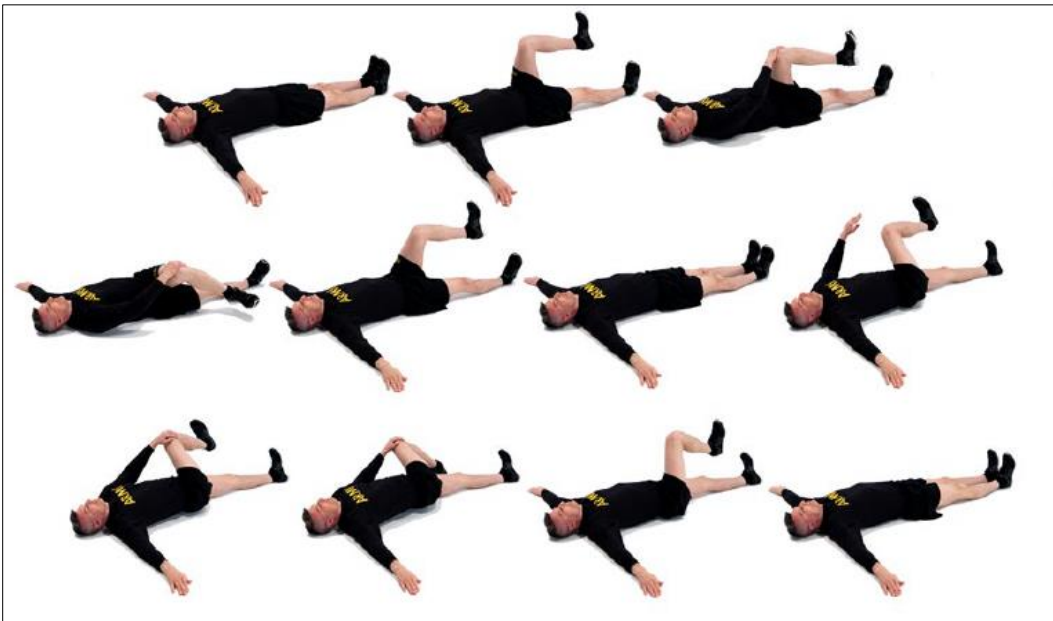


Figure B15. Single-leg over. Develops trunk mobility. The stretch should be held for 20-30 seconds.



Figure B16. Groin stretch. Develops flexibility of the hip. The stretch should be held for 20-30 seconds.



Figure B17. Calf stretch. Develops flexibility of the ankle. The stretch should be held for 20-30 seconds.



Figure B18. Hamstring stretch. Develops flexibility of the hamstrings and low back. The stretch should be held for 20-30 seconds.

U.S. Army Aeromedical Research Laboratory Fort Rucker, Alabama

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