

## Why Total Force Fitness?

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**ABSTRACT** In this article we describe a new paradigm for “Total Force Fitness.” In an age of sustained conflict, fitness requires continuous performance, resilience, and recovery of the whole person, not just the physical body. Injury from these conflicts is physical and mental, social and spiritual. It impacts the service members, their families and communities, and the nation. It is now abundantly clear that if our service members are to protect the freedom and security of our nation, we must move beyond the idea of simply having a sound body to a more holistic view of health and fitness, that includes both mind and body. We illustrate how science supports such a paradigm with research on how mind-body-spirit and community all interact to sustain health and accelerate healing in the path of stress and injury. A shift to total force fitness will be difficult, but essential, perhaps even for our very survival.

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—A chain is only as strong as its weakest link.

### INTRODUCTION

Warfighters and service members are the most valuable assets in the military for accomplishing our mission of defending the country. This mission has become progressively more complex as the United States is currently engaged in multiple conflicts resulting in unparalleled operational demands. Resilience to changing environments and the strains of war and multiple deployments is clearly required given the current stress on the force. Extensive resources are expended on insuring that equipment and materials are state-of-the-art and in good repair, whereas resources for maintaining and improving human resilience, performance, and health are more limited. Human health and performance optimization (HPO) are increasingly recognized as the cornerstones of an effective and efficient military. Most research has focused on the prevention of disease through physical examinations, vaccinations, health risk screening, enhanced exercise, and the reduction of unhealthy habits, such as smoking and alcohol use. The Department of Defense (DoD) invests a considerable amount in research and delivery of products in these screening, assessment, and treatment areas, but significantly less on health promotion, resilience enhancement, and HPO.

### WHY DO WE NEED A NEW APPROACH TO FITNESS?

Why do we need a new approach to fitness in the military? Why should we change the current approach to fitness, especially in the midst of two wars? And, why now? The answer is that the current paradigm is failing us. The demands on current warfighters and their families are overwhelming the resilience capacity of our service members. The military services are experiencing rampant post-traumatic stress disorder (PTSD), scores of injuries, family casualties, and increasing suicide rates. As described below, the burden is high and the framework of the current response does not match the circumstance or need.

### The Scope of Trauma Response

The current wars in Iraq (Operation Iraqi Freedom, OIF) and Afghanistan (Operation Enduring Freedom, OEF) are returning thousands of warfighters with psychological mind injuries such as PTSD and physical mind-body injuries, such as traumatic brain injury (TBI), many with long-term symptomatic and functional consequences.<sup>1,2</sup> Trauma to the head and neck occurs in 15–20% of all battle injuries, and mild TBI may afflict up to 28% of all deployed warfighters.<sup>3,4</sup> Over 46% of blast patients and 55% of amputees at Walter Reed Army Medical Center have sustained comorbid brain injury. Nearly 20% of warfighters returning from the wars in Iraq and Afghanistan suffer from diagnosable PTSD,<sup>5,6</sup> and nearly 40% report stress-related symptoms and dysfunction that significantly compromise reintegration into a full, productive life. As stated by Potash, the wounded veteran presents the health care system with “new challenges” not the least of which is the “... growing number of patients with comorbid chronic pain ... brain trauma and ... attendant cognitive issues.”<sup>7</sup>

Triggered by combined mind-brain/body injuries (MBI), the various manifestations of the trauma response share many common pathophysiological and recovery mechanisms. Evidence supports the potential for the development, expression, and durability of certain types of pain and psychopathologies (of various severities) in which genotypic factors could be either latent or code for differentially expressed phenotypes (e.g., of ion channels, neurotransmitters, receptors, and synaptic

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The views expressed in this article are those of the authors and do not necessarily represent the official policy or position of the U.S. Army Medical Command, U.S. Air Force, or the Department of Defense.

elements). The triggers for differential expression could reflect from the internal and external environmental factors. In such genotypically predisposed individuals, environmental and/or psychosocial insult can induce a core constellation of common symptoms that include:

- (1) psychological and emotional distress (e.g., depression, anxiety, anger),
- (2) cognitive impairment,
- (3) chronic and often refractory pain of organic and psychosomatic origins,
- (4) drug/opioid desensitization (with abuse potential),
- (5) somatic (sleep, appetite, sexual, and energy) dysfunction.

Best estimates suggest that multiple comorbidities after exposure to trauma may be present in a substantial percentage of wounded military personnel. Villano et al.<sup>8</sup> and Shipherd and coworkers<sup>9</sup> have shown that psychiatric conditions, such as depression and anxiety, appear to be responsible for the co-occurrence of a syndrome of chronic pain and heightened stress reactivity, including frank presentation of PTSD, in 24 to 66% of combat-wounded veterans of OIF/OEF. The impairment of cognitive abilities in patients with chronic pain and PTSD, and the reported incidence and prevalence of chronic pain, PTSD, other neuropsychiatric conditions, and cognitive deficits in wounded OIF/OEF troops are also described by Beck and colleagues.<sup>10,11</sup> These results are strengthened by the report that over 60% of these warfighters have been diagnosed with some form of brain injury or apparent constellation of cognitive, emotional, and behavioral features resulting from neural insult.<sup>9</sup> This constellation of trauma-related manifestations can occur after any trauma but is especially prevalent now as trauma responses. (Fig. 1)

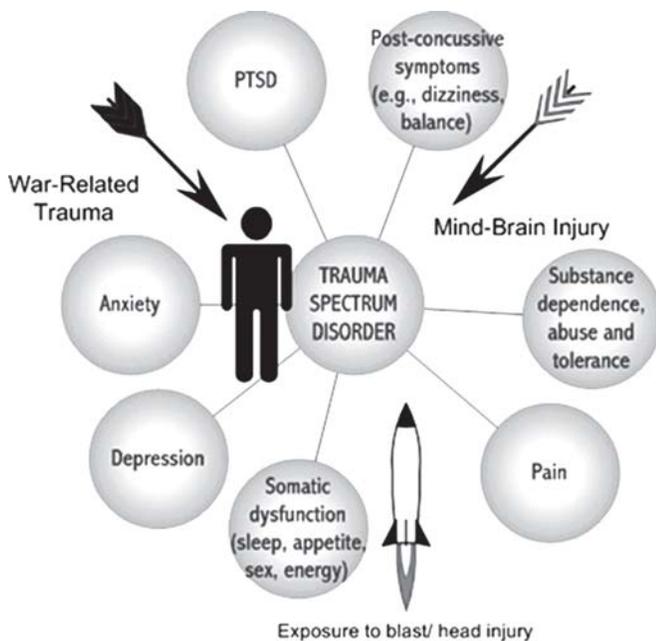


FIGURE 1. Trauma Spectrum Disorder.

**Failure to Address the Full Trauma Response**

The full expression of the MBI complex often manifests following treatment of the acute neuropsychological symptoms caused by in-theater trauma, with signs and symptoms reflective of progression along this neuropsychopathologic spectrum in these military personnel.<sup>12</sup> This pathological progression may be due to the psychophysiological effects of increased allostatic loads incurred by social, familial, occupational, and/or economic stressors, and it advances many service members down the slippery slope of resilience failure, symptomatic worsening, psychosocial stress, and life disruption.<sup>13</sup> These persons are then classified into categories on the basis of mind, brain, or bodily damage and sent to specialty clinics (psychiatry, neurology, rehabilitation medicine, etc.) that address selected components of the trauma response (psychological, neurologic, or physical). Often they simply do not show up for care (avoiding treatment altogether for symptoms that carry a social stigma) or show up repeatedly at a later time in primary care clinics with a variety of somatic complaints involving dysfunctions in sleep, appetite, energy and/or sexual activity, or with law enforcement after family and community violence. The former results in under diagnosis and treatment and the latter increases the burden on primary care, social and legal services from chronic, unremitting illness. The latter may arise from so-called “sub-threshold” PTSD or “mild to moderate” TBI, which often goes undiagnosed or ineffectively treated.<sup>14</sup> These patients may present weeks to months after trauma exposure with symptoms and dysfunctions that chronically burden the defense or veteran’s health care delivery systems.<sup>7,14</sup> During these months they may be performing suboptimally for the mission with increasing risk of becoming casualties during future deployments. Clearly, the zero-sum nature of this situation is not appropriate to the sound practice of health care and the military—both technically and ethically—and calls for a more innovative and comprehensive approach to addressing the full consequences of trauma response.

**The Need to Focus on the Whole System of Trauma Response**

Clearly this epidemiologic and mechanistic data indicate a large and growing clinical problem (with recent estimates of this pattern of comorbidity within this population of wounded at as much as  $n = 10,000$ ).<sup>15</sup> These patterns of comorbidity may reflect underlying, common pathoetiologic variables and mechanisms, but emphasize the critical need for different approaches to holistically address the confounding variables and mechanisms. Moreover, they equally compel and sustain the need for “... the development of intervention based on a new integrated care model.”<sup>19</sup> In addition, the long-term impact of mind–brain/body injuries extends beyond individuals as it touches their families and communities, a result that too often goes unaddressed by the health care system.<sup>16</sup> From the perspective of the person, family, and community there is good reason to consider the whole person (rather than individual

components) and investigate integrative, multidimensional (mind, body, symptom, function) approaches to classification and treatment.<sup>17</sup>

Because of the complex nature of the human trauma response, the current standards of care for the service member are not maximally effective, nor do they fully address the biopsychosocial aspects and spectrum effects of trauma. Such care should address the whole person, family, and community experience of trauma and seek to facilitate prevention, cure, and healing. Such an integrated paradigm includes contextual understanding of person-specific variables, uses innovative approaches based on rigorous methods of empirical evaluation, and should narrow the gap between science, health care, and training.<sup>8</sup> We cannot sustain our force by staying within the present paradigm. A new paradigm that leverages needs of the current wars, the science we know, and the best we can offer to the whole community is essential. A system that responds to the changing performance demands is imperative in these times of war and multiple deployments. To help frame this new approach, the Chairman of the Joint Chiefs of Staff called for defining "Total Force Fitness for the 21st Century."

#### **THE NEW PARADIGM: TOTAL FORCE FITNESS**

From December 6 to December 9, 2009, at the request of Admiral Mullen, Chairman of the Joint Chiefs of Staff (CJCS), 70 experts, drawn from the operational, scientific, and educational communities, came together to integrate the components of health and fitness under the title "Total Force Fitness for the 21st Century." At this conference, the dimensions of total force fitness were defined and some of the currently available metrics for assessing total force fitness were discussed. The following questions were posed: How do we get to total force fitness? What does total force fitness mean? What are the best strategies to move total force fitness into the training of the warfighter? And, how can we measure the components of total force fitness in a simple and integrated fashion? At a previous conference on HPO, Colonel Francis O'Connor outlined the major capability gaps that our warfighters face in mission performance.<sup>18</sup> The conditions that prevent optimal mission performance in the military involve three major areas directly connected to HPO and total force fitness: physical injury, being overweight, and psychosocial dysfunction.

Looking at the psychological components alone, nearly 40% of service members report symptoms and dysfunctions that significantly prevent a full and productive life.<sup>5</sup> Stress and psychological symptoms reduce the ability to maintain appropriate weight, fitness, and nutrition and increase the likelihood of developing chronic pain and dysfunction. Additionally, being overweight and having poor physical fitness compromises proper performance and often results in the discharge of service members each year. We are losing people due to lack of physical fitness despite mandatory testing. What we do not consistently mandate are programs that would provide the core (basic) physical fitness needed to build onto for the

special physical fitness requirements of the individual's mission. There is also no guidance on how to build both the physical and mental resilience of our warriors and their families so that they can better withstand and recover from the physical and mental insults of military service during training, deployment, war, and reintegration. Finally, lack of physical fitness contributes to injury, which is the number one cause of lost duty days among service members.<sup>18</sup> What became clear at this conference is that these facts represent the tip of the iceberg and that a community approach to the management of health and fitness is required. Although major medical diseases require standard medical treatment, more rapid and widely applicable nonmedical training approaches are needed for the majority of those who cannot perform optimally, for whatever reason. Optimizing stress management skills and maintaining a healthy physiology before and during deployment, coupled with a process for rapid improvement and reintegration into normal life and optimal functioning on return from wartime, may well prevent the progression to PTSD and the development of chronic pain and may well reduce the chances of obesity, injury, and poor performance. Thus, a holistic approach that integrates the current domains of health and function is requisite for achieving total force fitness.

#### **THE DOMAINS OF TOTAL FORCE FITNESS**

What are the conditions for optimum performance, human resilience, and flourishing? Converging research reveals that four foundational pillars are required for optimal function: (1) physical fitness (activity) and rest, (2) proper nutrition and substance use, (3) psychological resilience, and (4) social integration. This framework, called the biopsychosocial model of human functioning and its components, creates an optimal healing environment.<sup>19</sup> It postulates that a comprehensive lifestyle approach involving all four components works synergistically to improve function in all major areas that compromise human function and performance in any venue. Does such a holistic framework work? Yes it does. Reviews of research on comprehensive lifestyle programs show that when properly delivered these programs can attain good adherence and improvement in weight, body mass index, cholesterol, physical fitness, and quality of life.<sup>20</sup> Components of proven comprehensive lifestyle programs form the basis for optimizing performance and attaining total force fitness for military populations. But, optimum performance requires more than attention to just health. During deployment and upon reintegration into the family unit, warfighters are faced with multiple challenges, which include: (1) alertness and sleep rest management issues; (2) stress management from schedule pressure; (3) endurance and rapid recovery; (4) short- and long-term fatigue and functional sustainment in heat, cold, and altitude; (5) knee, leg, ankle, and spine trauma resulting in premature osteoarthritis; (6) a quick ramp-up in fitness, which is not sustained during deployment; (7) nonmission-specific training to prevent injury or psychological trauma; (8) rapid learning requirements and mental hardiness; (9) drug and supplement

side effects and interactions; and (10) pain—physical, psychological, and spiritual.<sup>21</sup> All of these issues must be addressed in a holistic, comprehensive, and effective approach to total force fitness.

**SORTING OUT THE PERFORMANCE CLAIMS THROUGH EVALUATION RESEARCH**

Currently the individual and commander are bombarded with a plethora of products, practices, and programs claiming to enhance performance and improve health and fitness. These include approaches such as team training, mind–body practices, dietary supplements (caffeine), brain stimulation, drugs (sedative hypnotics), electromagnetic machines and special training techniques, functional movement screening, PTSD treatment tapes, stress programs, and meditation. A recent worldwide survey showed that over 60% of service members are regularly taking some type of dietary supplement.<sup>22</sup> Usually supplement use is at the advice of the sales clerk or by getting information from magazines or peers. Evidence-based information is rarely available or rarely translated into a form that can be properly used by the warfighter or their commander. How can commanders and warfighters maximize the health, resilience, and performance of their charges? Credible, relevant and timely information or knowledge of total force fitness is difficult to find.

**FOUNDATIONS OF TOTAL FORCE FITNESS**

The foundations of total force fitness are multilayered as illustrated in Figure 2. First, fitness and performance optimization rest on the foundation of risk reduction, which allows for readiness to respond to challenges and prevent breakdown on physical, psychological, family, and social levels. The next layer of the foundation is health and wellness practices that allow a person to sustain balance and be symptom free. On top of these two levels, are stress resistance and resilience to changing environments. Resilience can only be determined during or after the stress or trauma occurs and the warfighter returns to health and function. Finally, the top layer of this

foundational pyramid is HPO. Performance optimization is determined when functional excellence results in mission accomplishment or post-traumatic growth. It means going beyond simply resisting the challenges of stress and functioning at a new optimal level to face new missions or challenges. Thus, the foundational layers of total force fitness rest on the bases of risk reduction, health and well-being, resilience, and optimal performance.

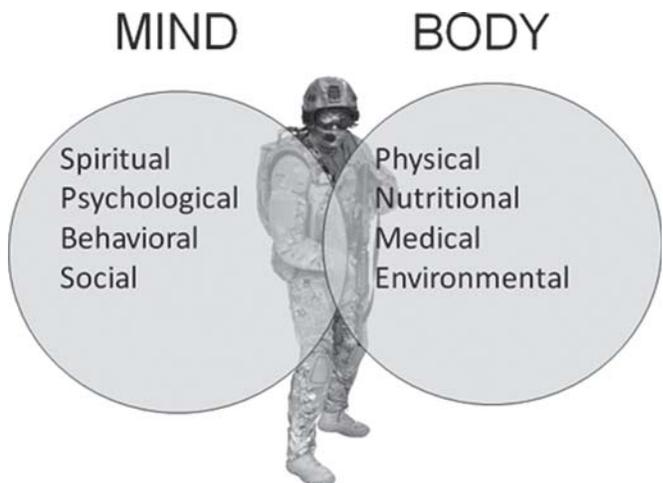
Health is important to the maintenance of total force fitness. Nothing works without health. Wars are won and lost on health. Health arises from our capacity to resist breakdown and rapidly heal and recover. But, what is health? We concur with the World Health Organization’s (WHO) definition of health, “a state of complete physical, mental, and social well-being and not merely the absence of disease” (<http://www.who.int/about/definition/en/print.html>). To this we would add spiritual well-being as a component of total force fitness. Spiritual well-being should not be confused with religion, however, which may or may not be an important part of one’s spiritual well-being. In the military, fitness is manifest in four fundamental ways—prevention, health and well-being, resilience, and optimal functioning. In addition, these foundations must be sustainable throughout the deployment and military lifecycle. Optimal performance during battle and deployment must be balanced against health and sustainable social functioning upon re-entry. This requires a holistic framework wherein all dimensions of human flourishing are addressed.

**INTEGRATING FITNESS DOMAINS**

The total force fitness charge requires us to seamlessly combine the multiple components of fitness in the mind and the body. Within the category of the mind, we include spiritual, psychological, behavioral, and social fitness, whereas within the category of the body, are physical, nutritional, medical, and environmental fitness (Fig. 3). In the current paradigm, these components are usually addressed independently with



**FIGURE 2.** Foundations of Total Force Fitness.



**FIGURE 3.** Total Force Fitness: The New Paradigm.

some being given more emphasis than others. Physical fitness for example, addressed through the performance of pushups, situps, and endurance training, is a part of the military culture. Medical and environmental fitness is also extensively addressed in the military. Recently, a focus on psychological fitness has begun to emerge. However, each of these components typically has its own specialists and delivery methods and resides within its own silo. To achieve total force fitness, the individual warfighter and commander require a more integrated and streamlined approach for monitoring and delivering the changes needed to be resilient and perform optimally.

Figure 4 illustrates where total force fitness is applied on the health–illness continuum relative to our current disease treatment approach. The healthy individual fluctuates within a certain range of function and optimal functioning occurs within the upper part of that range. Stressors, injury, and aging can force the individual over the threshold toward dysfunction where treatment usually occurs. Total force fitness works to the left of that stress, injury, and/or aging to retain health, reduce risk, improve resilience, and enhance performance. Disease management, on the other hand, focuses on symptoms and treatment after the injury. By focusing to the left of the injury, fitness increases the chances that the individual will return to healthy and optimal functioning in the event of environmental stressors and injury. Note: these factors, for the most part, are not dependent upon underlying gene susceptibility. A single genome when placed within its proper optimal functioning environment can flourish. The same genome when placed within a stressful or dysfunctional social, physical, or nutritional environment will degenerate. The question is: what is the environment that supports optimal fitness and function?

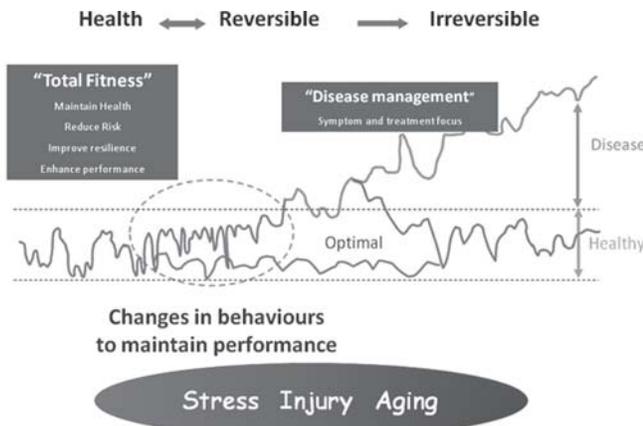
**GETTING TO TOTAL FORCE FITNESS**

The conference, Total Force Fitness for the 21st Century, began by describing the domains of total force fitness. These domains were derived from a variety of sources including current practices on medical fitness, psychological resilience

(e.g., Comprehensive Fitness Program of the Army and Total Family Fitness being implemented within the Navy and the Combat Operational Stress Program), physical fitness and injury screening (e.g., Special Forces and Marines), and integrative health care approaches being piloted in the Air Force and National Guard. The concept of total force fitness encompasses eight domains including medical, environmental, and social, including family, behavioral, spiritual, psychological, nutritional, and physical fitness. Figure 5 illustrates the domains of fitness derived at the conference. The constructs of health, resilience, and human performance require us to look at the intersections across and within each domain. In the next section of this article we provide examples of why it is essential to integrate these domains and not focus only on the most obvious.

**Physical Fitness Is Enhanced by Psychological Factors**

Physical fitness, well ingrained in military culture, is assessed regularly through semiannual testing and regular physical exercise. Time is provided during the work day to maintain physical fitness on many military installations. However, many would say we have a culture of testing not fitness. We often do not require warfighters to be fit for what they do, which is much more specific than just being generally physically fit. We know that one can be physically fit but if a job requires a specific physical activity like loading missiles under a wing, general fitness may not protect from injury. Most fitness trainers believe they can optimize physical function and endurance through general exercises, but should physical fitness be addressed only through such exercise? Research shows that other factors can impact physical fitness and endurance, for



\*Vigdor Gruntz, J. Marco S. Johnson, Adnan A. Pflaster, T. Yehudi (E. M. Durayazhi), The art and practice of systems biology in medicine: mapping patterns of relationships. J Proteome Res. 2007 Apr 4(4):1540-9

**FIGURE 4.** Fitness, Health, Performance Continuum.



**FIGURE 5.** Total Force Fitness Domains.

example, in the psychological domain. A study published in ACE Fitness Matters showed that average lap times could be enhanced by providing athletes something they were told would enhance their performance, even though that substance was a placebo. By calling a drink “super oxygenated water,” subjects ran an average of 83 seconds faster or 3.3 seconds faster per lap than when given “regular” water. Eighty-four percent of the athletes ran faster during the placebo enhancement part of the trial.<sup>23</sup> A recent survey of dietary supplements used in the military showed that service members frequently purchase and consume performance-enhancing products in an attempt to increase their endurance and strength.<sup>22</sup> Although the ingredients of these supplements may not impact performance, the psychological aspects of taking them probably do. Thus, total physical fitness requires attention to the psychological, not just the physical components. Similar arguments could be offered for the behavioral domain.

### **Psychological Fitness Is Enhanced by Nutritional Fitness**

Likewise, is it rational to address resilience by focusing only on the psychological fitness domain? A positive psychology enhancement program is currently being delivered and tested by the Comprehensive Soldier Fitness Program in the Army under the leadership of BG Rhonda Cornum. As with physical fitness, evidence indicates that we must step outside of the psychological fitness domain to attain total force fitness even in the mental health realm. For example, adequate nutrition is an essential component of psychological fitness. A meta-analysis of six trials examining the effect of dietary omega-3 fatty acids (FAs) on depression symptoms showed a significant inverse correlation between the amount of omega-3s with depression and psychiatric symptoms.<sup>24</sup> Supplementing American warfighters who have low levels of omega-3s might provide significant enhancement of mood and resistance to stress. Omega-3s also seem to be related to suicide. A study published in the *American Journal of Psychiatry* showed that low plasma levels of docosahexaenoic acid or DHA (an omega-3 FA) at baseline predicted future suicide attempts at patient discharge.<sup>25</sup> In addition, increased omega-3 FA intake is associated with reduced suicidal ideation.<sup>26</sup> Thus, achieving psychological fitness will require attention to nutrition. Resilience cannot be addressed solely by focusing on the psychological fitness domain in isolation.

### **Medical Fitness Is Enhanced by Social and Spiritual Fitness**

The components of medical fitness are well delineated within the health care system. The management of pain and wound healing are major areas of focus for medical treatment. Although current approaches to pain management include nonsteroidal anti-inflammatory drugs, acetaminophen, analgesics, and various types of opioids, it is well accepted that pain is influenced by psychological, social, and even spiritual components. Case studies have shown that hypnosis or

the belief in God’s blessing can help individuals resist pain, reduce bleeding, and accelerate wound healing. These factors can also be trained through various mind–body approaches. For example, Gonsalkorale 2002 in *The American Journal of Gastroenterology*, reported showing that simple imagery and self-hypnotic techniques can improve and maintain lower abdominal pain thresholds for individuals with chronic abdominal pain.<sup>27</sup> Other studies have shown that social interactions cannot only reduce pain, but improve immune function and enhance wound healing. For example, a study by Kiecolt-Glasier published in *The Archives of General Psychiatry*, 2005 showed that family conflict can significantly influence physical wound healing. Time to heal was delayed by an entire day following a marital conflict as compared to after a supportive social interaction.<sup>28</sup> Dr. Kiecolt-Glasier cites other studies showing that stressful family events can slow local cytokine production at the wound site and promote maladaptive, systematic, proinflammatory production that could lead to accelerated chronic disease later in life.

Mechanisms of these mind–body connections are increasingly being revealed through basic science.<sup>29</sup> Stressors that activate the hypothalamic pituitary adrenal axis cause the release of cortisol and other metabolic mediators, which have multiple systemic effects, inducing cytokines that feedback to the brain. Disruption of these feedback systems can impact the ability to properly respond and function, both cognitively and psychologically. The mind, body, and family are not separate functioning entities. Interventions that focus exclusively on nonpsychological aspects of medical fitness cannot withstand scientific scrutiny. The entire human being—mind, brain, and body—function as an integral whole.<sup>29</sup> Thus, one should not rely on the results of medical fitness assessments alone when considering even its basic medical issues, such as pain and wound healing, without addressing other domains such as social and family fitness.

### **Social Fitness Enhances Cell and Unit Fitness**

Social fitness is multidimensional and includes friends and family, recreation, religion, and hobbies, as well as bosses and peers. Cohesion is an important construct within social fitness, and minimal attention has been paid to the importance of family cohesion. The importance of family fitness and cohesion cannot be underestimated with regard to total force fitness. PTSD, depression, anxiety and, often, physical injuries, ultimately reside within the family unit, regardless of how a family is defined for long-term management. Is it possible to measure social cohesion easily and in a way that can track whether a family has adequate support? This is an area of great importance as well as a challenge to total force fitness. Losada and others have illustrated that assessing personal connectivity of a team is highly correlated with its performance. The emotional space as measured by “other vs. self” shows that high performance teams have high variability in emotional space and an emotional positivity ratio of 3 to 1.<sup>30</sup> Those with lower positivity ratios were shown to be low-performing teams. Thus, unit

and family cohesion are both likely to influence the individual warfighter with regard to unit productivity and performance. Bell and others have proposed a simple metric for assessing the likelihood of social connectivity and its ability to impact individual health and unit performance.<sup>31,32</sup> Thus, social and family fitness are essential to total force fitness and impact performance from such disparate areas as the rate of wound healing to overall unit functioning.

### MEASURING TOTAL FORCE FITNESS

These examples illustrate why a siloed approach to components of fitness is inadequate. Achieving total force fitness involves breaking down the barriers currently between the domains of fitness to develop a system that addresses an integrated whole person, including family, social, physical, and spiritual aspects in addition to providing practical approaches that can change and maintain positive health and behavior within the military environment. To do this, we must develop a comprehensive set of measures of success and use them in an integrated fashion for continual process improvements. Thus, a crucial requirement for moving total force fitness forward is an assessment tool for both the service member and the commander: a “total force fitness index,” if you will.

Measurement of total force fitness would require taking current evidence from each fitness domain and developing simplified, valid, and measurable parameters that can be fed back at the individual, unit, and organizational level. A tool for monitoring and delivering behavioral change of the whole person would be the next step. Figure 6 illustrates what a total force fitness assessment index might look like by using a radar map display for each of the fitness domains in a single graphic. Such a map reflects nutritional, physical, social, spiritual, psychological, behavioral, and medical fitness. By using such a single visual, the strengths and gaps in fitness and performance could be seen as a whole and areas for improvement could be highlighted. A system that provides the command and the DoD with this total force fitness index could provide an overview of where force fitness needs improvement and where it needs to be strengthened. Such a fitness index or map could serve as a guidepost to individuals and commanders and is critical for producing an integrated system for monitoring total force fitness in the DoD.

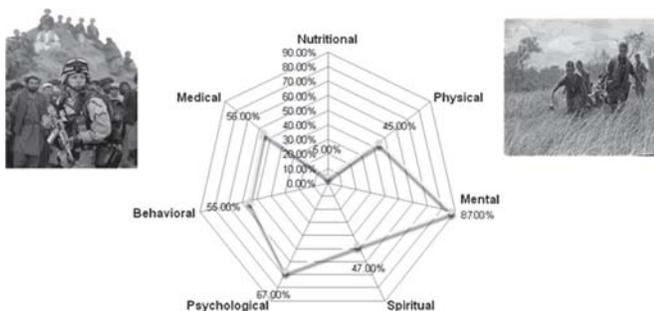


FIGURE 6. A Total Force Fitness Index.

### CONCLUSIONS

Monitoring and evaluating total force fitness will require comparative evaluations across approaches, units, and domains. Without ongoing monitoring and research, the effects of programs and policies delivered on the organizational level and the behaviors on the individual level cannot be assessed. Such evaluations will also require a new paradigm of research that uses information systems for rapidly tracking components of total force fitness and providing easy to understand and usable feedback. A coordinated effort that allows for program and outcome evaluation, a clearinghouse for identifying effective programs, and a mechanism for disseminating those results across the military is needed.

Leadership from top levels will be needed to integrate this new paradigm. The military has been a leader in innovation for millennia when it comes to health and human performance. Widespread application of vaccination, water sterilization, surgical techniques, physical fitness training, nutritional research, and now psychological health and resilience have often been applied first in the military before being disseminated to the civilian community for public health benefit. The same opportunity exists for the development and implementation of a new paradigm of total health and fitness. This approach is most important now that legislation for universal health care has been adopted. Embracing the concept of total force fitness requires the individual to take responsibility, but also that appropriate messages regarding total force fitness are disseminated for all to hear, accept, and embrace.

Never before has the scientific knowledge, medical capacity, war-time need, and political resources come together in a cry for change. But will those in the DoD accept this challenge and seize the day? Getting to total force fitness will require that we use the crisis of the wars as the opportunity to create a new reality for health, healing, and human flourishing for the 21st century.

### ACKNOWLEDGMENTS

The Total Force Fitness conference on which this article was based was supported by award number MDA 905-03-C-0003 (Uniformed Services University of the Health Sciences). The writing of this article was supported by award number W81XWH-08-1-0615-P00001 (United States Army Medical Research Acquisition Activity).

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## Physical Fitness

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**ABSTRACT** “Total force fitness” is a state in which the individual, family, and organization can sustain optimal well-being and performance under all conditions. Physical fitness, an important component of total force fitness, is the amount of physical training required to achieve a physical work capacity. Due to the austere environments and high physical work capacity required for mission tasks, military service members must sustain a more advanced level of physical fitness than the civilian population. To meet these high demands, physical fitness training must be split into four components: endurance, mobility, strength (including core strength), and flexibility. Both aerobic and anaerobic training need to be utilized. The four components of physical fitness training plus performance testing and injury surveillance/prevention must be well understood and included as part of all military physical fitness programs to ensure our service members are prepared to meet the physical demands of the mission without incurring injury.

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### INTRODUCTION

“Total force fitness” is a state in which the individual, family, and organization can sustain optimal well-being and performance under all conditions. Physical fitness is one component of total force fitness, which also includes psychological, behavioral, medical, nutritional, spiritual, and social health. Consistent regular exercise can have a positive impact on social health, depression, generalized anxiety, and sleep deprivation.<sup>1-5</sup> With the interdependencies of the categories of total force fitness, it is very important that military service members be physically fit. The physical fitness level required by a military service member is higher than that of the general population due to the diverse nature of military missions and the large loads carried by service members. Currently, service members must perform missions in austere environments over 6- to 15-month periods. Missions executed in these diverse environments require a large variety of physical skills. The purpose of this article is to discuss how to develop and maximize service members’ physical fitness by aerobically and anaerobically training the four components that make up physical fitness: endurance, mobility, strength (to include core strength), and flexibility; how to use injury surveillance and prevention strategies to train without incurring injury; and to outline current initiatives to improve physical training.

### DEFINING PHYSICAL FITNESS

What is physical fitness? The U.S. Department of Health and Human Services separates physical fitness into two categories: health-related fitness and performance-related fitness.<sup>6</sup> The general public focuses on health-related fitness, which is the amount of physical training required to reduce the risk of disease or injury. Military members focus on performance-related fitness, which is the amount of physical training required to achieve a physical goal, such as climbing a mountain or maneuver chocks and chains on an aircraft carrier.

What exactly is military physical fitness? According to the Army Manual FM 21-20, Physical Training, “War places a great premium upon the strength, stamina, agility, and coordination of the soldier because victory and his life are so often dependent upon them. To march long distances with full pack, weapons, and ammunition through rugged country and to fight effectively upon arriving at the area of combat; to drive fast-moving tanks and motor vehicles over rough terrain; to make assaults and to run and crawl for long distances; to jump into and out of foxholes, craters, and trenches, and over obstacles; to lift and carry heavy objects; to keep going for many hours without sleep or rest—all these activities of warfare and many others require superbly conditioned troops.”<sup>7</sup> To put it more succinctly, military physical fitness is the ability to physically accomplish all aspects of the mission while remaining healthy/uninjured. Because there are variations in military missions/tasks, it is important to adjust physical fitness training accordingly. Health-related fitness is therefore the same for all military members, but performance-related fitness differs depending on the mission. An Air Force load master who spends 10 hours a day loading planes needs to train differently than a scout who is tasked to patrol 15 miles through the mountains of Afghanistan. Military fitness training needs to be designed to specifically complement the mission tasks required by the service members. This is referred to as “specificity of training.”

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