

# Mind Fitness

## Improving Operational Effectiveness and Building Warrior Resilience

By ELIZABETH A. STANLEY *and* AMISHI P. JHA

**T**oday's complex, fluid, and unpredictable operational environment both demands more from the military in terms of mission requirements *and* exposes troops to more stressors and potential trauma than ever before. On the one hand, situational awareness, mental agility, and adaptability are characteristics that the military wants to cultivate to succeed in such complex environments. In part, this complexity comes from the number

and nature of the different missions the military must concurrently fill. The military needs to be able to mix offensive, defensive, and stability operations conducted along multiple lines of operations, without the benefit of a clearly demarcated "frontline." Many Soldiers liken this complexity and unpredictability to "the faucet," that is, needing to adjust to situations that could change from cold to hot instantaneously. Moreover, Servicemembers must navigate morally ambiguous

situations with balance and nonreactivity, while drawing on stores of cultural awareness to "win hearts and minds." Finally, these missions require that decisionmaking be pushed down to the most junior levels, as the doctrine of "distributed operations" makes clear. Such challenges require a tremendous amount of attentional capacity, self-awareness, and situational awareness.

On the other hand, because of the stressors and challenges of this operating



Marines fire during operations in Helmand Province, Afghanistan

U.S. Marine Corps (Pete Thibodeau)

environment, the U.S. military is showing signs of strain. In 2007, the Army experienced its highest desertion rate since 1980, an 80 percent increase since the United States invaded Iraq in 2003. The warning signs of future retention problems are increasingly apparent: suicide, post-traumatic stress disorder (PTSD), substance abuse, divorce, domestic violence, and murder within the force are on the rise. Recent attention has focused on the growing number of suicides, with the Marine Corps experiencing more suicides in 2008 than since the war began and the Army logging its highest monthly total in January 2009 since it began counting in 1980. Not surprisingly, PTSD rates are highest among Iraq and Afghanistan veterans who saw extensive combat (28 percent). However, military health care officials are seeing a spectrum of psychological issues, even among those without much combat experience. Various surveys provide a range of estimates, with up to half of returning National Guard and Reservists, 38 percent of Soldiers, and 31 percent of Marines reporting mental health problems.<sup>1</sup>

It is no wonder. Troops manning checkpoints or on patrol have to make split-second decisions on when to use lethal force, and veterans say fear often clouded their judgment. As Army Sergeant Dustin Flatt put it, “The second you left the gate of your base, you were always worried. You were constantly watchful for IEDs [improvised explosive devices]. . . . If you’ve been in firefights earlier that day or week, you’re even more stressed and insecure to a point where you are almost trigger-happy.”<sup>2</sup> The perpetual uncertainty is mentally exhausting and physically debilitating, and often its effects linger even after returning home.

What can be done to enhance the military’s capacities to operate in such complex environments while simultaneously protecting against the stressors inherent in them? This article proposes a new training program for both improving operational effectiveness and building resilience to the stressors of deployment: Mindfulness-based Mind Fitness Training (MMFT, pronounced M-Fit). This program includes techniques and exercises that previous research in civilians has demonstrated to be effective at enhancing the capacities central to mind fitness, such as

mental agility, emotion regulation, attention, and situational awareness. Importantly, these exercises appear to achieve improvements in mind fitness by changing brain structure and function so that brain processes are more efficient. Our pilot research, conducted in pre-deployment Marine Reservists, suggests that MMFT is similarly successful at bolstering mind fitness and building resilience against stressors in a military cohort. Drawing on the well-documented theory of neuroplasticity, which asserts that experience changes the brain, this article argues that mind fitness training could complement the military’s existing stress inoculation training by developing skills to promote resilience against stress and trauma so that warriors can execute their missions more effectively.

### Stress Can Degrade Performance

A variety of research indicates that harmful conditions such as chronic stress, neglect, and abuse can produce harmful changes in the brain.<sup>3</sup> Stress is produced by real or imagined events that are perceived to threaten an individual’s physical and mental

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well-being. Today, stress is commonly understood to mean external events or circumstances, and as a result, we tend to think of stress as something *external* to us. However, stress is actually a *perceived, internal* response. The right amount of stress will allow a decisionmaker to function at peak performance. However, excessive stress has biological and psychological consequences that reduce the capacity to process new information and learn. Stress may also bias decisionmaking more toward reactive, unconscious emotional choices.

Recent empirical research about decisionmaking in stressful military environments demonstrates that trauma and stress lead to deficits in cognitive functioning. One

large study of Army troops found that Soldiers who served in Iraq were highly likely to show lapses in memory and an ability to focus, a deficit that often persisted more than 2 months after they arrived home.<sup>4</sup> In the study, 654 Soldiers who deployed to Iraq between April 2003 and May 2005 did significantly worse in tasks that measured spatial memory, verbal ability, and the ability to focus than 307 Soldiers who had not deployed. In contrast, the Soldiers who had deployed outperformed those who had not in terms of quick reaction time (for example, how long it takes to spot a computer icon and react). In effect, the deployed Soldiers’ brains built the capacity for quick reaction, a function more necessary for survival in Iraq, while experiencing degradation in other mental capacities.

In another study, Soldiers who screened positive for mental health problems after returning home were up to three times more likely to report having engaged in unethical behavior while deployed.<sup>5</sup> Such behavior, including unnecessarily damaging private property or insulting or physically harming noncombatants, is obviously counterproductive to winning the confidence of the local population. This finding suggests a strong link between the negative effects of stress, which degrades Soldiers’ capacity to manage their own emotions and thereby control impulsive, reactive behavior, and a decrease in their ability to perform their mission effectively.

Other studies of military environments have found substantial degradation in cognitive performance when subjects experience sleep deprivation and other environmental stressors. One recent study of sleep deprivation among Navy SEALs and Army Rangers during a field training exercise demonstrated that the lack of sleep affected troops so badly that after a week they performed worse on cognitive tests than if they were sedated or legally drunk. In this study, the SEALs and Rangers showed severe degradation in reaction time, vigilance, visual pattern recognition, short-term memory, learning, and grammatical reasoning skills.<sup>6</sup>

Another group of studies examined more than 530 Soldiers, Sailors, and pilots during military survival training, including time in mock prisoner of war camps, to prepare them to withstand the mental and physical stresses of capture. In these studies, exposure to acute stressors resulted in symptoms of dissociation (alterations of

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one's perception of body, environment, and the passage of time), problem-solving deficits (as measured by objectively assessed military performance), and significant inaccuracies in working memory and spatial memory (as measured by eyewitness identification tests).<sup>7</sup> These findings corroborated with other studies that found multistressor environments lead to substantial degradation of executive control capacity and cognitive skills, and such degradation has been linked to battlefield errors, such as friendly fire incidents and collateral damage.<sup>8</sup>

### Mind Fitness Training and Performance

Optimal combat readiness requires three things:

- mission essential knowledge and skills
- physical fitness
- mind fitness.

All three components are crucial for equipping warriors to handle the challenges and stressors of deployment. The military devotes substantial resources to the first two categories, both in terms of funding and time on the training schedule. However, there is virtually no focus on mind fitness training today. The Army's Battlemind program is a first effort to raise Soldiers' awareness of the psychological health issues associated with deployment, but Battlemind mostly occurs after Soldiers

return home and provides no skills training. Instead, it introduces them to the cognitive and psychological effects of being deployed, provides psychological debriefing sessions, and helps them identify warning signs for when to seek help. In short, the military generally lacks proactive mind fitness training programs designed to give warriors skills that optimize performance and protect against the stressors of deployment.

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Most military training is "stress inoculation training" because it exposes and habituates warriors to the kinds of stressors they will face while deployed. Paradoxically, however, as the previous section demonstrates, stress inoculation training depletes warriors' executive control capacity—that is, the mental capacity that allows us to focus on demanding cognitive tasks and/or emotionally challenging situations. As we explain below, mind fitness training may counteract this cognitive degradation that results from stress inoculation training. Therefore, it could

complement existing military predeployment training, as it helps warriors to perceive and relate to deployment stressors differently. In other words, mind fitness training may provide "mental armor" to protect troops as they prepare for deployment and experience the stressors of deployment itself.

Just as stress and trauma can functionally and structurally change the brain, so too can training, practice, and expertise. The brain of an expert—such as surgeon, taxi driver, or musician—is functionally and structurally different from that of a nonexpert. In one study of London cab drivers, for example, researchers found that cab drivers have larger hippocampi than matched controls and that the longer an individual worked as a cab driver, the larger the hippocampus. The hippocampus is the brain region that controls conscious memory, obviously needed to navigate London's circuitous streets. These differences in hippocampus size were the result of experience and training as a cab driver, not of preexisting differences in the hippocampal structure.<sup>9</sup>

The London cab driver study highlights the well-documented theory of neuroplasticity, which states that experience changes the brain.<sup>10</sup> Areas of the brain may shrink or expand—become more or less functional—based on experience. In other words, the brain, like the rest of the body, builds the "muscles" it uses most, sometimes at the expense of other abilities. This concept is something athletes, musicians, and martial artists have known for a long time: with physical exercise and repetition of certain body movements, the body becomes stronger, more efficient, and better able to perform those movements with ease. A similar process can occur with the brain: with the engagement and repetition of certain mental processes, the brain becomes more efficient at those processes. This improved efficiency arises because any time we perform a physical or mental task, the brain regions that serve task-related functions show increased neuronal activity. Over time, as we choose to build a new mental skill, the repeated engagement of the brain regions supporting that skill creates a more efficient pattern of neural activity, for example, by rearranging structural connections between brain cells involved in that skill. In other words, experience and training can lead to functional and structural reorganization of the brain.

Secretary of Defense reenlists Soldiers at Forward Operating Base Airborne, Afghanistan



U.S. Air Force (Jerry Morrison)

Thus, there is a profound parallel between physical fitness and mind fitness. Athletes know that with repetition, physical fitness exercises can produce training-specific muscular, respiratory, and cardiovascular changes in the body. They know that specific training will correspond to specific benefits and promote better recovery from specific injuries. For example, sprints can build fast-twitch muscles, while longer runs can teach the body to burn fat instead of glucose. Similarly, specific mental exercises may allow the mind to become more “fit” and better protected against certain types of challenges by neuroplastic changes in the brain.

Mind fitness in today’s operational environment entails having a mind with highly efficient capacities for mental agility, emotional regulation, attention, and situational awareness (of self, others, and the wider environment). Just as physical fitness corresponds to specific enhancements in the body, mind fitness may correspond to enhancements in specific brain structures and functions that support these capacities. And, like physical fitness, mind fitness may be protective: it may build resiliency and lead to faster recovery from cognitive depletion and psychological stress. We propose that mind fitness can be maintained even in high-demand and high-stress contexts by regularly engaging in certain mental exercises. These exercises engage and improve core mental processes, such as working memory capacity, which lead to a more mentally agile, emotionally regulated, attentive, and situationally aware mode of functioning.

This scientific understanding is starting to be recognized and applied with many recent research studies and popular books describing training programs to bolster mind fitness.<sup>11</sup> These training techniques have existed for thousands of years, originating in Eastern spiritual traditions. In recent decades, they have been adapted for secular use, including in medical and mental health settings, corporations, prisons, and elementary schools. The most common and well-validated training program is mindfulness-based stress reduction (MBSR); more than 250 U.S. hospitals offer MBSR programs, and more than 50 research articles document its utility in many domains.<sup>12</sup>

Mind fitness can be enhanced through a variety of training techniques, but the foundational skill cultivated in both MBSR and our MMFT program is called “mindfulness.”

*Mindfulness* has been described as a process of “bringing one’s attention to the present experience on a moment-by-moment basis”<sup>13</sup> and as “paying attention in a particular way, on purpose, in the present moment and non-judgmentally.”<sup>14</sup> Mindfulness differs from a more conceptual mode of processing information, which is often the mind’s default way of perceiving and cognizing. In other words, paying attention is not the same thing as thinking, although we often equate the two.

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A growing body of empirical scientific evidence supports the efficacy of mindfulness-based interventions. Clinical studies demonstrate that civilian patients who participated in such programs saw improvement in many physical and psychological conditions and reported a decrease in mood disturbance from, and stress related to, these conditions. Similarly, numerous studies have documented how mindfulness training positively alters emotional experience by reducing negative mood as well as improving positive mood and well-being.<sup>15</sup> Mindfulness training has also been shown to increase tolerance of unpleasant physical states, such as pain,<sup>16</sup> produce brain changes consistent with more effective handling of emotions under stress, and increase immune functioning.<sup>17</sup> Finally, many studies have shown that mindfulness



Marines wait to leave temporary patrol base in Afghanistan

U.S. Marine Corps (Pete Thibodeau)

training improves different aspects of attention, which is the ability to remain focused on task-relevant information while filtering out distracting or irrelevant information.<sup>18</sup>

While this research draws from civilian populations, its findings clearly have implications in the military context. These techniques have already been extended to war veterans with PTSD, and preliminary results from this work suggest a reduction in symptoms.<sup>19</sup> In addition, mindfulness training could help optimize warrior performance by cultivating competencies critical for the modern battlefield, such as improved self-regulation, better attentional skills, and enhanced situational awareness.

### Working Memory Capacity and Mental Armor

Mind fitness, as we have operationalized it here, comprises mental faculties critical for military effectiveness, such as mental agility, emotion regulation, attention, and situational awareness. Interestingly, the cognitive neuroscience construct of “working memory capacity” (WMC) has also been linked to these faculties. WMC is the ability to maintain relevant information online while resisting interference from irrelevant information. Growing evidence suggests that working memory capacity is tied to the ability to engage in abstract problem-solving and counterfactual thinking. Recently, neuroscientists report that in addition to these “cold” cognitive processes requiring a high degree of mental flexibility and agility, “hot” emotional regulation processes also rely on WMC.

While individuals differ in their baseline WMC, everyone’s WMC can be fatigued and degraded after engaging in highly demanding cognitive or emotional tasks.<sup>20</sup> Conversely, WMC can be improved and strengthened through training. Studies have shown that individuals with higher WMC have better attentional skills, abstract problem-solving skills, and general fluid intelligence (that is, the ability to use rather than simply know facts). They also suffer less from emotionally intrusive thoughts and are more capable of suppressing or reappraising emotions when required. In contrast, individuals with lower WMC have poorer academic achievement, lower standardized test scores, and more episodes of mind-wandering. They are more likely to suffer from PTSD, anxiety disorders, and substance abuse, and are more likely to exhibit prejudicial behavior toward

personally disliked groups.<sup>21</sup> Thus, WMC corresponds to an individual’s success at willfully guiding behavior while overcoming cognitive or emotional distractions or impulsive tendencies.

Warriors with higher WMC are more likely to have better mind fitness and thus be better equipped for responding to the cognitive and emotional challenges that come from preparing for and experiencing deployment. These warriors are also more likely to maintain an effective level of performance when confronted by obstacles, setbacks, and distractions, and return to their baseline functioning after being exposed to stressors or traumatic experiences. Nonetheless, all warriors (even those with higher WMC) are likely to suffer from some degree of WMC degradation through the deployment cycle because the stressors of this time period are so depleting of cognitive and emotional resources. Moreover, an individual’s position within the military command structure may exacerbate the problem because recent evidence suggests that being lower in a power hierarchy reduces WMC.<sup>22</sup>

Thus, an important component of optimal combat readiness should be to maintain or increase baseline levels of WMC, despite the increase in stressors over the deployment cycle. Because WMC can be strengthened through training, performance on both cold cognitive processes and hot emotional regulation can be enhanced. Maintaining or enhancing warriors’ baseline levels of WMC could have cascading effects for effective decisionmaking, complex problem-solving, and emotional regulation processes, all of which are heavily taxed over the deployment cycle and are crucial for mission effectiveness. In other words, training to improve WMC may provide “mental armor” to protect against impending deployment-related degradation in mind fitness.

### MMFT

Mindfulness-based Mind Fitness Training is a 24-hour course that is taught over 8 weeks in groups of 20 to 25 Servicemembers. MMFT is based on the well-established MBSR course known to improve attentional functioning and reduce the negative effects of stress. However, MMFT is tailored for the military *predeployment* training cycle, with real-world examples from the counterinsurgency environment that show how mind fitness skills can enhance performance and

mission accomplishment. During the course, troops learn about the stress reaction cycle and its effects on the mind and body. They also learn how mind fitness training can boost resilience to stress. Most importantly, and unlike the Army’s Battlemind training, MMFT provides skills training through mind fitness exercises. These exercises are practiced 30 minutes a day. Some exercises build concentration by focusing on one object of attention, such as a particular body sensation. Others build situational awareness and non-reactivity through wider attention on internal and external stimuli. And some exercises use focused attention to reregulate physiological and psychological symptoms that develop from traumatic or stressful experiences. The exercises are incorporated into physical training and other mission essential tasks and completed during the duty day, in groups and/or individually. Thus, an important component of the course is engaging in MMFT training exercises each day.

We recently conducted a pilot study of MMFT with a detachment of 31 Marine Reservists, who received the training before they deployed to Iraq. (In March 2009, they returned home from this deployment.) While some Marines resisted the effort required by the training, the initial exposure was relatively

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positive. The entire detachment received training, and MMFT’s didactic information and group practices helped to socialize the concept. Once deployed, the Marines personalized their approach to the MMFT exercises, differing in how they incorporated them into their daily routines. From their anecdotal reports during and after the deployment, it appears some Marines continued the exercises during their down time, some incorporated them into their physical fitness regimes, some employed them as part of their premission rehearsals, and some employed them to keep themselves alert and focused while on missions. Many Marines reported using the exercises at bedtime, which they said helped them to quiet their minds, fall asleep faster, and sleep more soundly.

Before and after MMFT training (before they deployed), the Marines participated in a battery of behavioral tasks to measure their cognitive capabilities. We had predicted that the increase in stressors during predeployment training would degrade the Marines' cognitive performance. However, statistical analysis shows that the Marines who spent more time engaging in mind fitness exercises (on average, 10 hours outside of class) saw an improvement in their cognitive performance compared to Marines who spent less time engaging in the exercises (on average, 2 hours outside of class).<sup>23</sup> Specifically, despite the real increase in stressors during the predeployment period, the Marines who engaged in more mind fitness training maintained the same perceived stress level and preserved or even improved their working memory capacity over their initial baseline.

In contrast, the Marines who engaged in less mind fitness training experienced an increase in their perceived stress levels and the predicted decrease in their working memory capacity. This degradation in their WMC produced test scores of working memory capacity on par with populations that have suffered psychological injuries such as PTSD and major depression.<sup>24</sup> It is important to note that this degradation in

working memory capacity occurred *before* deployment, and thus does not reflect the additional stressors of the deployment itself. The apparent costs of the predeployment context are striking, given that the intention of the predeployment training is to prepare Servicemembers physically, emotionally, and cognitively for the stressors of deployment. Our findings highlight the potential importance of providing mind fitness training within the predeployment time period to buffer against WMC depletion.

While we have not yet fully analyzed the data from their postdeployment cognitive behavioral testing, it is clear from a post-deployment survey that the Marines continued to engage in mind fitness training and/or use the skills they learned while deployed. Sixteen percent of the Marines said that they "practiced regularly while deployed," while 35 percent gave neutral responses, and 48 percent said they did not practice regularly. In contrast, 26 percent of the Marines said that they practiced mind fitness exercises "after particularly stressful or traumatic experiences," while 35 percent gave neutral responses and 38 percent said they did not. Perhaps more importantly, 54 percent of the Marines said that they "used the skills learned in this course downrange," while 27 percent

gave neutral responses, and the rest said they did not use MMFT skills while deployed.

Thus, while only 16 percent practiced mind fitness exercises regularly during the deployment, more than a quarter used the practices to reregulate themselves after stressful experiences and more than half used MMFT skills during the deployment. These findings suggest the need for adding more structured mind fitness exercise sessions into a unit's daily schedule during deployment. They also highlight again the parallel to physical fitness: just as building muscle requires repetitive physical exercise, improving cognitive and emotional performance requires engaging in mind fitness exercises in a sustained, disciplined manner. While mind fitness skills are quickly and easily taught, they require ongoing commitment to develop and strengthen over time.

We acknowledge several limitations to this pilot study. Our cohort was a convenience sample, consisting of a detachment that agreed to receive training. There was no waitlist or active control group, although we are currently gathering control group data for further analysis. We think this weakness was partially mitigated by our use of well-validated cognitive behavioral instruments shown to be stable over time. This minimizes



Virtual reality software that recreates traumatic situations in safe environment is used in therapy for Servicemembers with post-traumatic stress disorder

U.S. Air Force (Lance Cheung)

the possibility that the observed changes simply reflected measurement artifact. Nonetheless, the fact that all Marines started with similar WMC scores and that changes in their scores over time correlate, in a statistically significant way, with the amount of time spent engaging in mind fitness exercises highlights the need for further study. To this end, we have recently received funding from the Department of Defense to examine how mind fitness training can build resilience and combat readiness among Army Soldiers. The first study will compare MMFT to the Army's Battlemind program in a predeployment context. The second study will compare different versions of MMFT in a nondeployment context, to see which version is most effective at producing optimal cognitive and psychological performance among warriors.

As this article has shown, mind fitness training can immunize against stress by buffering the cognitive degradation of stress inoculation training and by permitting more adaptive responses to and interpretation of stressors. Mind fitness training can also enhance warrior performance by cultivating competencies critical for today's security environment. Finally, beyond its immediate effects for managing stress and enhancing

mission performance, mind fitness training is protective: it builds resiliency and leads to faster recovery from cognitive degradation and psychological injury. While warriors may choose to engage in mind fitness exercises to optimize their performance downrange, the protective effects will still be accruing—likely leading to a decrease in psychological injury upon returning home. As a result, mind fitness training could reduce the number of warriors in need of professional help and thereby reduce caregiver burnout among Armed Forces' chaplains and medical and mental health professionals. In other words, mind fitness training's beneficial effects could continue long after the deployment is over, increasing the likelihood that warriors will be ready, willing, and able to deploy again when needed. **JFQ**

NOTES

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U.S. and French servicemembers set out on survival training hike in Geggade Desert, Djibouti



U.S. Air Force (Joe Zuccaro)

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