When Memory is Under Attack

A study suggests mindfulness improves working memory and reduces negative emotions in Marines before they deploy.

By Sharon Begley | June 13, 2014

War is hell. And while troops aren't at risk of enemy fire during the weeks leading up to their deployment to a combat zone, pre-deployment deserves a circle in Dante's creation, too. As soldiers contemplate leaving their families and shipping out to a place where people may shoot at them, the resulting anxiety, trepidation, and confusion can take a toll on their cognitive functioning. Their decision-making, attention, memory, and judgment can all be impaired, not exactly a good mental state in which to go to war. Pre-deployment is therefore a good situation in which to test the effects of mindfulness meditation.

And that's why Elizabeth Stanley, of Georgetown University's School of Foreign Service, developed Mindfulness-Based Mind Fitness Training (MMFT, pronounced M-Fit). A former
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Developed Mindfulness-Based Mind Fitness Training (MMFT, pronounced M-Fit). A former army captain, Stanley (whose family has served in the U.S. Army for nine generations) had firsthand experience of stress in war zones, including in Bosnia. She was hoping to show that mindfulness training could build resilience and optimize individual and team performance. For her first program assessing the effectiveness of mindfulness training for military personnel prior to deployment, she collaborated with Amishi Jha, one of the leading research psychologists investigating how attention and working memory can be enhanced. A better working memory—the mental scratchpad our brain uses to keep information for several seconds so it can be accessed and manipulated to solve problems, make decisions, or send to long-term storage—can make people more resilient in the face of emotional stress. In other words, training memory and attention, which are facets of cognition, can improve the circuitry needed to regulate emotions: how we cope with stress.

If people know anything about the relationship between memory and stress, it’s probably that the latter can wreak havoc on the former, as shown by the memory impairment that often accompanies post-traumatic stress. According to Jha, who now heads the Jha Lab at the University of Miami, “Attention and working memory are the workhorses of emotion regulation. Our hypothesis is that psychological health and resilience rely on the optimal neural functioning of attention and working memory.”

The idea that cognitive processes like memory affect emotional regulation has undermined a longstanding tenet of brain science. For decades, neuroscientists believed the brain’s emotion circuits were confined to the limbic system (an evolutionarily ancient region deep in our gray matter) while cognitive circuits filled the cortex (a more recent evolutionary invention). Emotions dwelled in the bad part of town, the brain’s version of the neighborhood where bar fights and lovers’ quarrels occur, and cognition resided in the ivory tower.

But many studies refute that simplistic notion. Cognition regularly goes slumming, as signals from cognitive circuits travel to the brain’s emotion regions. The evidence:

- People with social anxiety disorder became more comfortable in social situations, after improving their ability to focus attention using mindfulness, a 2010 study found. People with better working memory and attentional control are better able to regulate emotions, a 2008 study found.

- Conversely, those with poor working memory are more vulnerable to what’s called “reactive parenting,” whereby a parent who has reached the end of his or her rope yells, storms about, and even smacks a child (who may not even have misbehaved)—all signs of lousy emotional control.

When working memory and attention buckle under stress, “emotional regulation becomes problematic,” Jha says. “Working memory seems to correspond to how well people can control their behavior, especially in the face of distractions—emotional or otherwise.”

The discovery that better working memory and attention are associated with better emotional control, and resilience, offers a promising avenue toward increasing both. Previously, studies found that greater resilience is associated with high socioeconomic status, education, and certain personality types such as optimists. Unfortunately, there’s no quick fix for low education and income, and science has not exactly perfected personality transplants. Working memory and attention, by contrast, can improve with training.

The MMFT study examined whether mindfulness training can benefit Marines preparing for deployment to Iraq by improving their working memory, and whether that would affect the decline in cognitive functioning and the increase in anxiety as deployment approaches. The researchers gave 31 Marine reservists 24 hours of training in Stanley’s eight-week program. Seventeen Marines and 12 civilians served as controls. The researchers tested working memory capacity at the beginning and end.

The civilians’ working memory improved slightly. Of course, they weren’t worried about going to war. The control group of Marines saw their working memory become notably worse as deployment approached, consistent with earlier observations of the toll that pre-deployment stress takes. The Marines who received mindfulness training and practiced extensively actually experienced improved working memory. The more time a Marine spent practicing mindfulness meditation, the greater the sense of well-being, which Jha believes is
a direct effect of mindfulness.

The key finding, however, was that the more a Marine practiced mindfulness, the less severe the anxiety, fear, and other negative emotions while the higher the level of positive emotions. Crucially, that effect correlated with improvements in working memory. That is, mindfulness training and practice improved working memory, and better working memory reduced negative emotions. These findings “suggest that practicing mindfulness might allow you to build a working-memory reserve,” Jha says. “By improving your working memory capacity, you might be able to protect against both cognitive and emotional impairments.”

The result is somewhat ironic, in that one of the most robust findings in the science of stress is that high stress murders memory, both working memory and long-term memory. Yet by going at the relationship between stress and memory sort of ass-backward—improve working memory and see what happens to the negative feelings triggered by stress—this work has deepened our understanding of the relationship between cognition and emotion. Mindfulness training improves working memory. Better working memory enables better regulation of emotion—less flying off the handle, less terror at the prospect of deploying to Iraq.

How? Researchers have identified several possibilities. The better your working memory, the better other elements of cognition. As a result, you can successfully filter out thoughts of despair, steer your attention to avoid the excessive rumination that can bring on depression, and draw on memories to reframe negative experiences as no worse than neutral.

Mindfulness training might protect troops from post-traumatic stress by improving their ability to quash negative emotions and strengthen emotional control. It might also provide greater cognitive resources for members of the military “to act ethically and effectively in the morally ambiguous and emotionally challenging” war zones where they find themselves, Jha and her colleagues wrote in the journal Emotion. The work applies not only to the military. A 2012 study, led by Michael Mrazek in the psychological and brain sciences department at UC Santa Barbara, showed that mindfulness training improved working memory capacity, reduced mind wandering, and increased performance for people taking the Graduate Record Exam.

We’re not all heading into combat or fighting to enter grad school, but think of what mindfulness regimens might do for police and firefighters, teachers, and medical students. And, really, all of us.

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