Mindfulness and Pain: What the Research Tells Us

The most important studies illuminating the science of how mindfulness impacts pain intensity and how it impacts a person's perception of pain.

BY KELLE WALSH

Mindfulness meditation—the practice of bringing focused attention to whatever is happening in and around you, with an attitude of interest and openness—has been found to decrease stress, boost concentration, and increase feelings of connection with others, among other benefits. And it supports mental and emotional health in helping to manage conditions such as anxiety and depression, and by increasing resiliency.

Over the past decade there has been strong interest in learning how some of the benefits of mindfulness

might help people better deal with pain. Dozens of studies have put mindfulness to the test against pain, and particularly for two key markers: how mindfulness impacts pain intensity and how it impacts a person's perception of pain. The results are encouraging.

The challenge in treating pain, says researcher Fadel Zeidan, whose lab at University of California, San Diego, studies the brain mechanisms involved with pain is that "Everyone's pain is different."

The experience of pain results from the interactions of many influences, including psychological, cognitive, and contextual factors, such as mood or gender—even the weather can affect it.

"Mindfulness practice is alleviating the processing of pain, from the site of injury up the spinal cord to the brain," Zeidan says. It also does something that most other pain therapies don't, by mitigating the emotional components of pain—the thoughts and feelings associated with pain, or what researchers call "pain unpleasantness."

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"Mindfulness is teaching someone to *change their relationship to pain*, their reaction to it," he says. That may be the most important piece, he adds. We may not be able to cure pain, but mindfulness may help how someone feels about their pain and their experience in life.

From a practical standpoint, mindfulness for pain relief could be a needed cost-effective option that doesn't rely on potentially harmful or addictive drugs,

and that doesn't appear to have a plateau point. In fact, just like a muscle, mindfulness gets stronger the more you use it.

Mindfulness also *empowers* people in pain to do something to help themselves feel better, to find agency in the midst of powerlessness—and that just may be the best news of all.

Here, in chronological order, are some of the most important studies in this exciting area of research, and there will be much more to come, since this field of investigation is at a very early stage:

The Top Studies on Mindfulness for Pain

1) The Clinical Use of Mindfulness Meditation for the Self-Regulation of Chronic Pain. Lead investigator: Jon Kabat-Zinn, Phd *Journal of Behavioral Medicine*, 1985

In this first groundbreaking investigation into the potential for mindfulness to help people in pain, 90 people were enrolled in a 10-week Mindfulness Based Stress Reduction (MBSR) course at the University of Massachusetts Medical Center. During the program, they experienced significant decreases in their experience of pain, including: present-moment pain, pain symptoms, inhibition of activity because of pain, mood disturbance, and negative body image. They also experienced less anxiety and depression, and their use of pain-relieving drugs decreased. Most of these pain-relieving benefits lasted up to 15 months later.

2) Pain Sensitivity and Analgesic Effects of Mindful States in Zen Meditators: A Cross-Sectional Study. Lead investigators: Joshua Grant, PhD and Pierre Rainville, PhD*Psychosomatic Medicine*, 2009

This study at the University of Montreal examined whether people who meditate experience less pain than people who don't. For the study, 13 longtime Zen meditation practitioners and 13 non-meditators were exposed to a heat stimulation tool, with temperatures ranging intermittently from 109.4 to 127.4 degrees Fahrenheit, pressed against their calves. The meditators had much less pain sensitivity than the non-meditators during regular testing. And when the test was repeated, while the meditators were actively practicing mindfulness meditation, their pain decreased even more.

3) Brain Mechanisms Supporting Modulation of Pain by Mindfulness Meditation. Lead investigator: Fadel Zeidan, PhD. *Journal of Neuroscience*, 2011

This study explored how mindfulness alters the way the brain experiences and processes pain. In it, 15 people were exposed to a series of heat stimulations while an MRI scanner documented activity in their brains. For the first phase of the study, there were two tests: One where participants were instructed to close their eyes and rest while being touched on the calf with heat stimulation, and another where they were told to just focus on the changing sensations of their breath while receiving the heat stimulation. For the second phase of the study, all participants went through four 20-minute mindfulness meditation training sessions, and then did the same tests. In the tests done following the meditation training, participants experienced significant reductions in pain intensity (11-70%) and pain unpleasantness (20-93%), which correlated to greater activity in the areas of the brain related to emotional-regulation and cognitive control

and how the brain evaluates sensory events. An exciting new finding from this study was in discovering that the pain-reducing benefits of mindfulness are gained after just four trainings.

4) Pain Attenuation Through Mindfulness is Associated with Decreased Cognitive Control and Increased Sensory Processing in the Brain. Lead investigator: Tim Gard, PhD. *Cerebral Cortex,* 2012

This study built on the existing evidence that meditation reduces the experience and impact of pain, by testing another potential benefit: reduction in anxiety associated with pain. For the testing, 17 people who practiced mindfulness meditation and 17 people who had never meditated were subjected to six blocks of random electrical stimulation described as being like a sharp needle prick to the lower arm, either while in a resting state or when paying attention to the area under the electric node on their skin, and to the sensations there related to the stimulation. Their brain activity was measured during each block, and participants also rated the intensity and unpleasantness of the pain, and their anticipatory anxiety after each block. Both mindfulness practitioners and non-meditators showed brain activation in the regions typically associated with pain during the tests, but the meditators, while in a state of mindfulness, experienced unchanged pain intensity and decreased pain unpleasantness. In addition, they reported significantly less anxiety while in a state of mindfulness compared to the non-meditators.

5) A Mind-Body Program for Older Adults with Chronic Low-Back Pain: A Randomized Clinical Trial. Lead investigator: Natalia Morone. *JAMA Internal Medicine,* 2016

This study looked at how mindfulness might help chronic back pain among older people. In it, 282 people over age 65 with lower back pain were recruited and split into two groups: One group went through 8 weeks of Mindfulness Based Stress Reduction (MBSR) training and the other group did an 8-week education program in healthy aging. Compared to the health-education group, the MBSR group experienced significantly reduced pain (both current pain and pain felt in the past week) immediately following the training, and maintained this improvement six months later. In the short term, they also experienced greater physical function. Both the mindfulness and the health-education group experienced increases in self-efficacy.

6) Effect of Mindfulness-Based Stress Reduction vs Cognitive Behavioral Therapy or Usual Back Care on Pain and Functional Limitations in Adults with Chronic Low Back Pain: A Randomized Clinical Trial. Lead investigator: Dan Cherkin, PhD. *JAMA*, 2016

Researchers compared three approaches to manage chronic low-back pain: mindfulness, cognitive behavioral therapy, or usual care. They randomized 342 adults, ages 20-70, into one of the three approach groups. For the MBSR and CBT interventions, each group went through two-hour weekly trainings for 8 weeks. The usual care group continued to do whatever they had been doing. Both the MBSR and CBT groups showed greater improvement in both back pain and functional limitation due to back pain than the usual care group, with results lasting up to a year later.

7) Neural Mechanisms Supporting the Relationship Between Dispositional Mindfulness and Pain. Lead investigator: Fadel Zeidan, PhD.*PAIN*, 2018

Researchers sought to determine whether mindful people feel less pain, and also, what brain processes are involved with that experience. In this study, 76 people with no prior meditation experience completed a survey to determine their level of trait mindfulness, or “day-to-day ability to experience sensations and emotions without reaction.” They then were exposed to two rounds of heat stimulation to the calf. Participants rated their own pain intensity and pain unpleasantness, and brain activity was inferred through changes in cerebral blood flow as documented in an MRI brain scan. Higher trait mindfulness was associated with less pain sensitivity. It also indicated greater deactivation of an area of the brain’s default mode network, which goes quiet when we’re attending to a task.

ABOUT THE AUTHOR

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