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Mind Over Muscle-Ups

Scientists and meditation experts explain how focus and mindfulness can help athletes rise above burning discomfort to improve fitness.

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Hunter Boxley

On the surface, pain seems straightforward.

You get poked with a sharp stick. It hurts. The end.

Or you do Fran. Your burning quads and forearms force you to put down the barbell. The pain was too much.

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As with many things involving the human body, pain—and our perception of it—is actually much more complicated. Scientists have discovered pain and emotion are deeply intertwined.

In a study designed to measure the link between emotion and pain perception, participants listened to slowed-down, sad music while reading depressing statements such as, “It seems such an effort to do anything,” or, “I’ve made so many mistakes in the past.”

Then, to add insult to injury, researchers touched the subjects with a hot probe and asked them to rate the level of pain. A control group listened to neutral music and looked at neutral statements before getting poked with the same probe.

Researchers found those who listened to sad music reported the pain experience as much worse than those in the control group. What’s more, functional magnetic resonance imaging (fMRI), a technique for measuring brain activity, supported their reports of increased pain by showing increased activity in the various pain receptors of the brain. (A full explanation of the study can be found [here](#).)

“When you’re more anxious, pretty much most people rate the same input as more painful. They wouldn’t believe it until it happens,” Dr. Irene Tracey, an expert in pain research at the University of Oxford, said in a [podcast](#).

The implications of this study, and others like it, are far reaching.

Instead of passively accepting pain, it’s possible to train the brain with techniques such as mindfulness and meditation to filter pain out—or at least mute the emotional reaction to the stimulus.

Understanding and learning how to manage the emotional side of pain is a powerful tool for both athletes and those suffering from chronic pain.

Pain and the Brain

In the new book “Touch: The Science of Hand, Heart, and Mind,” neuroscientist David J. Linden explored how our state of mind influences pain perception.

“The brain is exerting control over the information that it receives. It controls which sensory information will be received by the spinal cord. The brain actively and subconsciously suppresses or enhances pain information on a moment-to-moment basis. It spins the media,” Linden wrote.

Pain is not perceived in just one area of the brain. In fact, in the chapter on pain and emotion, Linden wrote, “Pain perception is distributed over a group of brain regions, each involved in a different aspect of the pain experience.”

What’s more, the brain is not a helpless victim to pain signals. It’s more like an audio engineer at a soundboard, moving the levels up and down, determining the strength of each pain stimulus.

“The brain can send signals down to the pain and transmitting neurons in the dorsal horn of the spinal cord that can say either, ‘Speak up and say it louder,’ or ‘Shut up! Dial down the pain information!’” Linden wrote.



Chris Rosa

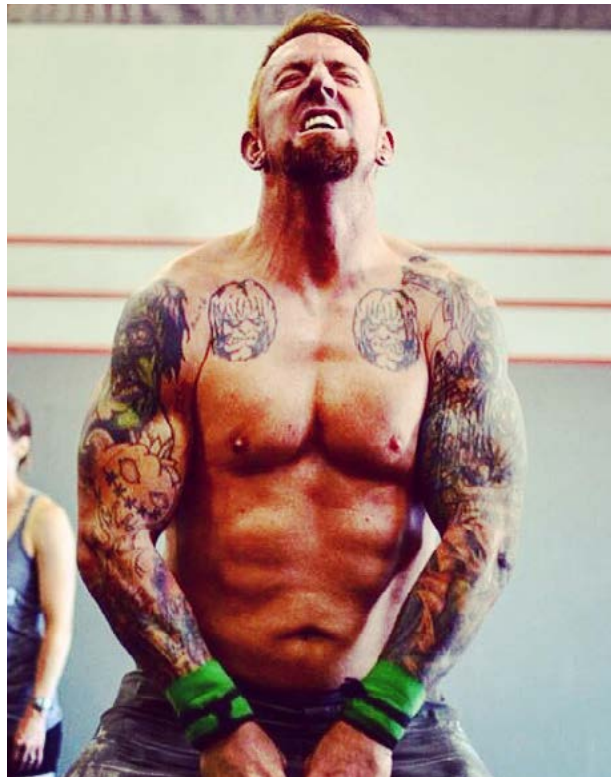
When it comes to managing pain, scientists say it's mind over matter.

The degree to which our mind can block pain is equal to the effect of powerful painkillers.

"If people are told they are receiving an analgesic that is unlikely to work, fewer people report pain relief, even if they are getting oxycodone or morphine," Linden wrote.

Statistics from "[Pain in Men Wounded in Battle](#)" show about 75 percent of the badly wounded soldiers studied reported such little pain they refused pain-relief medication when offered it in a forward hospital in World War II. Author Henry K. Beecher noted, "Pain is an experience subject to modification by many factors. ... Strong emotion can block pain."

When your body experiences pain—let's say you touch a hot skillet—there's an initial, sharp pain as skin receptors send electrical signals up the nerve fibers to the thalamus in the brain, which then directs the signals to the sensory cortex. Next, a slower, second wave of pain is conveyed to the brain by smaller-diameter neural fibers. As all of these pain signals are traveling through the body to the brain,



In the same way you train your body, you also can train your mind to quiet the stimulus you call "pain."

the brain sends messages to the spinal cord, which can either turn up the volume on the pain experience or mute it if there is something more important going on, like a battle—or Fran.

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So if our brain can control the experience of pain to such a degree, how can we consciously reduce pain?

Linden reported recent studies show mindfulness-based practices such as meditation, yoga, tai chi and Feldenkrais reduce chronic pain and acute pain. In 2011, researchers at Wake Forest Baptist Medical Center in Winston-Salem, North Carolina, found that even people new to meditating could reduce the experience of pain and their pain-related brain activity. The study was detailed in the April 6 article "[Even Beginners Can Curb Pain With Meditation](#)," published on [NPR.org](#).

After attending four 20-minute meditation sessions, subjects were touched with a hot probe. The subjects reported a 40 percent decrease in pain intensity and a 57 percent decrease in pain unpleasantness. Brain scans showed an increase in brain activity related to cognitive control and almost no activity in the part of the brain that processes pain—which was highly active when the subjects experienced pain without meditating.

Pain Is an Experience

Jim Cahill is a former brain researcher at the world-renowned Scripps Research Institute in La Jolla, California, and the developer of [Mindfulness-Based Biofeedback](#). The therapy combines meditation and biofeedback—which involves monitoring and consciously manipulating physiologic functions such as brainwaves or heart function—to treat everything from stress to chronic pain. He also trains athletes looking to improve performance.

Unlike surgery or a pill, training the brain to deal with pain takes effort and time.

"It's training the nervous system to make a fundamental shift, and it's done incrementally and over time," Cahill said.

"The essence of it is to train the attention to stay put on whatever you ask it to. And when the attention wanders, to bring it back. This gives us what is called 'chosen mind,'" he said.

The word "mindfulness," which is a translation of the word "sati," comes from the earliest Buddhist documents. Mindfulness is a state of focusing on the emotions, thoughts and physical sensations of the present moment. It can also be thought of as awareness, and in Buddhism it's one of the seven factors of enlightenment. Mindfulness is now used in psychology to help with obsessive-compulsive disorder, anxiety, depression and drug addiction. In psychology, mindfulness refers to both a meditation practice as well as a state of focused attention to everyday life. According to Psychology Today, mindfulness is "a state of active, open attention to the present."

Using meditation and mindfulness as a form of treatment has become common within cognitive psychology as more studies show its effectiveness. In 2013, a [study](#) at Brown University found mindfulness-based cognitive therapy reduced distress in chronic pain and decreased the risk of depression relapse. A [study](#) in 2000 by the University of Oxford found that mindfulness reduced the reoccurrence of depression from 66 to 37 percent.

Cahill meets with clients once a week, and he asks them to meditate twice a day, in 20-minute increments, learning deep control of the mental experience. He says practicing meditation and mindfulness helps manage pain, because pain is an experience, not a physical entity.

"You would more easily measure vapor than you could measure the experience of pain. Pain is what the person reports it is," Cahill said.

We need to feel pain—it's a useful signal, especially as a warning to prevent further damage—but there are times when we overreact to a mild pain signal or, in the case of a CrossFit workout, need to focus the mind on something other than how much thrusters hurt.



Chris Rosa

As human beings, feeling pain is important to survival. However, we can overreact to pain and make ourselves believe thrusters hurt more than they do.

“Pain is a signal of potential physical damage, and it is to be attended to. It is our friend. But pain is also a stimulus. And—as long as we are being reasonable with our dealing with the pain—we don’t push ourselves into injury unnecessarily, then it becomes, ‘OK, how do I tolerate the necessary pain in order for me to achieve my goals?’” Cahill said.

The first step is changing the word “pain” to “stimulus.”

“We can develop a relationship to the stimulus that we have habitually called pain, just as we can develop a relationship towards any stimulus. Some stimuli are useful, and some are problematic. Some are simply habitual, some are just there because of imprints and expectations. And some are there because we’ve chosen them and we expose ourselves to them,” he said.

In the example of CrossFit athletes, Cahill said focusing too much on one sensation—let’s say the pain of thrusters—robs our mind of other jobs, like maintaining good form. If 80 percent of your mind is focused on the pain stimulus, and only 20 percent on your form, your experience of the pain will be much greater.

“The thread that is split—halfway on the pain and halfway on your technique and motivation and other things—is not serviceable. It’s like a thread that’s frayed and can’t go through the eye of the needle,” Cahill said.

Instead of focusing on and wallowing in the pain of the workout, Cahill suggests noticing the sensation ... and then directing your attention somewhere else.

He added: “You want to be able to shift attention, and that’s what meditation in its essence is all about—it is ‘attentional’ training. So that you can choose the content of what’s on your mind. And whatever you attend to, in a regular, consistent fashion—whatever you attend to regularly—you’re actually physically, literally reconfiguring your brain cells to do that more easily.”



Courtesy of Jim Cahill

Jim Cahill, developer of a therapy combining meditation and biofeedback, says you can develop a relationship with pain that helps you achieve your goals.

Instead of focusing on and wallowing in the pain of the workout, Cahill suggests noticing the sensation—shortness of breath, burning leg muscles—and then directing your attention somewhere else.

“This is the difference between having a mind that is out of your control and one that is in your control,” Cahill said.

“If the sensation is going to be there but it’s not damaging, it’s just strong sensation. You don’t even need to call it pain. Just shift all your attention over to whatever is helping you motivate to finish your workout, what your core motivation is and what is most useful,” he said.

Our brain is quite good at making connections, and sometimes that can lead to our mind’s making connections that aren’t logical. Cahill gave the example of how negative thought patterns can turn a place you once loved—like your CrossFit gym—into a place with negative associations. If you always focus on the suffering in your workouts, both during and after, your mind will start associating the gym with negative thoughts. This can affect your performance and your enjoyment of the experience.

Cahill urges CrossFit athletes to practice good “mental hygiene.”

“Just like you’d wipe down your bar after you’re done, be sure to wipe your mind of unnecessary, unpleasant thoughts,” he said. “Make sure you are not sloppy in how you use your mind when you are (in the gym).”

It’s surprisingly difficult to consistently maintain a positive inner monologue. The first step is to recognize negative thoughts when they arrive and consciously direct the thought toward something positive.

Managing Chronic Pain

Dr. Eva Selhub has been dealing with the emotional reverberations of chronic pain for 30 years.

The doctor, who is on staff at Harvard Medical School and is a Clinical Associate of the world-renowned Benson Henry Institute for Mind-Body Medicine at the Massachusetts

General Hospital, was in a terrible car accident when she was 15. The resulting back pain forced her to quit the swim team. Because she couldn’t do any type of athletics, she focused on academics instead and became a doctor of internal medicine.

While the physical pain eventually subsided, Selhub said the emotional pain remained.

“A lot of psychological baggage was wrapped up into my back,” Selhub said.

Over the years, she’d try to get fit and would start to get strong and healthy. Within a few months, she’d be injured and out for six months.

Selhub started CrossFit in 2012 but was scared to pick up any weights. She went a few times a week and only did body-weight workouts. At the time, most movements provoked lower back spasms, and she became so afraid of provoking pain she shied away from using any weights.

Finally, after about a year, Selhub felt her core and back were strong enough to start using weights. Working out at CrossFit Newton in Waltham, Massachusetts, Selhub began to enjoy the workouts. But every time she’d get into the groove and establish some momentum at the gym, her back began to spasm. When that happened, she fell apart.

“I would go into the next room and start crying. I’d have to work out separately from everybody else and not do the WOD. It was really sad. It would bring me to tears,” Selhub said.

Selhub was not just experiencing the pain at that moment. She was reliving the fear and anxiety resulting from 30 years of exclusion from athletics.

All pain is regulated by the brain. Whether you are suffering a recently broken leg or a decades-old injury, the pain is caused by nerve fibers sending messages to the brain. In the case of chronic pain, nerve fibers continue to fire even after the acute phase of the injury has passed. The more the pain messages travel to the brain, the more efficient those circuits become in transmitting pain signals. A 2013 [study](#) in the neurology journal *Brain* detailed how a group



After decades of chronic pain, Dr. Eva Selhub trained her mind so she could progress athletically without pain.

of patients started out with acute pain and ended up with chronic pain. The study showed how the neurological synapses transition from the acute pain center to the more emotional center, connected to the limbic system. Eventually, the pain becomes a self-contained feedback loop within the nervous system.

As the author of “Your Health Destiny” and an expert in mind-body medicine, Selhub began to see a pattern in her pain.

She realized her back would go out when she was worried or feeling stressed. She began to work through her deep-seated fears about her back pain while gradually building up her strength in the gym. Selhub said being in a CrossFit gym helped give her tools to manage the emotional and physical pain.

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“What CrossFit taught me is not to be scared, to look at a hard WOD and say, ‘OK, it might hurt afterwards, but I’ll be better for it.’ As I got stronger, my back got stronger, and so did my own belief in myself, my own prowess, my own ability. Everything was building on itself,” she said.

Just recently, Selhub was doing a workout with heavy cleans and felt a twinge in her back. Rather than starting to panic, she refocused on her form. She did the workout and was fine afterward.

“The key of it is that I didn’t break down. Normally what would happen is I would get this pain and I would get upset. ‘Here it is again, or now I can’t work out,’ or (I’d) get angry at it,” she said.

Instead, Selhub said she asked herself what the pain was trying to tell her, saying to herself, “Let’s work together here.”

She said the key was to be mindful about the pain, which means being aware and nonjudgmental about the body’s signals.

“How does (my body) signal me when I need to stop, and how does it signal me when I need to shift position? How does it signal me when my negative stories are coming forward? That’s what your health destiny is all about,” Selhub said.

Without outlets of relief, our body is more susceptible to pain, Selhub said.

“Outlets of relief are meditation practice, social support—like how nurtured do you feel? How supported do you feel? How connected do you feel?” she said.

A Simple Technique

For high-level, competitive CrossFit athletes, managing stress and anxiety translates to improved performance. Four-time CrossFit Games athlete and medical student Julie Foucher regularly practices meditation.

“I have found different forms of mindfulness and meditation to be very beneficial,” she said in an [interview for Reebok](#).

It’s simply not enough to work for hours a day training the body and neglect training the mind. The mind and body are interconnected, and a weakness in one will affect the other. It’s no coincidence CrossFit Founder and CEO Greg Glassman has said, “Mind-body dualism is a myth.”

The body has an extremely complicated way of processing pain: Emotion, state of mind, and level of attention and distraction all influence how we experience pain. As Cahill suggested, regular mediation might help you learn to cultivate the control and skill that are needed to redirect your thoughts away from pain, but finding ways around pain doesn’t have to be incredibly complex.

Theresa Larson is a doctor of physical therapy and a CrossFit Mobility Trainer Course Instructor. A former Marine, she works with [wounded and tactical athletes](#) and uses meditation as a tool in her own life.

She has a simple exercise that helps her when she’s feeling sad or anxious or overwhelmed: She thinks of 12 things that are good.

"The other day I was upset and overwhelmed," Larson said. So she took out her journal and began writing: "1. I like my shoes. 2. I like my skin," until she had listed 12 good things.

"It made me smile. And it made my anxiety of the sadness go down," Larson said.

This technique, which is a basic form of mindfulness, can be used anywhere, anytime—even in the middle of the workout.

"My mind will try to go to the negative. It's a battle, (but) you can retrain your brain the same way you retrain your body. It's called 'neuroplasticity,'" Larson said.

Next time you're feeling crushed by pain and the number of reps you have left, take a few seconds to say, "I like this barbell. I got my favorite spot on the pull-up bar. I'm wearing a really cool shirt today." Or just focus on one thing, like a favorite song playing in the background.

Mindfulness does not have to take place in silence on a yoga mat. You can practice mindfulness in the gym by detaching your emotions from the sensation of burning muscles and lungs during a tough workout. Acknowledge the sensations, but don't allow them to upset you.

The meditation guru Andy Puddicombe describes this emotional detachment as the difference between standing in the middle of a snowstorm versus watching it from inside, next to a fire. The storm is present in both cases, but in one scenario you are caught in the midst of it, and in the other you are simply watching, calm and composed.

Knowing how the brain works, and understanding the link between emotions and pain perception, is the first step in managing and controlling pain, and it can be a powerful tool inside and outside the gym.



James Richard Photography

Theresa Larson, a doctor of physical therapy, says you can retrain your mind the same way you can retrain your body.

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