

Your Brain on Exercise – The Neuroscience Behind a Good Workout



We've all been there before: a tough day at work, with the kids, or in school. We're exhausted, both mentally and physically, but we still manage to push ourselves and get to the gym. Why do we do it? Because we know how much better we'll feel after an evening indoor cycling class, an hour of kickboxing or a challenging weight workout. We leave feeling refreshed, rejuvenated and invigorated—truly transformed.

Clearly, there's a relationship between exercise and the brain, but what is it? What creates such a dramatic improvement in mood, mental health and even memory following a workout?

Simply put, it's the change in brain biochemistry that takes place when you lace up. The human brain is made up of cells called neurons—100 billion of them—that transmit chemical signals between each other and allow you to interpret the world, both inside and outside. These chemical signals, called neurotransmitters, are responsible for how you feel, how you think, and how you behave. There are approximately 100 neurotransmitters working in the brain to carry out a variety of functions, but two types of neurotransmitters in particular—endorphins and serotonin—are responsible for why you feel so good when you exercise.

If you participate in any endurance activity, from a vigorous sprint triathlon or a trot on the treadmill to a long walk with your dog, your brain releases endorphins, the neurotransmitters responsible for what some call the “runner's high.” It's that feel-good sensation you get after a bout of aerobic exercise. But why do endorphins leave us bathed in an afterglow of calm when we get our heart pumping? Endorphins are the body's internal painkiller. So instead of feeling pain, endorphins leave you feeling pleasure.

Serotonin is a mood-boosting neurotransmitter and is known as the “happy chemical” because it too makes us feel good. But unlike endorphins, which initially block pain to produce pleasure, serotonin promotes pleasure itself. In fact, research has shown that a lack of brain serotonin in some individuals has been associated with depressive illness. This is also why the most commonly prescribed anti-depressant medications today work by pumping more serotonin into the brain.

There is, however, a non-pharmacological way to trigger production of serotonin. Research has shown that physical activity can increase brain serotonin levels. For example, a research paper published in the *Journal of Psychiatry and Neuroscience* included exercise among the several possible approaches to boosting serotonin levels in the brain.

But it's not just aerobic activity that can relieve symptoms of depression. More recently, strength training—which includes anything from body-weight exercises and resistance-band workouts to machines and free-weight exercises—has also been shown to improve mental health and reduce the incidence of depressive illness.

Additionally, while high levels of exercise-induced serotonin and endorphins have long been associated with better mood, another brain compound—a protein called brain-derived neurotrophic factor (BDNF)—also promotes cognitive health in areas such as memory, learning and depressive illness (Ratey, 2008). BDNF's main role is to promote the survival and growth of neurons and to ensure the proper transmission of chemical messages between brain cells. If neurons die, chemical signals are interrupted and cognitive functioning declines. The presence of BDNF strengthens neurons, ensuring their survivability, which means message signaling continues to hum along nicely, sustaining positive mood, intact memory and better learning. It's no surprise that the best way to trigger production of BDNF protein is—you guessed it—exercise.

Of course, understanding the inner workings of your brain on exercise is more than just a nice set of facts to know about mental wellness. Knowing exactly why exercise helps improve your mood can be a powerful tool to get you to the gym on those days when you would prefer to skip it.

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