Table of Contents

How Exercise Affects Your Brain 1

1. Exercise Boosts Memory 1

2. Exercise Increases Concentration 1

3. Exercise Improves Mental Health 2

4. Exercise Enhances Creativity 2

5. Exercise Slows Cognitive Decline 2

6. Exercise Improves Circulation 2

7. Exercise Aids Learning and Memory 3

8. Exercise Builds More Brain Cells 3

9. Exercise Prevents Disease 3

Brain and exercise 3

Ted Talk by Wendy Suzuki 3

# How Exercise Affects Your Brain

<https://www.quickanddirtytips.com/health-fitness/exercise/how-exercise-affects-your-brain>

促进生长素分泌。Research from UCLA even demonstrated that [exercise increased growth factors](http://www.sciencedirect.com/science/article/pii/S0306452206003228" \t "_blank) [Neuroscience, 2006, 140:823-33]in the brain which makes it easier for the brain to grow new neuronal connections.

Here are just a few examples.

### **1. Exercise Boosts Memory**

The part of the brain that responds strongly to aerobic exercise is called the hippocampus. Since the hippocampus is at the core of the brain’s learning and memory systems, this finding partly explains the memory-boosting effects of improved cardiovascular fitness.

### **2. Exercise Increases Concentration**

Exercise can actually help you focus and stay on task longer. During a [study in Holland](http://www.ncbi.nlm.nih.gov/pubmed/26724833" \t "_blank), they interspersed lectures with 20-minute long aerobics-style workouts and found that it improved the attention spans of the students. Then a large randomised controlled trial in the US looked at the effects of daily sports classes which spanned the entire school year. The students got fitter but they also became better at multitasking, ignoring distractions, and processing complex information. 但是也有更加模糊的例子，似乎对认知的作用并不明显[<https://www.ncbi.nlm.nih.gov/pubmed/30319345>]

### **3. Exercise Improves Mental Health**

We’ve all heard of (or experienced) the runner’s high – that feeling of happiness and clarity that often follows exercise – well, it is real. It has even been observed in mice and evidence points to a pleasurable and pain-killing firing of the [endocannabinoid system](https://www.ncbi.nlm.nih.gov/pubmed/14625449" \t "_blank) (also known as the psychoactive receptor for cannabis).

Science is also increasingly backing the yogi’s claim of the “relaxation response”. A 2010 study titled [Stress reduction correlates with structural changes in the amygdala](https://www.ncbi.nlm.nih.gov/pubmed/19776221" \t "_blank) put participants through eight weeks of daily yoga and meditation practice. The study concluded “... participants reported significantly reduced perceived stress. Reductions in perceived stress correlated positively with decreases in right basolateral amygdala gray matter density.”

Another study showing exercise as a way to overcome depression is the [2013 meta-analysis](http://www.ncbi.nlm.nih.gov/pubmed/24026850" \t "_blank) which reported that exercise (aerobic and heavy lifting) was “moderately effective” in treating depressive symptoms. Of particular note is that the researchers stated that exercise seemed as effective as antidepressant drugs and psychological treatments.

### **4. Exercise Enhances Creativity**

[Creative types through the ages](http://www.marksdailyapple.com/why-these-nine-famous-thinkers-walked-so-much/" \t "_blank) have claimed that walking aided their creative process and lately, psychologists gave it empirical support. A 2014 paper titled “[Give your ideas some legs: the positive effect of walking on creative thinking](https://www.ncbi.nlm.nih.gov/pubmed/24749966" \t "_blank)” showed that walking, either on a treadmill or around Stanford’s leafy campus, boosted creative thinking. Interestingly, it didn’t help convergent thinking which is generally defined as the ability to give the "correct" answer to standard questions that do not require significant creativity,

### **5. Exercise Slows Cognitive Decline**

To get this benefit, workouts don’t even need to be extreme. Once again 30-45 minutes of brisk walking, three times a week, can help fend off the mental wear and tear and delay the onset of dementia. Walking FTW!

And if walking isn’t your jam then twice weekly sessions of weight lifting can have a [visible neurological impact](http://www.ncbi.nlm.nih.gov/pubmed/21741129" \t "_blank). Or how about some dancing? [Studies show that dancing](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3581819/" \t "_blank) may also be restorative. Just an hour of dance a week, for six months, boosted elderly individual’s cognitive well being.

### **6. Exercise Improves Circulation**

Because exercise usually increases the heart rate, it helps deliver more oxygen and glucose to the brain which stimulates the brain’s synapses by preserving the number of acetylcholine receptors found at the junction of muscle and nerve. This is observed in the fact that active people have more receptors in their brains than inactive people.

### **7. Exercise Aids Learning and Memory**

Even moderate physical exercise, such as our old friend walking, can boost memory functions, learning, and the ability for abstract reasoning. It is not completely understood how this works, but improved oxygenation and nutrition for the brain are likely the major factors.

### **8. Exercise Builds More Brain Cells**

Up until 1999 the brain was thought to be complete at birth and not capable of growing new brain cells, but a [Salk Institute study](https://www.salk.edu/news-release/exercise-makes-mice-smarter-salk-scientists-demonstrate/" \t "_blank) showed that the adult human brain is capable of producing new cells (neurogenesis). Although we don’t understand how, the one thing that is sure is that physical exercise helps build brains. The theory is that exercise stimulates the production of a very aptly named brain protein known as Noggin and this protein initiates the production of neurogenesis and stem cells.

### **9. Exercise Prevents Disease**

According to the [National Institutes of Health](https://www.nia.nih.gov/health/exercise-physical-activity" \t "_blank), being physically active may help to delay or prevent the decline of cognitive function associated with age. People who stay seated are twice as likely as people who bust-a-move to develop diseases such as Alzheimer’s.

Researchers are still working on the why and the how and are trying to determine the critical factors that make exercise so good for the brain but the focus seems to be on: increased blood flow to the brain, surges of growth hormones, and massive expansion of the brain’s network of blood vessels.

Neuroscientists have known since that 1999 study that brain-derived neurotrophic factor (BDNF) is released during aerobic exercise and that stimulates neurogenesis (the growth of new neurons) but more recently scientists have honed in on an exercise activated hormone called [Irisin](https://www.psychologytoday.com/blog/the-athletes-way/201402/irisin-the-exercise-hormone-has-powerful-health-benefits" \t "_blank). And I gotta say, if you need one more reason to get fit, you can add Irisin to your list. In 2012 scientists discovered that Irisin has the ability to help maintain healthy body weight, improve cognition, and slow the aging process. Now that is a trifecta that I can get on board with.

So, after listing all of these factors, we can see that the cognitive benefits are nearly as impressive as the physical benefits of exercise. This also reminds us that our brains and bodies don’t operate in isolation, independent of each other. What you do with your body and what we put in our body, benefits or harms your mental faculties as much as it adds or subtracts girth from your biceps or your ability to run a 10-minute mile. Being sedentary all day, every day, is as dangerous for your waistline as it is for your mind. So, don't wait. Find an activity and do it. Or, as we learned again and again today, just go for a walk.

# Brain and exercise

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