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The Healthy Programmer

Get Fit, Feel Better, and Keep Coding

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The Healthy Programmer

Get Fit, Feel Better,
and Keep Coding



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Thinking on Your Feet

Go for a walk right now. Put this book down, walk around, and get your blood flowing. After five or ten minutes, come back and pick up where you left off. Your ability to think, remember, and concentrate will be enhanced as blood returns to your brain. In fact, a number of scientific studies have shown that this kind of exercise has a direct impact on your ability to learn new things.

Few people better understand the link between exercise and learning than John Ratey, MD. His book, *Spark: The Revolutionary New Science of Exercise and the Brain* [Rat08], begins with the story of Naperville Central High School in Illinois. At this school, a revolutionary approach to gym class has transformed the student body of 2,947 into perhaps the fittest in the nation. The students have access to climbing walls, video game-based aerobic machines, heart-rate monitors, and weight machines. The results have been remarkable. In one class of sophomores only three percent were overweight versus the national average of thirty percent.

Even more remarkable, this high school's students are also some of the smartest in the nation. Naperville's graduating class of 2012 had an average ACT score that was 4.9 points higher than the rest of the state's.¹ And when the school's students took a test called the Trends in International Mathematics and Science Study (TIMSS), they finished sixth in the world in math and first in science. This is the test that *New York Times* columnist Thomas Friedman refers to when he laments that children in Asia are "eating our lunch."

Naperville isn't your run-of-the-mill town, though. It's an affluent suburb of Chicago, and its proximity to Fermilab (a particle-physics laboratory) makes it home to a very well-educated population. In terms of environment and genetics, the kids in Naperville have a distinguished pedigree. But that doesn't mean the correlation found at this school is an anomaly.

The California Department of Education (CDE) has found that students with higher fitness scores also have higher test scores.² The CDE factors in socioeconomic status when aggregating its results, which makes the numbers less biased. Results like this, along with the findings of many other studies,

1. http://schools.chicagotribune.com/school/naperville-central-high-school_naperville

2. [Physical Fitness and Academic Achievement \[Gri05\]](#)

are beginning to reveal a profound link between physical fitness and academic achievement.^{3,4}

That's all well and good for school children, but what does it mean to we programmers? To begin with, programmers are perpetual students. In a field like technology, where change is constant, learning new concepts is a part of the job. A programmer's ability to absorb new technology is essential to staying relevant. Unfortunately, this often leads to a sedentary lifestyle as we hack on code late into the night or read the latest tech books. In some cases, it leads to consumption of too much caffeine.

But as we've started to learn from the kids in Naperville, one of the best ways to enhance your ability to learn is to get some exercise. There's also a lot of laboratory evidence showing that our brains work better when our bodies are active. In particular, they become better at remembering new concepts, ideas, and patterns.

Here's a simple example. Try to memorize the following string of letters:

I N T S M L I F H

Okay, you've got it. But how will you remember it tomorrow? The basic memory mechanism in your brain works by recruiting nerve cells, called neurons, which build new pathways that transmit electrochemical signals. To oversimplify things, the strength of these pathways determines how well you remember something. Over time, these pathways weaken and eventually fade away—especially if you don't make them strong in the first place. However, studies have shown that the walk you took a few minutes ago helped to strengthen the connections you made when memorizing those letters.

In one experiment, which was published in the journal *Medicine and Science in Sports and Exercise*, participants were asked to memorize some letters just like you did a moment ago. They were then asked to either sit quietly or run. The participants who ran were quicker and more accurate when they were tested than subjects who sat.⁵

The link between memory and exercise can most likely be explained by a class of protein called brain-derived neurotrophic factor (BDNF). This protein is responsible for strengthening the connections between neurons. As it turns out, exercise increases the production of BDNF. Shortly after the link between

3. [*Physical Fitness and Academic Achievement in Third- and Fifth-Grade Students \[CHBE07\]*](#)
4. [*Is there a relationship between physical fitness and academic achievement? Positive results from public school children in the northeastern United States \[CSMM09\]*](#)
5. [*The Effect of Acute Aerobic and Resistance Exercise on Working Memory \[PHFT09\]*](#)

BDNF and memory was discovered (and a Nobel Prize was awarded), a researcher at the University of California, Irvine, devised an experiment to show that more BDNF is produced in the brains of mice that run on an exercise wheel than those that sit around.⁶

When you went for a walk earlier, you were encouraging your brain to produce BDNF. Now that you've returned to reading, those proteins are being put to work as your brain creates new neurons and synapses. The result is that you have a better chance of remembering things you learn shortly after exercising. This applies to programming as well as reading.

Try it out the next time you're working on something new. Go for a walk before you start researching the distributed-data-clustering software you've been wondering about. Or maybe stroll around the block after you've exhaustively debugged some tough legacy code. When it comes time to refactor it, you'll probably be quicker at remembering how it works.

Tip 1

Studies show that doing exercise before or after learning something new can help you remember it.

Can you still remember that string of letters? You probably can.

Unfortunately, most programmers' lifestyles tend to favor the activity levels of the sedentary mice in the study from UC Irvine, which means their brains are lacking BDNF and may not be reaching their learning potential. Programmers who make regular trips to the gym aren't doing much better if they sit idle for the remaining ten to fifteen hours each day. In either case, taking a few daily walking breaks can make a big difference. It can boost your brain power, but it's also the best way to stay healthy.

6. *[Exercise: a behavioral intervention to enhance brain health and plasticity \[CB02\]](#)*