

# Get Smart

We all know exercise is good for us. But recently, researchers have added a startling new perk to its long list of benefits--it may make you smarter and help you stay that way as you age.

According to neuroscientists, exercise increases blood flow in the brain, encourages activity between the neurons, and even promotes new neurons to grow in the hippocampus, which plays a major role in memory and learning.

"Exercise is the single most powerful tool you have to optimize your brain function," says Harvard psychologist John Ratey, M.D., and author of the book *Spark: The Revolutionary New Science of Exercise and the Brain*.

Turns out, exercise boosts brainpower regardless of age, which is why you, your 4-year-old daughter and your 84-year-old grandmother should get moving.

## Fit Kids = Smart Kids

Charles Hillman, a runner, cyclist, hockey player and associate professor of kinesiology at the University of Illinois at Urbana-Champaign, has spent more than a decade researching the effects of exercise on adult brains. The birth of his now 5-year-old son shifted his work in a new direction.

"My son runs around like a maniac all the time," says Hillman, who noticed the children unlike his son at a shopping mall's play center--those who chose to sit on the fringes and not participate. "One thing that's always bothered me about my work with adults is that we don't intervene until they are older and sedentary. I wondered if by studying sedentary children we could prevent them from becoming sedentary, unhealthy adults."

In 2005, Hillman and his research team began investigating a simple question: Do fit kids perform better on a cognitive test than sedentary kids? To find out, Hillman had 51 volunteer children watch a screen that displayed drawings of dogs and cats randomly. He instructed the kids to hit a button as fast as they could whenever they saw a cat, shown 20 percent of the time. Their results were then compared with scores from a fitness test.

"The fit kids processed information more quickly and performed faster and more accurately than their sedentary peers. Exercise can really affect cognition, just as it affects muscles," says Hillman.

Ratey's research backs this up. "Exercise influences learning directly, at the cellular level, improving the brain's potential to log in and process new information," he says.

In *Spark*, he cites the small, low-income school district of Titusville, Pennsylvania, where physical-education coordinator Tim McCord convinced the district to add 10 minutes to the schedule to make time for daily gym classes that focused on aerobic fitness.

Since the changes in 2000, the students' standardized test scores have risen dramatically, from below the state average to 17 percent above it in reading and 18 percent above in math.

As a parent, Hillman has simple advice for how to help your children's brains get healthier. "Keep kids moving," he says. "They need at least one hour of intermittent movement per day--the more the better."

### Stay Sharp as an Adult

From the growing number of studies conducted in the last decade, researchers have discovered that exercise most positively affects what's known as executive function--mental processes that allow you to plan, organize, and multitask.

Interestingly, in your 20s and into middle age, these benefits can be seen both immediately after a workout and years later.

For example, in a 2006 German study, researchers found participants learned vocabulary words 20 percent faster immediately after an anaerobic sprint session. Scientists theorize these boosts occur because the brain, flowing with increased levels of blood and oxygen, can operate at its most efficient level.

The take-home lesson: "If you have an important afternoon brainstorming session scheduled, going for a short, intense run at lunch is a smart idea," says Ratey.

Beyond the immediate benefit exercise provides, working out regularly now can also help you years down the road. A 2002 study at University College London surveyed more than 1,900 people and found that those who participated in regular physical activities at age 36 showed significantly less decline in memory at ages 43 to 53 than their less active peers.

Although researchers aren't sure why, studies have found that regular aerobic exercise (lasting at least 30 minutes) combined with strength training offers the most cognitive benefits.

### Active Aging

Two years ago, Group Health Cooperative and the University of Washington conducted a study that made front-page news around the world. "Exercise Cuts Alzheimer's Risk," read the headlines. Led by Dr. Eric Larson, the study followed more than 1,700 people ages 65 and older for six years.

At the end of the research, Larson found that those who exercised three or more times per week had a 30 to 40 percent lower chance of developing dementia, which often leads to Alzheimer's.

Dr. Jennifer Weuve, an epidemiologist at Harvard, and her colleagues observed something similar when they surveyed more than 18,000 women ages 70 to 81 involved in the long-running Nurses' Health Study. Weuve discovered the women with the highest levels of activity had a 20 percent lower chance of being cognitively impaired on memory tests.

"The neat thing," says Weuve, "is we started to see the effects at modest levels of activity--walking an hour and a half a week."

To determine why cognitive skills are related to physical activity, in 2006 Arthur Kramer, a neuroscientist at the University of Illinois, recruited 59 healthy volunteers, ages 60 to 79, and divided them into two groups. One group walked on the treadmill three times a week for six months, slowly increasing their speed. The other group did a stretching and toning routine on the same schedule.

Participants had MRIs (magnetic resonance imaging) taken before and after the six-month test, and Kramer discovered something that had never been recorded before: The treadmill walkers

showed an increase in brain volume at the end of the study. The stretching group showed no change.

"The results demonstrate, for the first time, that brain aging is not a one-way street," says Kramer. He found that fitness training increased the volume of both white matter, which provides the connections in the brain, and gray matter, the neurons and other cells that form the basis of computations.

Importantly, the increase in brain volume occurred most in regions of the brain that are often the first to decline with age.

In other words, exercise may help erase years of mental decline--as good a reason as any to go for a walk.