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OP-ED CONTRIBUTOR

## Exercise on the Brain

By SANDRA AAMODT and SAM WANG

FEELING a little less mentally quick than you did a few years ago? Maybe you are among the many people who do “brain exercises” like sudoku to slow the cognitive decline associated with aging. We’ve got a better suggestion.

Computer programs to improve brain performance are a booming business. In the United States, consumers are expected to spend \$80 million this year on brain [exercise](#) products, up from \$2 million in 2005. Advertising for these products often emphasizes the claim that they are designed by scientists or based on scientific research. To be charitable, we might call them inspired by science — not to be confused with actually proven by science.

Environmental enrichment does improve mental function in laboratory animals. Rodents and monkeys that get playmates or toys learn to complete a variety of tasks more easily, at all ages. They also have larger brains, larger brain cells and more synaptic connections than animals raised alone in standard cages. But here’s the rub: standard laboratory environments are tremendously boring. Lab animals rarely need to search for food or avoid predators. In contrast, most of us get plenty of everyday stimulation in activities like finding a new address, socializing with friends or navigating the treacherous currents of office politics. Animal enrichment research may be telling us something important not about the positive effects of stimulation, but about reversing the negative effects of deprivation.

Another line of evidence cited by marketers comes from studies of elderly people who improve certain skills by practicing a challenging computer-based task. Although most programs work to some extent, the gains tend to be specific to the trained task.

That is, practice can certainly make people better at sudoku puzzles or help them remember lists more accurately. The improvement can even last for years. Similarly, people tend to retain skills and knowledge they learned thoroughly when they were younger. Unless the activities span a broad spectrum of abilities, though, there seems to be no benefit to general mental fitness.

For people whose work is unstimulating, having mentally challenging hobbies, like learning a new language or playing bridge, can help maintain cognitive performance. But the belief that any single brain exercise program late in life can act as a quick fix for general mental function is almost entirely faith-based.

One form of training, however, has been shown to maintain and improve brain health — physical exercise. In humans, exercise improves what scientists call “executive function,” the set of abilities that allows you to select behavior that’s appropriate to the situation, inhibit inappropriate behavior and focus on the job at hand

in spite of distractions. Executive function includes basic functions like processing speed, response speed and working [memory](#), the type used to remember a house number while walking from the car to a party.

Executive function starts to decline when people reach their 70s. But elderly people who have been athletic all their lives have much better executive function than sedentary people of the same age. This relationship might occur because people who are healthier tend to be more active, but that's not the whole story. When inactive people get more exercise, even starting in their 70s, their executive function improves, as shown in a recent meta-analysis of 18 studies. One effective training program involves just 30 to 60 minutes of fast walking several times a week.

Exercise is also strongly associated with a reduced risk of [dementia](#) late in life. People who exercise regularly in middle age are one-third as likely to get [Alzheimer's disease](#) in their 70s as those who did not exercise. Even people who begin exercising in their 60s have their risk reduced by half.

How might exercise help the brain? In people, fitness training slows the age-related shrinkage of the frontal cortex, which is important for executive function. In rodents, exercise increases the number of capillaries in the brain, which should improve blood flow, and therefore the availability of energy, to neurons. Exercise may also help the brain by improving cardiovascular health, preventing heart attacks and strokes that can cause brain damage. Finally, exercise causes the release of growth factors, proteins that increase the number of connections between neurons, and the birth of neurons in the hippocampus, a brain region important for memory. Any of these effects might improve cognitive performance, though it's not known which ones are most important.

So instead of spending money on computer games or puzzles to improve your brain's health, invest in a gym membership. Or just turn off the computer and go for a brisk walk.

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