

# Excerpt from “How Exercise Could Help You Learn a New Language”

by Gretchen Reynolds

- 1 Many scientists suspect that exercise alters the biology of the brain in ways that make it more malleable and receptive to new information, a process that scientists refer to as plasticity.
- 2 But many questions have remained unanswered about movement and learning, including whether exercise is most beneficial before, during or after instruction and how much and what types of exercise might be best.
- 3 So for a new study, which was published recently in *PLOS One*, researchers in China and Italy decided to home in on language learning and the adult brain.
- 4 Language learning is interesting. As young children, almost all of us picked up our first language easily. We didn’t have to be formally taught; we simply absorbed words and concepts.
- 5 But by early adulthood, the brain generally begins to lose some of its innate language capability. It displays less plasticity in areas of the brain related to language. As a result, for most of us, it becomes harder to learn a second language after childhood.
- 6 To see what effects exercise might have on this process, the researchers first recruited 40 college-age Chinese men and women who were trying to learn English. The students had some facility with this second language but were far from proficient.
- 7 The researchers then divided the students into two groups. Those in one group would continue to learn English as they had before, primarily while seated in rote vocabulary-memorization sessions.
- 8 The others would supplement these sessions with exercise.
- 9 Specifically, the students would ride exercise bikes at a gentle pace (about 60 percent of their maximum aerobic capacity) beginning 20 minutes before the start of the lessons and continuing throughout the 15 minutes or so of instruction.
- 10 Both groups learned their new vocabulary by watching words projected onto large screens, together with comparable pictures, such as “apple” and a Red Delicious. They were shown 40 words per session, with the sequence repeated several times.
- 11 Afterward, the students all rested briefly and then completed a vocabulary quiz, using computer keys to note as quickly as possible whether a word was with its correct picture. They also responded to sentences using the new words, marking whether the sentences were accurate or, in the case of “The apple is a dentist,” nonsensical. Most linguists<sup>1</sup> feel that understanding sentences shows greater mastery of a new language than does simple vocabulary improvement.
- 12 The students completed eight vocabulary sessions over the course of two months.

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<sup>1</sup>**linguists:** scientists who study language

- 13 And at the end of each lesson, the students who had ridden bikes performed better on the subsequent vocabulary tests than did the students who sat still.
- 14 They also became more proficient at recognizing proper sentences than the sedentary students, although that difference did not emerge until after several weeks of instruction.
- 15 Perhaps most interesting, the gains in vocabulary and comprehension lingered longest for the cyclists. When the researchers asked the students to return to the lab for a final round of testing a month after the lessons—without practicing in the meantime—the cyclists remembered words and understood them in sentences more accurately than did the students who had not moved.
- 16 “The results suggest that physical activity during learning improves that learning,” says Simone Sulpizio, a professor of psychology and linguistics at the University Vita-Salute San Raffaele in Milan, Italy, and a study co-author.
- 17 These improvements extend beyond simply aiding in memorization, she added. The exercise also deepened language learners’ grasp of how to use their newly acquired words.
- 18 This study involved college students performing relatively light exercise, though, and cannot tell us whether other people completing other types of exercise would achieve the same results.
- 19 It also offers no clues about what is occurring inside the brain that might be contributing to the benefits of the exercise. But many past studies have shown that exercise prompts the release of multiple neurochemicals in the brain that increase the number of new brain cells and the connections between neurons, Dr. Sulpizio says. These effects improve the brain’s plasticity and augment the ability to learn.
- 20 From a real-world standpoint, the study’s implications might seem at first to be impractical. Few classrooms are equipped with stationary bicycles. But specialized equipment is probably unnecessary, Dr. Sulpizio says.
- 21 “We are not suggesting that schools or teachers buy lots of bicycles,” she says. “A simpler take-home message may be that instruction should be flanked by physical activity.”

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