Aerobic exercise improves cognition, even in young adults

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Aerobic exercise training improves cognition, even for young and middle-aged adults, according to a new study led by researchers at Columbia University Vagelos College of Physicians and Surgeons.

The study of 132 adults between the ages of 20 and 67 found that aerobic exercise training increases executive function—cognitive processes important for reasoning, planning, and problem-solving—in adults as young as 20, although the effect was stronger with increasing age.

Why it matters

The study indicates that aerobic exercise training improves cognition in younger adults, suggesting that exercise can prevent or slow the appearance of at least some age-related cognitive changes.

The flexibility of the exercise protocol, in which participants choose when and how to exercise, could make the intervention more attractive to the general population and increase its chances for adoption.

Previous studies focused on elderly

Most previous studies of exercise and cognition have focused on the elderly, and those that include young adults were small and did not include a randomly assigned control group.

In the new study, Yaakov Stern, Ph.D., chief of cognitive neuroscience in the department of Neurology and a faculty member in the Taub Institute, and Richard Sloan, Ph.D., chief of behavioral medicine, assigned 132 individuals with below median aerobic capacity to an aerobic exercise training program or to a control program of stretching and core-strengthening exercises.

All participants worked out at a local YMCA four times a week, and those in the exercise group could choose any form of aerobic exercise as long as they reached target heart rates. Data from heart rate monitors

worn by the participants were downloaded to an on-site computer.

Participants were tested for executive function, processing speed, language, attention, and episodic memory prior to being assigned to groups and at 12 and 24 weeks.

Exercise improves the brain's executive function

After 24 weeks, there was significant improvement in executive function in the aerobic exercise group for participants of all ages, and the greater the participant's age, the greater the improvement in executive function.

"Executive function usually peaks around age 30," Stern says, "and I think that aerobic exercise is good at rescuing lost function, as opposed to increasing performance in those without a decline."

Executive function underlies many day-to-day activities. For example.e bill paying requires planning, organizing, and shifting from one related task to another. These activities rely on intact executive function.

Aerobic exercise did not improve cognitive function in processing speed, language, attention, or episodic memory for participants of any age. Some studies have found that aerobic exercise improves these features in adults above 55, and Stern says that a larger study may be able to detect improvement in younger adults. It's also possible that exercise has different effects in young vs. older adults.

Aerobic exercise increases gray matter in brain

Brain imaging at baseline and 24 weeks revealed that aerobic exercise training is associated with significantly increased cortical thickness in the left caudal middle frontal cortex. The increase in gray matter was not

associated with the participant's age. And increases in gray matter did not correlate directly with a corresponding change in any cognitive domain.

Still, several aerobic exercise studies in older adults have noted comparable changes in the frontal lobe, suggesting that aerobic exercise has a beneficial effect on a brain area that is associated with executive function.

More information: The study, "Effect of Aerobic Exercise on Cognition in Younger Adults: A Randomized Clinical Trial," appeared online January 30th in the journal *Neurology*.

Provided by Columbia University Irving Medical Center

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