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Exercise Improves Math Skills, Brain Study Suggests

By Tom Corwin, *The Augusta Chronicle*, Ga. (MCT)

Regular exercise in an after-school program helped sedentary, overweight children perform better on goal-oriented tasks, according to a study from the Georgia Prevention Institute at Georgia Health Sciences University. The exercise also seemed to improve math skills, an area of great concern for U.S. educators.

"That's exciting and has important implications," said the lead author, Dr. Catherine L. Davis, an associate professor of pediatrics at GHSU. "I think it shows that children being sedentary may adversely impact their ability to do mathematics. And that's very important."

In the study, published online in the journal *Health Psychology*, children ages 7 to 11 in Augusta, Ga., were assigned to a group that got 20 minutes of aerobic exercise in an after-school program at the institute, one that got 40 minutes of exercise in a similar program, or a group that had no exercise program. The study used assessment tests to gauge cognitive and academic achievement.

Increasing amounts of exercise seemed to have an increasing effect on "executive function," the ability to achieve goals and exercise things such as self-control, the study found.

In functional MRI scans of some of the children, exercise seemed to increase activity in the prefrontal cortex area of the brain that is associated with executive function. Animal studies have found exercise seems to increase the release of growth factors in the brain that would result in more neurons and more blood vessels, Davis said.

"So as you have more neurons and more capillaries to feed those neurons, that's brain growth basically," she said. "So it is possible that it could be the mechanism that is responsible for the benefits in humans as well. We don't know that yet."

It could also be that the brain itself is getting a workout.

"You have to use your brain to exercise," Davis said. "It is not just that you are using your muscles. Your brain is coordinating your movements. Your brain is issuing the commands to the body to do the exercise. So it may be a direct stimulation of the neurons that are needed to exercise that makes the difference."

Randomized control trials have found a similar effect from exercise in older adults, but this is the first such trial to provide evidence in children, she said.

"It's important to get the trial evidence before you draw strong conclusions," Davis said. "And this is to date the best trial evidence we have."

The study looked at a three-month period for the after-school program, and Davis is now following up with a program through the whole school year to see if the effects increase.

"But it is a meaningful effect, which if it is maintained or if it accumulates over time could be really important for kids' development," she said.

Of particular interest is math improvement. In the most recent Trends in International Mathematics and Science Study, U.S. fourth-graders' average math scores lagged behind their counterparts in eight countries, according to the National Center for Education Statistics at the U.S. Department of Education.

"I think it is something that should be taken very seriously by policymakers, particularly now that we have at least one randomized clinical trial of exercise in kids that examines relative educational outcomes," Davis said.

Even more encouraging was that the study found that gender, race, socioeconomic factors or parental education did not change the impact of the exercise-induced increases. "Hopefully, it will be helpful for the disadvantaged groups," she said.

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