Healthy breakfast boosts math performance

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An ARS-funded study with children ages 8-11 showed that starting the day with breakfast can enhance the ability to solve math problems. Credit: Peggy Greb

Eating breakfast—or choosing to skip it—may significantly influence a child's ability to solve math problems, a U.S. Department of Agriculture (USDA)-funded nutrition study suggests.

Scientist R. Terry Pivik's work with 81 healthy children has indicated that those who ate breakfast were better able to tackle dozens of math problems in rapid-fire succession than peers who didn't have a morning meal.

Pivik directs the Brain Function Laboratory at the USDA Agricultural Research Service (ARS) Arkansas Children's Nutrition Center, and is also a research professor in pediatrics at the University of Arkansas for Medical Sciences. Both the center and the university are in Little Rock.

In his study of 8- to 11-year-old volunteers, each child took two morning math tests, with a 40-minute break in between. Half of the kids ate breakfast during the break; the others did not.

During the math tests, Pivik used EEG (electroencephalographic) sensors to harmlessly record electrical activity generated over regions of children's brains that are involved in solving math problems. The sensors were fitted into a soft cap that the kids wore as they viewed simple math problems presented to them on a computer monitor, calculated the answer in their head, then selected one answer from among three onscreen choices.

EEG data showed that youngsters who had skipped breakfast had to exert more effort to perform the "mental math" that the tests required, and to stay focused on the task at hand, according to Pivik. In contrast, those who had eaten breakfast used less mental effort to solve the problems, stayed more focused on the tests, and improved their scores in the post-breakfast test.

Previous studies by researchers elsewhere have shown an association between nutrition and academic performance. However, the design of the Arkansas study had some important differences. For example, the researchers carefully controlled the time at which the kids ate breakfast,

as well as what they were served. The study is apparently the first published investigation, with 8- to 11-year-olds, that controlled the time and content of the morning meal and used EEG technology to monitor brain activity while the children were solving math problems.

Pivik and nutrition center colleagues Yuyuan Gu and Kevin B. Tennal, along with Stephen D. Chapman—formerly at the center—documented their findings in a peer-reviewed article published in 2012 in the scientific journal Physiology & Behavior.

The research supports the USDA priority of enhancing children's health and nutrition. ARS is the USDA's chief intramural scientific research agency.

The study is described in the November-December 2013 issue of *Agricultural Research* magazine.

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