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EXERCISE APPEARS TO IMPROVE BRAIN FUNCTION AMONG YOUNGER PEOPLE

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CHAMPAIGN, Ill. — As an expanding body of work continues to confirm links between exercise and improved brain function in older adults, a new study by researchers at the University of Illinois at Urbana-Champaign and Vrije Universiteit in Amsterdam suggests similar improvements among younger populations as well.

“Physical activity may be beneficial to cognition during early and middle periods of the human lifespan and may continue to protect against age-related loss of cognitive function during older adulthood,” said Charles H. Hillman, a U. of I. professor of [kinesiology and of community health](#) and the lead author of the study, published in the current edition of the journal *Health Psychology*.

Hillman said the findings support the need to promote the benefits of regular exercise across the lifespan, beginning in childhood. And, he said, more research is needed to gain a better understanding of the relationship between physical activity and cognition for people of all ages.

“It is important to begin studying individuals during early adulthood, and especially childhood, as early intervention may be more beneficial. That is, why wait until individuals are older and have been sedentary to intervene? Why not demonstrate the prophylactic effects of exercise on cognition at an earlier age, if there is indeed an effect?”

Hillman noted that most previous research to date indicating positive relationships between physical activity and cognitive function has been focused primarily on older populations. The current study considered data collected by Hillman’s Dutch colleagues from 241 people aged 15-71 living in the greater Amsterdam area. Participants reported their physical-activity behavior and completed a series of tests designed to indicate task-performance capabilities.

The tasks, which measured subjects’ reaction time and response accuracy when presented with

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Charles Hillman, a professor of kinesiology and community health, has found that exercise may be beneficial to cognition during early and middle periods of life and protect against age-related loss of cognitive function during older adulthood.

congruent and incongruent visual patterns, involve cognitive processes known as executive control function (ECF).

ECF, Hillman said, “refers to a subset of processes – planning, scheduling, working memory, inhibition, task coordination etc. – involved in the intentional component of environmental interaction.” In other words, he said, while carrying out these activities, “the individual cannot go on ‘autopilot.’ Further, the task never habituates, meaning that each time the task is presented, it requires control.”

After controlling for gender and IQ – factors related to physical activity participation or cognitive function – the researchers documented slower reaction time among older compared with younger subjects, and improved (faster) reaction time with increased physical-activity participation. Among older participants, those who indicated they were physically active demonstrated improved task performance – in reaction time and response accuracy.

Physically active younger participants registered improved reaction times. However, Hillman said, there was no significant correlation between physical activity and response accuracy among that group.

In general, he noted, the study results supported conclusions of previous research by U. of I. [psychology](#) and neuroscience professor Arthur F. Kramer and colleagues linking physical activity to improved performance on tasks with large executive components. But Hillman’s team also observed improvement on tasks with small executive components, “indicating a general relationship of physical activity to cognitive performance that is selectively larger for ECF.”

Hillman described tasks with large executive control components as those requiring “inhibition of habitual responses, such as stepping on the brake when the light changes from red to green because a cyclist jumps out in front of the car.”

Another example, he said, involves “the management of interference within an environment – for example, detecting a street sign amid a visually confusing environment.” Greater levels of ECF are also present when “switching between cognitive tasks,” or, in simple, everyday terms – multitasking.

Among the study’s older physically active participants there was a “disproportionately larger influence of physical activity on tasks requiring greater amounts of executive control.” No similar relationship was observed among younger subjects.

In the end, Hillman said the researchers do not know whether physical activity protects against cognitive loss during younger periods of the lifespan or if it promotes better cognitive function.

“Regardless,” he said, “the importance is the same. Physical activity is related to better cognitive health and effective functioning across the lifespan.”

Co-authors of the study with Hillman are U. of I. kinesiology and community health professor Robert W. Motl and U. of I. graduate student Matthew B. Pontifex, and, at Vrije Universiteit, biological psychology professors Dorret I. Boomsma, Eco J.C. de Geus and Danielle Posthuma, and graduate student Janine H. Stubbe.