Performance in '20-meter shuttle run test' associated with brain health in overweight children

January 29 2024

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Aerobic fitness is often considered one of the best indicators of childhood health. It is also linked to better academic performance,

executive function, and larger brain volume. However, aerobic fitness has been studied quite narrowly, often using methods that do not optimally represent it.

According to a study by the University of Jyväskylä and the University of Granada, aerobic fitness performance measured by the 20-meter shuttle run test was associated with several different brain health outcomes. The results are published in *Scandinavian Journal of Medicine & Science in Sports*.

In the study, maximal oxygen uptake was measured objectively during a maximum treadmill test. In addition, fitness was assessed with a 20-meter shuttle run test. Brain health was studied using tests measuring cognitive functions and learning, as well as brain imaging.

The most consistent and clear associations with brain health outcomes were observed with the results of the 20-meter shuttle run tests. Children who performed well in the shuttle run also had better executive functions and academic performance and higher total brain gray matter volume.

In addition to these, the maximum oxygen uptake estimated by an equation based on the shuttle run test results was also associated with general intelligence and reasoning ability. Somewhat surprisingly, the maximal oxygen uptake measured objectively during the treadmill test was not associated with any brain health outcome.

"It is important to note that the 20-meter shuttle run result is determined not only by maximal oxygen uptake but also by other factors such as body composition, motor skills, and motivation. Endurance performance that combines these characteristics may be the most beneficial for brain health from childhood," says Dr. Eero Haapala from the University of Jyväskylä.

"The significance of aerobic fitness for brain health is not yet fully understood, partly due to variable methods. According to our study, maximal oxygen uptake does not seem to be very significant for children 's brain health," Haapala adds.

The study included 100 children aged 8 to 11 years who were overweight or obese and participated in the ActiveBrains study conducted in Granada, Spain, and led by Professor Francisco Ortega from the University of Granada, Spain. Professor Ortega is also a Visiting Professor at the Faculty of Sport and Health Sciences at the University of Jyväskylä.

"These findings have important implications since the 20-meter shuttle run test is widely used in primary and secondary schools all around the world, and several countries, such as Finland, have a nationwide fitness monitoring system which includes this test," says Professor Ortega.

"Our results indicate these fitness assessments are informative and predictive of the brain health status of the kids evaluated, and these monitoring systems can identify regions with poorer fitness, which can inform public health strategies."

More information: Eero A. Haapala et al, Which indices of cardiorespiratory fitness are more strongly associated with brain health in children with overweight/obesity?, *Scandinavian Journal of Medicine & Science in Sports* (2023). DOI: 10.1111/sms.14549