Understanding the role of cardiorespiratory fitness and body composition in brain health

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A new study led by researchers at the Beckman Institute for Advanced Science and Technology examined how cardiorespiratory fitness and body composition relate to neuronal health in 290 healthy young adults.

The study "Body mass and cardiorespiratory fitness are associated with altered brain metabolism" was published in *Metabolic Brain Disease*.

The study contributes to a growing body of research suggesting that fitness has beneficial effects for brain health. The study applied magnetic resonance spectroscopy to detect and measure brain metabolites, focusing specifically on N-acetyl aspartic acid.

"NAA is produced in the neurons and is an important biochemical marker of energy production and neuronal health" said Aron Barbey, a University of Illinois psychology professor, who led the research with senior research scientist Ryan Larsen. "Our prior work demonstrates that neuronal health, as measured by NAA, has favorable associations with cognitive performance. We were interested in exploring whether modifiable life style factors, such as physical activity and aerobic fitness, are also linked to NAA."

The researchers showed that a lower percentage of body fat is associated with higher NAA in the white matter, and that this relationship largely accounts for the association between NAA and cardiorespiratory fitness.

"Our findings suggest that fitter adults benefit from improved structural

brain connectivity," Larsen said. "A central question raised by this work is whether we can modify NAA through physical activity and fitness interventions, providing an effective method to enhance cognitive performance and brain health across the lifespan."

The research team also included U of I psychology professors Charles Hillman and Neal Cohen, Northeastern University postdoctoral fellow Lauren Raine, and Arthur Kramer, Beckman Institute director emeritus and senior vice provost for research and graduate education at Northeastern University.

More information: Ryan J. Larsen et al, Body mass and cardiorespiratory fitness are associated with altered brain metabolism, *Metabolic Brain Disease* (2020). DOI: 10.1007/s11011-020-00560-z

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