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Study finds aerobic exercise benefits memory in persons with multiple sclerosis

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A research study headed by Victoria Leavitt, Ph.D. and James Sumowski, Ph.D., of Kessler Foundation, provides the first evidence for beneficial effects of aerobic exercise on brain and memory in individuals with multiple sclerosis (MS). The article, "Aerobic exercise increases hippocampal volume and improves memory in multiple sclerosis: Preliminary findings," was released as an epub ahead of print on October 4 by *Neurocase: The Neural Basis of Cognition*. The study was funded by Kessler Foundation.

Hippocampal atrophy seen in MS is linked to the memory deficits that affect approximately 50% of individuals with MS. Despite the prevalence of this disabling symptom, there are no effective pharmacological or behavioral treatments. "Aerobic exercise may be the first effective treatment for MS patients with memory problems," noted Dr. Leavitt, research scientist in Neuropsychology & Neuroscience Research at Kessler Foundation. "Moreover, aerobic exercise has the advantages of being readily available, low cost, self-administered, and lacking in side effects." No beneficial effects were seen with non-aerobic exercise. Dr. Leavitt noted that the positive effects of aerobic exercise were specific to memory; other cognitive functions such as executive functioning and processing speed were unaffected.

The study's participants were two MS patients with memory deficits who were randomized to non-aerobic (stretching) and aerobic (stationary cycling) conditions. Baseline and follow-up measurements were recorded before and after the treatment protocol of 30-minute exercise sessions 3

times per week for 3 months. Data were collected by high-resolution MRI (neuroanatomical volumes), fMRI (functional connectivity), and memory assessment. Aerobic exercise resulted in a 16.5% increase in hippocampal volume, a 53.7% increase in memory, and increased hippocampal resting-state functional connectivity. Non-aerobic exercise resulted in minimal change in hippocampal volume and no changes in memory or functional connectivity.

"These findings clearly warrant large-scale clinical trials of aerobic exercise for the treatment of memory deficits in the MS population," said James Sumowski,, Ph.D., research scientist in Neuropsychology & Neuroscience Research at Kessler Foundation.

More information: Leavitt VM, Wylie G, Chiaravalloti ND, et al. Warmer outdoor temperature is associated with task-related increased BOLD activation in patients with multiple sclerosis. *Brain Imaging Behav.* 2013 Oct 23. [Epub ahead of print].

Sumowski JF, Rocca MA, Leavitt VM, et al. Brain reserve and cognitive reserve in multiple sclerosis: what you've got and how you use it. *Neurology*. 2013 Jun 11;80(24):2186-93.

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