

# Exercise maintains brain size, new research finds

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Credit: University of Western Sydney

Aerobic exercise can improve memory function and maintain brain health as we age, a new Australian-led study has found.

In a first of its kind international collaboration, researchers from Australia's National Institute of Complementary Medicine (opens in new window) at Western Sydney University and the Division of Psychology and Mental Health at the University of Manchester in the UK examined the effects of aerobic [exercise](#) on a region of the [brain](#) called the hippocampus, which is critical for memory and other brain functions.

Brain health decreases with age, with the average brain shrinking by approximately five per cent per decade after the age of 40.

Studies in mice and rats have consistently shown that physical exercise increases the size of the hippocampus but until now evidence in humans has been inconsistent.

The researchers systematically reviewed 14 clinical trials which examined the brain scans of

737 people before and after aerobic exercise programs or in control conditions.

The participants included a mix of healthy adults, people with [mild cognitive impairment](#) such as Alzheimer's and people with a clinical diagnosis of mental illness including depression and schizophrenia. Ages ranged from 24 to 76 years with an average age of 66.

The researchers examined effects of aerobic exercise, including stationary cycling, walking, and treadmill running. The length of the interventions ranged from three to 24 months with a range of 2-5 sessions per week.

Overall, the results – published in the journal *NeuroImage*– showed that, while exercise had no effect on total hippocampal volume, it did significantly increase the size of the left region of the hippocampus in humans.

Lead author, NICM postdoctoral research fellow, Joseph Firth said the study provides some of the most definitive evidence to date on the benefits of exercise for [brain health](#).

"When you exercise you produce a chemical called brain-derived neurotrophic factor (BDNF), which may help to prevent age-related decline by reducing the deterioration of the brain," Mr Firth said.

"Our data showed that, rather than actually increasing the size of the hippocampus per se, the main 'brain benefits' are due to [aerobic exercise](#) slowing down the deterioration in [brain size](#). In other words, exercise can be seen as a maintenance program for the brain."

Mr Firth said along with improving regular 'healthy' ageing, the results have implications for the prevention of ageing-related neurodegenerative disorders such as Alzheimer's and dementia –

however further research is needed to establish this.

Interestingly, [physical exercise](#) is one of the very few 'proven' methods for maintaining brain size and functioning into older age.

**More information:** Joseph Firth et al. Effect of aerobic exercise on hippocampal volume in humans: A systematic review and meta-analysis, *NeuroImage* (2017). [DOI: 10.1016/j.neuroimage.2017.11.007](#)

Provided by University of Western Sydney

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