

Running helps the brain counteract negative effect of stress, study finds

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Credit: Brigham Young University

Most people agree that getting a little exercise helps when dealing with stress. A new BYU study discovers exercise—particularly running—while under stress also helps protect your memory.

The study, newly published in the journal of *Neurobiology of Learning and Memory*, finds that running mitigates the negative impacts chronic [stress](#) has on the hippocampus, the part of the brain responsible for learning and memory.

"Exercise is a simple and cost-effective way to eliminate the negative impacts on memory of chronic stress," said study lead author Jeff Edwards, associate professor of physiology and developmental biology at BYU.

Inside the hippocampus, memory formation and recall occur optimally when the synapses or connections between neurons are strengthened over time. That process of synaptic strengthening is called long-term potentiation (LTP). Chronic or prolonged stress weakens the synapses, which decreases LTP and ultimately impacts memory. Edwards' study found that when exercise co-occurs with stress, LTP levels are not decreased,

but remain normal.

To learn this, Edwards carried out experiments with mice. One group of mice used running wheels over a 4-week period (averaging 5 km ran per day) while another set of mice was left sedentary. Half of each group was then exposed to stress-inducing situations, such as walking on an elevated platform or swimming in cold water. One hour after stress induction researchers carried out electrophysiology experiments on the animals' brains to measure the LTP.

Stressed mice who had exercised had significantly greater LTP than the stressed mice who did not run. Edwards and his colleagues also found that stressed mice who exercised performed just as well as non-stressed mice who exercised on a maze-running experiment testing their memory. Additionally, Edwards found exercising mice made significantly fewer memory errors in the maze than the sedentary [mice](#).

The findings reveal exercise is a viable method to protect learning and memory mechanisms from the negative cognitive impacts of [chronic stress](#) on the [brain](#).

"The ideal situation for improving learning and [memory](#) would be to experience no stress and to exercise," Edwards said. "Of course, we can't always control stress in our lives, but we can control how much we [exercise](#). It's empowering to know that we can combat the negative impacts of stress on our brains just by getting out and running."

More information: Roxanne M. Miller et al, Running exercise mitigates the negative consequences of chronic stress on dorsal hippocampal long-term potentiation in male mice, *Neurobiology of Learning and Memory* (2018). [DOI: 10.1016/j.nlm.2018.01.008](https://doi.org/10.1016/j.nlm.2018.01.008)

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