

HEALTH SCIENCES PRESS RELEASE

Training to improve memory

Game-based training improves not only the cognitive abilities of people with initial signs of developing dementia, but also leads to positive changes in the brain. That is according to two new studies by researchers from ETH Zurich and Eastern Switzerland University of Applied Sciences OST.

08.09.2025 by [Christoph Elhardt, Corporate Communications](#)

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By stepping to the right, a study participant confirms that the product was on the shopping list. (Image: Jonas Weibel)

In brief

- Around 40 people with mild cognitive impairment and an average age of 73 trained for around 25 minutes, 5 times a week over a 12-week period.
- In response to the training, an increase was found in the study participants' cognitive performance and in the volume of brain regions responsible for memory.
- The researchers showed that the changes in the brain were correlated with the improvements in memory and general cognitive performance.

In Europe, almost one in 10 people over 70 suffers from dementia, and this figure could even triple by 2050 due to rising life expectancy. Over time, those affected lose everything that makes them who they are, including their memory and their ability to go about their everyday lives. Many also suffer from physical deterioration. In an advanced stage of the disorder, dementia patients generally require comprehensive care.

Now, the first drugs have emerged that can slightly slow down disease progression in the early stages of Alzheimer's – which is the most common of several different forms of dementia. However, these drugs are not yet authorised in Switzerland and are only relevant to a small group of patients. In recent years, "exergames" emerged as a low-risk alternative or complement treatment to medications. These fitness games combine physical activity with brain-exercises – without any undesired side effects. In 2021, a [study involving](#)

researchers from ETH had already shown that this kind of training improves not only cognitive but also physical abilities, as well as the quality of life of people with severe dementia.

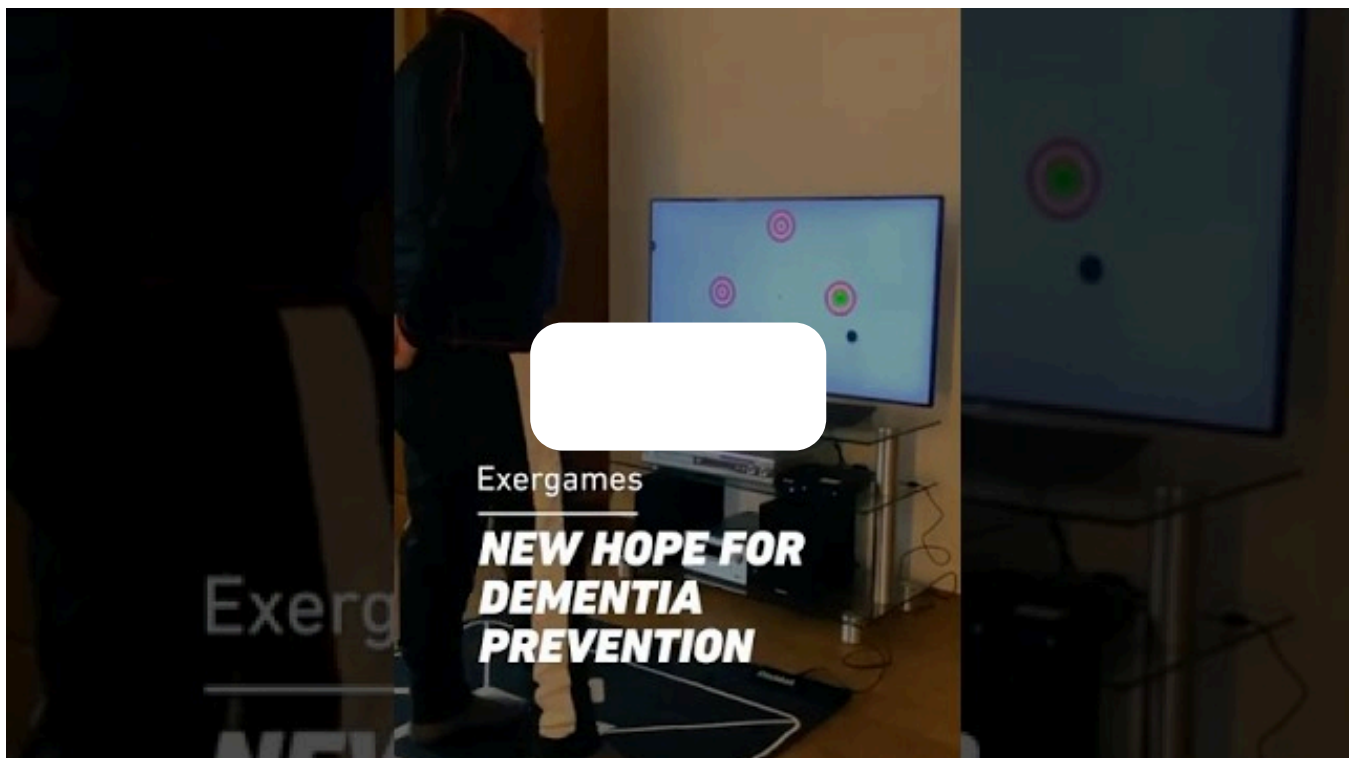
Now, two new ETH studies have shown that training with “exergames” also works in older individuals with mild cognitive impairment – an early stage of dementia. “Not only did game-based training improve the cognitive performance of study participants, but we also measured significant changes in their brains,” explains Patrick Manser, who is now carrying out research at the Karolinska Institute in Stockholm. Both studies emerged from his doctoral thesis at ETH Zurich and confirm the findings obtained in 2021.

Training for mind and body

In the two studies, Manser and his colleagues examined around 40 people with mild cognitive impairment and an average age of 73. Study participants trained at home for around 25 minutes, 5 times a week over a 12-week period, using a system consisting of a screen with the game software and a floor panel with four fields that measured the person’s steps.

The participants generally had to solve predefined tasks on the screen by performing a sequence of movements with their feet. For example, they would attempt to memorise a shopping list and then decide by stepping to the right or left whether the product shown was on the list or not. “Tasks like these train specific cognitive abilities that deteriorate in dementia patients, such as attention, memory or visuospatial skills,” says Manser.

Following the exercises, the study participants each had to breathe slowly and in a controlled manner for a period of time. By doing so, they regulated their autonomic nervous system by stimulating the Vagus nerve and activated regions of the brain that are relevant to cognitive processes. This was intended to further boost the effectiveness of the training.



New hope for dementia prevention (Video: ETH Zurich)

Memory improves significantly

In their first study, the researchers showed that there were significant improvements in the cognitive performance and memory of those doing the training. These improvements were not only statistically significant but also noticeable in everyday life – while shopping, in conversations or when dealing with stress, for example. Study participants reported feeling fitter, more lucid and more self-assured. In contrast, study

participants in the control group, who continued with their usual therapies, experienced a worsening of their condition – which matches the typical disease progression.

The results are encouraging above all for people showing initial signs of dementia and for their relatives: “We hope that, with targeted exergame training, we’ll be able to slow down and reduce dementia symptoms,” explains project leader and co-author Professor Eling D. de Bruin, who carries out research at ETH Zurich and Eastern Switzerland University of Applied Sciences OST.

Structural changes in the brain

In a second study, the researchers investigated whether the cognitive improvements were reflected in the brain. To their surprise, they could indeed detect changes in certain structures. In magnetic resonance images, the researchers found that the volume of the hippocampus – a region that plays a key role in memory – and the thalamus increased in those doing the training. They also observed effects in the anterior cingulate cortex, as well as slight improvements in the prefrontal cortex. In participants in the control group, on the other hand, the volume of these areas of the cerebral cortex decreased.

“These regions play an important role in neurodegenerative diseases. Reduced hippocampal volume is even considered an early feature of dementia,” explains de Bruin. The fact that the researchers were able to measure structural changes after just 12 weeks is, he says, impressive proof of the brain’s plasticity – even in people showing the first signs of dementia.

The researchers also showed that the changes in the hippocampus and thalamus were correlated with better cognitive performance and better memory. This is a first indication of a potential causal, disease-modifying effect of the training. “Our results give us confidence for the future. However, demonstrating whether the personalised, game-based training can delay or even prevent the development of dementia will require studies in which the participants train for longer than three months. There are already plans for projects of this kind,” says de Bruin.

References

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