

# Exercise may help reduce long-term side effects of chemotherapy for breast cancer patients

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After treatment for breast cancer, most women suffer side effects such as fatigue, not feeling physically fit and cognitive issues. This can often

last for years after treatment. Neuroscientist Emmie Koevoets investigated whether an exercise program could help these women, as there is currently little research on that topic. She concluded that exercise has many beneficial effects, especially for women with high levels of fatigue. She is set to defend her thesis at the University of Amsterdam on Tuesday 27 June.

"Between 21% and 34% of [women](#) treated with chemotherapy for [breast cancer](#) perform lower on [neuropsychological tests](#) than you would expect based on their age and level of education," Koevoets says. "They have difficulty concentrating or have problems with their memory, for example." According to Koevoets, there were no scientifically supported interventions yet to address the underlying cause of these cognitive difficulties—a situation she was keen to change. She therefore investigated whether an [exercise](#) program could enhance cognitive functioning and induce changes in the [brain](#).

For Koevoets' study, 181 women who had been treated with chemo two to four years ago and were still struggling with cognitive difficulties were randomly divided into two groups. One group participated in an exercise program and the other group, the [control group](#), did not. For a period of six months, the exercise group did fitness and [strength training](#) and Nordic or power walking every week. The members of the control group were asked to maintain their current exercise pattern.

To discover the effect of the training, Koevoets deployed several tools. She conducted neuropsychological tests, made an MRI scan of the brain, performed an exercise test and drew blood from the participants. She also asked participants to self-report whether they had noticed an effect using questionnaires on cognitive complaints, fatigue, anxiety, depression and quality of life.

Koevoets found no positive effects of the training on participants'

cognitive functioning in neuropsychological tests. However, the physical fitness of the exercise group did improve compared to the control group. Remarkably, in addition to feeling physically fitter, the participants themselves did report cognitive improvements, as well as experiencing less fatigue and feeling less depressed. In addition, they reported that their quality of life had improved.

## **A deeper look inside the brain**

Koevoets also took a deeper look inside the brain. "We looked specifically at the volume of the brain region that relates to memory (the hippocampus), at the thickness of the outer layer of the brain (the cortex), gray matter volume, brain blood flow and the quality of the white matter pathways connecting different brain regions."

Changes in brain volume or disruptions in white matter pathways or blood flow can impair cognitive ability. However, the exercise program was found to have had no effect on brain volume or white matter pathways. According to Koevoets, this could be because the women in the sample were still relatively young and the volume was actually still up to par, or that there had either been little damage to brain structures or that it had already recovered.

Koevoets also examined the potential of the exercise program for women who experienced high levels of fatigue in addition to cognitive difficulties. "Fatigue is one of the most common and upsetting symptoms after cancer treatment. Cognitive complaints are often associated with fatigue. Previous studies have shown that [physical activity](#) has beneficial effects on fatigue after cancer diagnosis."

For this particular group that experienced high levels of fatigue, Koevoets did find beneficial effects of the exercise program on their memory and speed of information processing, as measured by

neuropsychological tests. "We also found effects on their brains, namely a decrease in brain volume resulting in better memory function and a change in the quality of white matter pathways."

Koevoets concludes that this study shows the many beneficial effects of exercise, even if the cognitive functions tested did not improve in the [exercise group](#). "The participants themselves reported fewer cognitive complaints, their fitness perked up, and cognitive functioning in participants with high levels of fatigue showed improvements."

According to Koevoets, it is important to repeat this study among women with [fatigue](#) symptoms for other patients in order to validate the results.

Provided by University of Amsterdam

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