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Mental fitness: Does brain training when you are older help?

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The saying "use it or lose it" probably applies to some extent to our brains as well as the rest of our bodies. Hobbies, doing puzzles, learning a new language or how to play the piano – these are all ways in which people have traditionally tried to keep themselves mentally fit and active as they age.

Brain training is becoming more popular, whether as a leisure activity or with the goal of improving brain fitness. There are now many commercial products for computers, handheld computers and phones that claim to be able to keep us mentally fit for longer. Some products even claim that brain training can prevent Alzheimer's. Claims such as these need to be proven in trials to see whether it is really worth investing in them or whether other options are better.

The brain is perhaps the most complex organ in our bodies. It interprets the information coming in from our senses (such as what we see, hear and smell), regulates the body's functions, and enables us to think and feel. The brain has more than 100 billion nerve cells (neurones) to help it do all of that. These neurones are linked at junctions called synapses. Chemical messengers called neurotransmitters help to pass information between neurones through the synapses. But the number of neurones and synapses in our brains reduces as we get older. This can mean that our thinking gets slower and it is harder for us to learn new things.

Whether or not brain training helps maintain brain fitness is controversial

The specialist term for thinking functions is cognitive abilities, and specialists often call brain training a cognitive intervention. This kind of activity is meant to help counteract the effects of the reduced brain function that normally comes with aging. Tests looking at what happens when you are doing something that exercises your brain show that "brain exercise" can affect the brain chemistry and is theoretically good for the brain. However, that does not necessarily mean that regular brain training will make a noticeable difference in everyday life. Also, just because one form of brain training could help, it does not mean that all other kinds work too. This has made brain training controversial among experts.

Researchers from the University of Connecticut and Brown University in the USA systematically assessed the evidence on whether or not so-called cognitive interventions like brain training had an influence on brain ability in healthy older people. The researchers looked for trials that tested brain training, and then analysed their results. They only included studies that could provide genuine proof of whether or not brain training works – so-called randomised controlled trials (RCTs). You can read more about how these trials are carried out and why they are the most reliable kind of study here (URL: http://www.informedhealthonline.org/evidence-based-medicine.6
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The trials on cognitive interventions in healthy older people

The researchers found 10 trials with about 4,000 participants. None of these trials was long enough to be able to answer the question whether brain training can prevent or delay the onset of dementia. The average age of the people in these trials was between 60 and 80 years. They were all mentally fit (that is, they had not been diagnosed with any form of cognitive impairment). The goal of these studies was not to find out whether brain training helps people who have a cognitive impairment or dementia.

A study called the ACTIVE trial in the USA was by far the biggest: it had 2,800 participants. In that trial, people were split into 4 groups: 3 groups had different types of training, and one control group had no training. The people in training groups had training courses. Over about 5 weeks they attended 10 training classes that lasted between 60 and 75 minutes.

The 3 groups were trained in different kinds of exercises. The first group had exercises involving letters and the order of words – this was intended to work on their logic. The second group worked to find symbols as quickly as they could on a computer screen. This was intended to work on the speed of brain processing or reaction times. The third group learned strategies using mnemonics (word association techniques). This was aimed at their memory skills.

The other trials looked at similar kinds of activities, but some also looked at things like learning to play the piano.

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Brain training can improve cognitive ability to some extent – but only in the specific thinking functions that are trained

The trials showed that, in general, brain training can improve cognitive abilities somewhat, but the improvement was not large. The results of the ACTIVE trial confirmed what some experts have been arguing: that a brain training exercise only has an effect on the very specific ability it is aimed at, and not on mental fitness in general. For example, people who worked on the computer screen trying to find symbols as fast as possible improved their reaction time. However, in some types of thinking skills, such as logical thinking and memory, the people in the training group did not improve compared to the people who had no training. This means that there is likely to be a big difference between different types of brain training and what they can achieve.

It is not clear from the research whether brain training could have adverse effects. For example, some of these kinds of activities could be frustrating or confusing. Other kinds might cause headaches or eyestrain.

The researchers concluded that activities that only aim at one single cognitive skill are probably not enough to improve overall brain fitness. It could be that brain training that is designed to affect many areas of brain function would be better. But that has to be tested in trials to be sure.

Even though there is no particular set of brain exercises that has been proven to improve overall mental fitness, it is possible to improve certain brain functions. So if a particular brain game or other mental activity is enjoyable, then as long as you do not overdo it, it might have some benefits. But scientific research has not shown that there are any important health reasons to invest in a brain game.

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Glossary

evidence

Evidence is what we call scientific proof from well-conducted, good-quality scientific trials that have been carefully designed to answer specific questions. Depending on the types of questions, different scientific research methods (types of study) are most appropriate to find reliable answers to these questions. Randomized controlled trials (RCTs), for example, are the best way to get reliable evidence on the effectiveness of medical treatments (interventions). This type of study, however, is not the best form of evidence for all possible questions, and does not provide the best answers to all kinds of questions, either. Epidemiological studies, for example, are very suitable for establishing well-founded proof for the spreading of a disease in the population.

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Sources

IQWiG health information is based on research in the international literature. We identify the most scientifically reliable knowledge currently available, particularly so-called "systematic reviews". These summarise and analyse the results of scientific research on the benefits and harms of treatments and other health care interventions. This helps medical professionals and people who are affected by the medical condition to weigh up the pros and cons. You can read more about systematic reviews and why these can provide the most trustworthy evidence about the state of knowledge here (URL: http://www.gesundheitsinformation.de/evidence-based-medicine.61.en.html) . The authors of the major systematic reviews on which our information is based are always approached to help us ensure the medical and scientific accuracy of our products.

Papp KV, Walsh SJ, Snyder PJ. Immediate and delayed effects of cognitive interventions in healthy elderly: a review of current literature and future directions. *Alzheimer's & Dementia* 2009; 5: 50-60. [PubMed summary (URL: http://www.ncbi.nlm.nih.gov/pubmed/19118809?dopt=abstract)]

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The German Institute for Quality and Efficiency in Health Care (IQWiG)

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Evidence basis of our health information

Our information is based primarily on systematic reviews of the effects of health care. Systematic reviews are necessary to gain an objective picture of health care. In order to do this, a clear question is formulated. Researchers then find all the relevant studies that could answer this question. They then evaluate those studies.

You can find a list of the evidence and other scientific literature on which this information is based at **www.informedhealthonline.org**

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