Does brain training make you smarter?

November 13 2013, by Jonathan Foster

No one disputes that extensive training on a specific task will improve performance on that task. Credit: Paul Boxley

No one who has kept their head out of the sand over the past several years needs to be told "brain training" is a hot topic. And it's big business

too, with advocates using claims such as "personal training design by scientists" to market their wares.

Decades of studies in both laboratory animals and humans have demonstrated the capacity of the brain for some degree of plasticity. This can be extremely beneficial; after someone suffers a stroke, for instance, and has to relearn some basic abilities.

But is there any evidence that specific "brain training" can improve overall performance? Or is it all hype and hyperbole?

For many, not one

The cornerstone of scientific progress is the demonstration of evidence-based effects rather than a media vortex of gee-wizz findings in individuals, no matter how compelling these may be for the television viewer.

Sceptics argue that brain-training studies claiming to demonstrate significant effects lack more general applicability and have shown only very specific kinds of improvement.

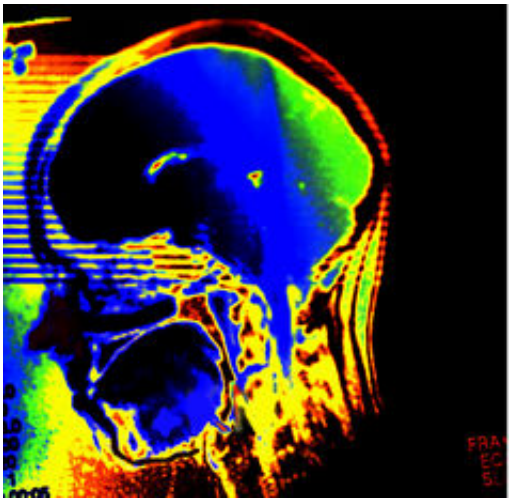
Meanwhile, proponents of brain training argue studies failing to demonstrate effects employ flawed approaches, including unsatisfactory application of recommended methods.

The key question is generalisability of benefits – the holy grail of brain training.

No one really disputes that extensive training on a specific task will improve performance on that task. But the acid test for brain training is whether it can be reliably demonstrated that training on some tasks transfers more widely to a range of other tasks and thought processes.

In the largest study undertaken in this area to date, researchers were patently unable to demonstrate a generalisation of training across tasks.

They conducted a six-week online study in which 11,430 participants trained several times each week on cognitive tasks designed to improve reasoning, memory, planning, visuospatial skills and attention. Improvement effects were task specific and failed to transfer to other untrained tasks.



The key question for assessing the benefits of brain training is the generaliszability of benefits. Credit: Daniela Hartmann

But in another, more recent high-profile study undertaken in older individuals, another group of researchers used a video game in which players were required to drive and identify specific road signs.

After training, older individuals, aged 60 to 85 years, became more proficient than untrained individuals in their 20s. Their performance levels were sustained for six months, even without additional training.

Perhaps most critically, these researchers reported that older adults performed better at other attention and working memory tests as well, demonstrating the transferability of benefits from the training game to different cognitive functions.

But there's been much criticism of the study's findings; for example, with respect to the relatively small number of participants involved.

The bigger picture

And so it goes. Volleys are fired back and forth between the two camps against the backdrop of more general and far-reaching considerations that currently appear to stack up on the side of the sceptics.

It's widely accepted among working scientists that it's much more challenging to publish findings that demonstrate non-significant outcomes compared with findings that demonstrate statistically significant differences. So, there's a potential publication bias against studies of brain training that fail to demonstrate an effect.

But where does this all leave us?

It may be that brain training will show generalizability only from some specific tasks onto others.

There have been claims, for instance, that brain training may improve intelligence (which remains an inchoate concept), or that brain training can rewire the prefrontal cortex or its connections – or both.

The latter (alluded to by researchers who did the video game study above) may be beneficial, given that prefrontal brain regions are known to be engaged in the coordination of many different processes.

It's also been claimed from neuroimaging investigations that brain training can produce changes in the "hardwiring" of the brain. But whether these changes endure and what they truly signify remains open to question.

The jury is still out on brain training for otherwise healthy individuals. But if you're considering taking it up, it's important to consider that some of the principal proponents of brain training methods have a financial or other commercial stake in the packages they're endorsing.

The key question you should ask yourself is the opportunity cost associated with brain training – what is it you are not doing in order to spend time 'training your brain'?

In addition to financial expense, many brain-training packages involve considerable investment of your time over an extended period.

You might spend your time and money more effectively doing other things to improve your abilities, such as exercising, improving your diet, learning to play an instrument, or acquiring a new language.

These alternative pursuits confer the additional benefit of social interaction, which has clearly been demonstrated to benefit our brain health.

Source: The Conversation