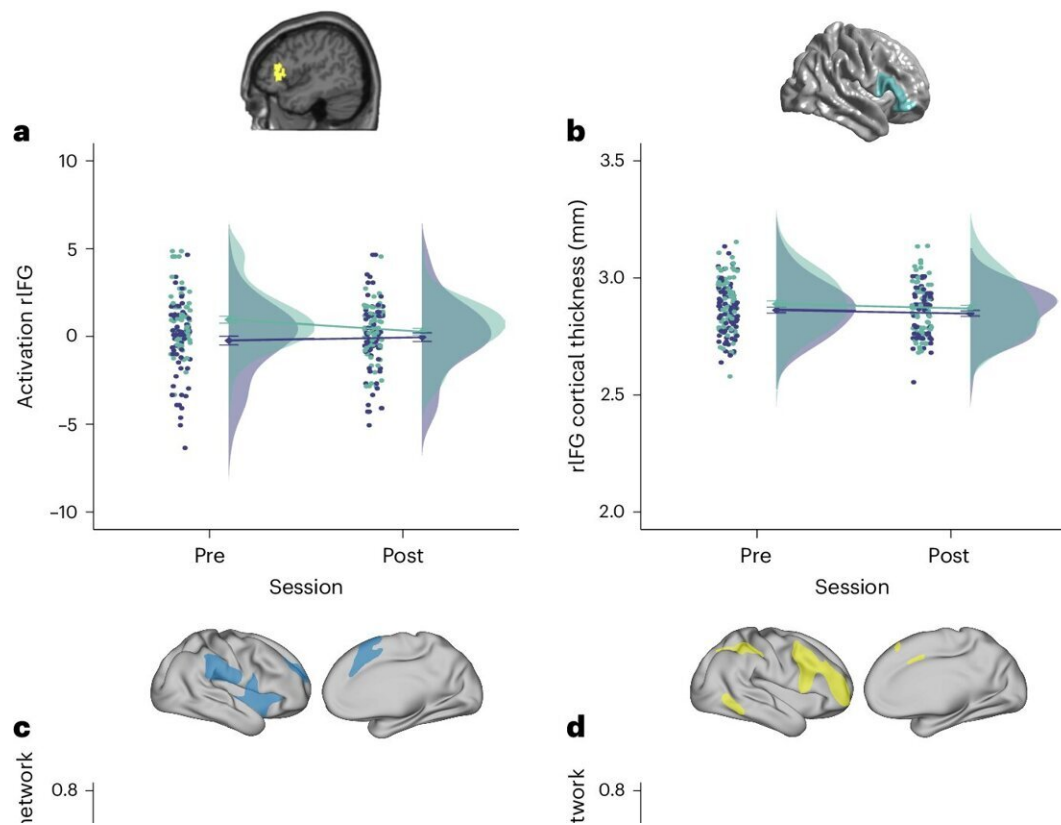


# Training cognitive control in children does not change brain or behavior, finds study

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Short term far transfer on neural indices. Credit: *Nature Neuroscience* (2024).  
DOI: 10.1038/s41593-024-01672-w

Training exercises designed to improve cognitive control in children do not make a significant difference to their ability to delay gratification or

to their academic achievement, nor do they lead to any brain changes, finds a new study led by UCL researchers.

The findings, [published](#) in *Nature Neuroscience*, appear to debunk the popular idea that brain training could improve [cognitive control](#)—the mental processes that allow us to set and pursue short- or [long-term goals](#)—and thereby lead to tangible benefits to other real-life outcomes.

Lead author Professor Nikolaus Steinbeis (UCL Psychology & Language Sciences) said, "Cognitive control is a very important cognitive function that is positively correlated with prudent decision-making, academic achievement, good social skills and mental health. Children with good cognitive control are also more likely to have better mental health and attainment later in life.

"There is an enormous and growing industry developing [brain training](#) programs purporting to improve children's cognitive control and, as a result, other areas of functioning, and yet the evidence for their efficacy has been patchy."

For the study, 235 children aged six to 13 completed an eight-week training program designed to train either cognitive control or response speed. The cognitive control training was focused on response inhibition (the ability to stop oneself from doing an action that is no longer helpful in achieving a goal) and informed by neuroscientific research. They completed a range of gamified tasks, often requiring them to inhibit their impulses.

Before and immediately after the study, as well as one year later, the children were also tested for other outcomes known to be related to cognitive control, including decision-making like delaying gratification, [academic achievement](#), fluid reasoning, mental health and creativity.

The researchers found that immediately after completing the training, and a full year later, the children improved their performance on the [specific tasks](#) they trained on. However, those improvements did not carry over into other skills and there were no improvements in any of the related cognitive or behavioral measures.

The research team also scanned the children's brains using MRI, and found no changes in brain structure or function across the entire brain. The researchers ran additional [statistical analysis](#) which provided strong evidence of the absence of any training effects.

Professor Steinbeis said, "Our findings suggest that even though cognitive control is clearly very important for other real-life outcomes, we simply do not see that training can yield such broader benefits even when trained over an extensive period of time. We should stop seeing cognitive control as a skill that can be readily boosted by training exercises, as that is likely a waste of time and resources.

"While our study only investigated a specific set of training exercises, they were designed in line with the best evidence and did improve children's abilities on the specific tasks themselves, so we find it unlikely that other training exercises would be any better at improving real-life outcomes.

"Instead, it may be better to focus on how we use our cognitive control in practice. We are more able to concentrate and learn effectively when we are motivated, so focusing on motivational factors may be a better way to impact how we use cognitive control to guide our behaviors."

While the study was conducted only in children, the researchers say that their findings would likely apply to adults as well, as children's brains are more malleable and thus it would be even more difficult to train such abilities in adults.

The researchers caution that their study did not include clinical populations or children with learning disabilities, so they cannot say whether their findings generalize beyond typically developing [children](#).

The study was conducted by researchers at UCL, McGill University, Washington University in St. Louis, and Radboud University Medical Center.

**More information:** Keertana Ganesan et al, Cognitive control training with domain-general response inhibition does not change children's brains or behavior, *Nature Neuroscience* (2024). [DOI: 10.1038/s41593-024-01672-w](#)

Provided by University College London

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