

Exercise has numerous beneficial effects on brain health and cognition, review suggests

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It's no secret that exercise has numerous beneficial effects on the body. However, a bevy of recent research suggests that these positive effects also extend to the brain, influencing cognition. In a new review article highlighting the results of more than a hundred recent human and animal studies on this topic, Michelle W. Voss, of the University of Illinois at Urbana-Champaign, and her colleagues show that both aerobic exercise and strength training play a vital role in maintaining brain and cognitive health throughout life. However, they also suggest that many unanswered questions remain in the field of exercise neuroscience—including how various aspects of exercise influence brain physiology and function and how human and animal studies relate to each other—and issue the call for further research to fill in these gaps.

The article, "Exercise, Brain and Cognition Across the Lifespan," is published in the online edition of the *Journal of Applied Physiology*.

Methodology

Using the findings from 111 recent studies, the researchers write a brief review showcasing the effects of [aerobic exercise](#) and strength training on humans ranging in age from children to elderly adults. They relate these findings to those in lab animals, such as rats and mice, which provide a window on the pathways through which exercise may enhance brain function.

Results

The review suggests that aerobic exercise is important for getting a head start during childhood on [cognitive](#) abilities that are important throughout life. For example, physical inactivity is associated with poorer academic performance and results on standard neuropsychological tests, while exercise programs appear to improve memory, attention, and decision-making. These effects also extend to young and elderly adults, with solid evidence for aerobic training benefiting executive functions, including multi-tasking, planning, and inhibition, and increasing the volume of brain structures important for memory. Although few studies have evaluated the effects of strength training on brain health in children, studies in older adults suggest that high-intensity and high-load training can improve memory.

Animal studies, primarily models that test the influence of aerobic exercise, suggest a variety of mechanisms responsible for these effects. For example, exercise appears to change brain structure, prompting the growth of new nerve cells and blood vessels. It also increases the production of neurochemicals, such as BDNF and IGF-1, that promote growth, differentiation, survival, and repair of brain cells.

Though this collection of studies clearly reveals the [beneficial effects](#) of exercise on the brain, it also highlights gaps in the scientific literature. For example, the review authors note that more research is needed on how exercise type might promote different effects on brain health and cognition. Similarly, they say, future research that integrates human and animal work will be necessary, such as studies that incorporate exercise over animals' life spans to understand the effects of exercise at different time points, or human studies that include measures of BDNF, IGF-1, or other neurobiological markers.

Importance of the Findings

The reviewed studies suggest that both aerobic exercise and [strength training](#) can have significant positive effects on [brain health](#) and function, but more research is needed to better elucidate these effects.

"It is increasingly prevalent in the print media, television, and the Internet to be bombarded with advertisements for products and programs to enhance mental and physical health in a relatively painless fashion through miracle elixirs, computer-based training, or gaming programs, or brief exercise programs," the authors say. "Although there is little convincing scientific evidence for such claims, there have been some promising developments in the scientific literature with regard to physical activity and [exercise](#) effects on cognitive and [brain](#) health."

Provided by American Physiological Society

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