The Benefits of Exercise on the Mind

**Exercise has long been advocated as a way to enhance physical health, but it has also been shown to have several benefits on the mind.** More recently, research has focused on how exercise can improve cognitive function. Over the past three decades, Drs Phillip D. Tomporowski and Caterina Pesce from the University of Georgia and the University of Rome, respectively, have examined the benefits of exercise on the mind. Their recent work assesses the role that skill acquisition plays in developing and maintaining cognitive function across life stages. They propose that mentally engaging physical activities have the greatest benefit for cognitive health.

Exercise has long been promoted to enhance physical health, but it has also been shown to have several benefits on the mind, from improving mental health and helping to fight depression to reducing stress and increasing our overall well-being. More recently, research has focused on the benefits of exercise on the mind and the impact that it can have on cognitive function. The term cognitive function refers to multiple mental abilities and encompasses processes such as learning, thinking, reasoning, remembering, problem-solving, decision-making, and attention.

Most of the research to date has focused on how the body adapts to the demands of exercise training. Evidence from this research demonstrates that changes occur in the body following aerobic exercises and strength training. As such, several studies have been made on how exercise alters brain health and enhances a person’s mental abilities. Many of these studies have made exercise recommendations based on the results they obtained. While it is clear that exercise can have a positive impact on the mind, many of these studies have failed to consider additional factors that could impact how beneficial exercise can be for cognitive function.

Over the past three decades, Dr Phillip Tomporowski at University of Georgia and Dr Caterina Pesce at the University of Rome have conducted lines of research to determine if and how physical activity benefits cognition. This article will focus on some of the findings from their joint work, ranging from understanding the importance of physical exercise on cognitive development in children to how exercise can be a vital part of keeping the mind healthy as we age.

**IS THERE AN ‘OPTIMAL DOSE’ OF EXERCISE TO BENEFIT BRAIN AND COGNITION?**

Given the public health benefits gained from physical activity, researchers have tended to identify the ideal mixture of intensity, duration, and frequency to create the optimal ‘dose’ of exercise required for maximal mental health gains and especially cognitive gains. Researchers have found that chronic exercise that is designed to significantly alter physical fitness can also result in changes in the brain function which is assumed to lead to brain adaptations that underlie cognitive processing.

This approach has been used by the healthcare community to provide guidelines for exercise prescriptions. Researchers have found that chronic aerobic exercise is particularly effective in enhancing children’s cognitive development without decreasing the intensity of their physical activities.

Physical activity games provide a unique form of enrichment that enhances children’s cognitive development. Physical activity games are positively linked to the level of physical activity later in life. This link between chronic exercise and changes in the brain, most of the research to date that has investigated the link between exercise and cognitive function uses aerobic exercise training regimes that are typically designed to alter some aspect of physical fitness, namely cardiovascular fitness.

This approach has provided a new method for determining the effects of exercise on cognitive function. While this approach has benefits for the brain and cognitive function, it is important to consider additional factors that could impact how beneficial exercise can be for cognitive function.

**MENTAL ENGAGEMENT DURING EXERCISE MATTERS**

Alternative explanations emerged in publications suggesting that a participant’s mental engagement during physical activity might be important. A book co-authored by Dr Tomporowski and Pesce (2015) outlined how physical activity games would be ideal for enhancing children’s cognition.

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Due to this link between chronic exercise and changes in the brain, most of the research to date that has investigated the link between exercise and cognitive function uses aerobic exercise training regimes that are typically designed to alter some aspect of physical fitness, namely cardiovascular fitness. While this approach has benefits for the brain and cognitive function, it is important to consider additional factors that could impact how beneficial exercise can be for cognitive function.

**Cognitive processing, they also show that the direct link between exercise-induced changes in cognition and academic performance is less clear.** They also add that this problem is complex as there are several mediators and moderators that can influence the relationship between physical activity and academics.

**EXERCISE, BRAIN, AND COGNITION: THE ROLE OF SKILL ACQUISITION**

In their review published in Psychological Bulletin, Drs Tomporowski and Pesce examined exercise experiments comparing interventions that combined physical activity with mental engagement to interventions that did not, as well as studies drawn from sport and performance arts domains that assessed the benefits of skill acquisition on cognition. Skill acquisition is a key mechanism that may be responsible for the cognitive gains elicited by exercise. These skills can be gained by every type of exercise, including physical exercises, sports, and performance arts and can result in cognitive benefits at all stages of life.
Drs. Tomporowski and Pesce have also demonstrated that exercise training may not be necessary at all to improve cognitive function. Although research in this area remains limited, the researchers highlight the benefit that performing arts can have on cognitive function. For example, several studies have linked music training with increased cognitive function, demonstrating that this type of training has the potential to improve several mental processes, including reading, reasoning skills, vocabulary skills, as well as spatial skills, and language acquisition. This link between music training and the mind is further supported by neuropsychological studies that have indirectly provided evidence for a relationship between music training and cognitive function.

**References**


**Personal Response**

Tomporowski: My introduction to the Martial Arts led to improvements in physical health and changes in perceptions of my ability to meet and overcome academic challenges. Five decades ago, I asked myself the question, “how are physical and mental skills learned?” I continue to strive to answer the question.

Pesce: When I was young, I intuitively loved moving and thinking, thoughtful moving. Getting older, I learnt the theory that our ability to think emerged as a side effect of the evolutionary advantage of having a brain that was able to load and monitor complex movement actions in a flexible and adaptive way.

**Do you think we could reduce the number of people suffering from cognitive decline later in life by making mentally engaging physical activities a part of regular school curriculum?**

Tomporowski: Life-span research confirms that physical activity promotes brain health and that the benefits are enduring. However, physical activity is only one of many factors that may favour cognitive functioning later in life.

Pesce: The broad array of factors that determine the maintenance of cognitive function or the rate of its age-related decline are intertwined. Thus, physical activities designed to be enjoyable and cognitively challenging should be embedded into the broader frame of children’s healthy lifestyle habits to set the stage for moving steps to health in cognitive aging.