Cognitive Benefits of Physical Activity in All Ages

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I have neither given nor received help on this work, nor am I aware of any infraction of the Honor Code

From the very beginning, a lot of people have always expressed staying active to help your physical health, but did you know that physical activity can also help keep your brain strong? Physical activity can help maintain brain function and lessen the effects of diseases of the brain. Furthermore, not only can exercise help fight diseases of the body, it can help fight diseases of the brain such as depression, Alheimer's, Parkinson's, and dementia. Research in this field can be beneficial for the elderly and children alike. It is crucial to understand the importance of the benefit that exercise has on your physical and mental health to help you live your life to the fullest. Physical exercise is momentus to aiding in cognitive function and diseases of the brain that affect all ages.

Development

As the years continue and society becomes more industrialized, people have relied on technology more and more, even the children. This being said, children stay inside for more hours of the day without them getting the adequate exercise. Due to this, it has been found that there has been a decline in childrens' health without the necessary exercise (Hillman, 2014). In his article, Hillman hopes that his research not only helps fight childhood obesity but also helps strengthen childrens' minds. Hillman suggests a body-mind relationship which can be strengthened with adequate physical activity. There has not been extensive research with children but from the research that has been done physical activity can "increase cognitive health and effective functioning during development, with the potential to increase lifelong brain health" (Hillman, 2014). Implications continue to show that this study can also result in higher performances in school, which inturn relates to "individuals' cognitive reserve, improve vocational opportunities, and promote lifelong health and function" (Hillman, 2014, p. 152).

Improvements in child cognitive function is crucial due to the fact that there is research that depicts that the projected childhood health appears that there will be a continued decrease in the future. Furthermore, Käll and other authors bring to light that all over the world schools tend to reduce physical education to increase time for academic subjects. Overall, this feeds into a more sedentary lifestyle which can lead to deteriorating mental health. One of the most impactful things concluded from studies of this nature include "aerobic physical exercise is positively associated with cognition and academic achievement and with behavior and psychosocial function" (Käll, 2015, p. 705). The hippocampus is key for memory and learning. When going too long without being stimulated, the hippocampus tends to shrink which results in diseases of the brain. Due to this, the hippocampus might explain the links between exercise, fitness, and cognition. Reduced hippocampal size has shown to be connected to a reduced ability to learn. Käll and other authors showcase that in school, it is important that children learn good life habits, initiating changes, and preventing health problems all by promoting physical activity. However, some schools are concerned that suitable physical education time will take away from key academic subjects (Käll, 2015).

Authors have hypothesized that children in an intervention program would have better academic results, fitness, and psychological well-being and larger hippocampal volumes than controls. This intervention program would marry academics and learning. Repeatedly, schools believe that physical activity takes away valuable academic instruction time and as a result has been reduced by changes in school's curriculum. Not to mention, more physical education does not appear to hinder academic results. A study was performed with 545 children from elementary schools in Sweden. Children either attended the intervention school or attended the control

school. In the intervention schools, two extra weekly physical activity classes of 30-45 minutes each were added and mandatory for all children. The extra time was designed to be "engaging, enjoyable, health-promoting, and noncompetitive and consisting of different sports and games with or without the use of equipment" (Käll, 2015, p. 706). At the end of the study, girls attending the intervention school were more likely to pass the Swedish and math national tests. There were also lower levels of conduct problems reported. Furthermore, there were also many behavioral benefits among the girls, the extended physical activity alleviated stress and strengthened their concentration and classroom behavior while reducing boredom. Overall, there was no difference in hippocampal structure. Up until now, an increase in curriculum-based physical activity shows great potential to improve children's academic outcome especially in girls. This study was done in hopes to encourage more intervention programs in schools that promote greater participation in physical activity with the goal to improve children's academic achievement (Käll, 2015).

Diseases and Mental Health

With continued research, the realization of the importance of exercise is increasing. Exercise has been found to be efficient in treating and preventing age-related neurodegenerative processes along with a correlation between physical activity and mental health. Diseases that can be impacted include depression, Alzheimer's disease, and Parkinson's disease, as well as the quality of life of the individual. Furthermore, exercise has been found to increase cognitive functioning and brain plasticity. Brain plasticity can be described as the ableness and willingness of the brain to adapt. Interventions have been done with elderly patients with major depressive disorder (MDD), Alzheimer's disease, and Parkinson's disease. In one sense, a sedentary

lifestyle greatly contributes to MDD. In the same way, "several studies have reported the relationship between physical activity and reduced incidence of dementia or cognitive deterioration" (Deslandes et al., 2009). Although there are other factors with any of these diseases other than just activity level, leading a more active lifestyle can slow rapid degeneration associated with these diseases. One benefit exercise helps is by increasing the release of several neurotrophic factors which all contribute to better cognitive function (Deslandes et al., 2009). Being more physically active can lead to a slower regression in mental diseases and mental health along with help promote brain function.

Research regarding exercising helping individuals with mental health diseases is relatively limited however there has been an abundance of research overseas, especially in the United Kingdom. However, there are many professionals in the United States that have been working to further implement some type of physical activity into their patients' rehabilitation. The increase in utilization of exercise might be able to be attested to the further increase in specialization in the health fields. It is essential for people to know the importance of exercise and how it could greatly impact their mental health. Faulkner discusses how mental health professionals rather than just clinical psychologists are an important gateway into the group of people that will benefit greatly from the use of exercise as part of their intervention plan. It will also be important for those professionals to support access to physical activity (Faulkner, 2001). As effective as this research appears, if more professionals turned their patients to a more physical remedy, if possible, this could be an entirely different world. If the patient is unable to do physical activity such as working out, a walk or even spending more time outdoors should be accompanied with the needed medication. Physical activity, if done in the right way so that risk

of injury is lowered, has virtually no long term negative effects unlike some medication. On the other hand, physical activity can take longer to see any results mentally and physically rather than taking medication. Furthermore, for some medications, physical activity can help combat some negative side effects.

Benefits

By implementing more physical activity based treatment plans, it has been shown that endurance exercise could possibly induce more muscle-derived proteins specifically in rodent brains but could be the same for humans. This is relevant for helping individuals with stress-induced depression. Furthermore, aerobic exercise that is of a moderate intensity for upwards of twelve months has been shown to improve memory and hippocampal size (Phillip, 2017). Reduced hippocampus size can affect the way the individual learns. This can also lead to neurodegenerative progression which can cause Alheimer's, dementia, and depression (Phillip, 2017). This shows that if individuals were to lead a more active lifestyle they could greatly lessen the chance of getting a disease of the brain. Additionally, over decades life expectancy has increased which means there has been an increase in the elderly population. This means that people with diseases who are living longer, have to have more pharmaceutical interventions which is very costly. Physical activity and exercise can be used as a very good non-pharmacological strategy (Bernardo et al., 2016). One example of how this can have a positive impact includes being more active can "contribute to a protective phenotype against AD [Alheimer's disease] (Bernardo et al., 2016, p. 656)." Protecting against Alheimer's among other diseases of the brain could lead to a fuller and more productive life for many individuals. Even if

Alheimer's is still present, making sure that the effects are delayed or lessened could change a lot of people's lives.

Conclusion

Increasing physical activity levels lead to better help cognitive function and brain health continues to be a growing field of research. Many researchers have found that physical activity helps lessen and slow the regression of mental health along with other diseases. Furthermore, many hope to lessen the amount of medication that is prescribed by implementing physical activity in able patients with poor mental health to help them succeed. Researchers, such as Käll, have used children to help further determine whether exercise is effective in boosting academic performance. Although there are some studies that have not had many conclusive results, one of the most outstanding pieces of research is that physical activity and exercise leads to a larger and more stimulated hippocampus. A larger hippocampus means better memory and better learning abilities. When the hippocampus goes too long without being stimulated, it shrinks resulting in diseases of the brain such as Alheimer's. Physical activity and exercise have a copious amount of impact on diseases of the brain and cognitive function.

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