Effect of daily exercise program for adhd symptoms in children

A serious public health problem that affects many children is Attention-Deficit Hyperactivity Disorder (ADHD). The Center for Disease Control Prevention (CDC) is one of the many organizations that research to learn more about ADHD (Learn About Attention-Deficit Hyperactivity Disorder, 2019). The information gained from research improves our knowledge about the factors that increase the risk for ADHD, along with the causes and best treatments. Research findings also aid the development of resources to help people living with ADHD . ADHD can cause problems in how children perform in school, their ability to successfully acquire and sustain friendships, and how children and adults function in society. The following research question is proposed, " Can offering a daily exercise program at schools help lessen the symptoms in children with ADHD by improving their attention and performance in the classroom? With the support of parents and teachers, an added exercise program may help children and youth with ADHD by reducing attention issues and improving cognitive function in the classroom.

Treatments are available to improve the symptoms of ADHD. Still, more information from research on how to manage ADHD is needed so children can learn and grow into successful adults without being held back by their symptoms. ADHD is a cognitive disorder since many children diagnosed with ADHD cannot use working memory effectively or focus their attention on specific tasks. It is considered a developmental impairment of executive functions or the self-management system of the brain (Learn About Attention-Deficit Hyperactivity Disorder, 2019). The precise causes of ADHD are unclear, although research has shown that genes have a role to play, although there are other factors that contribute or aggravate the

symptoms. As there are still many unanswered questions about ADHD, more research to find ways to help control some of the effects of ADHD is needed.

Research has shown that exercise at school can help lessen the attention difficulties and symptoms of ADHD. The cardinal signs of inattentional ADHD include distractibility, forgetfulness, weak organizational skills, and low perseverance. Hyperactivity and impulsiveness with impatience for delayed gratification, difficulty in inhibiting excessive and inappropriate motor reactions, as well as failure to dampen motor movements to appropriate levels for a particular situation are associated with ADHD (Wilens & Spencer, 2010). There is a known link between these symptoms and executive functions, and existing research has documented performance deficits in tests of cognition, including executive functions in children with ADHD (Wilens & Spencer, 2010). Meta-analysis suggests that pediatric ADHD is associated with consistently lower performance in response inhibition studies, behavioral control, variation in reaction time, cognitive flexibility, and the impulsiveness of decision making (Wilens & Spencer, 2010). Exercise might offer a way to manage or improving these cognitive functions. Physical activity and exercise have an array of positive physiological, psychological, and neurocognitive impact. These positive influences on cognition include improved executive and memory functions (Wilens & Spencer, 2010).

One of the symptoms of ADHD is attention issues. Attention is defined as an information filter, a spotlight that focuses on an element of the environment, and a glue that ties environmental characteristics together (Wilens & Spencer, 2010). Evidence has shown that children with ADHD are paying

attention to everything which makes it hard to focus on specific tasks. This lack of focus or interest occurs when the activity is not pleasant to the individual or when an activity lacks excitement. An example is that homework for, some children, may not be fun or exciting. This condition is the product of a central processing disorder in the minds of children with ADHD, whose brains are unable to flush out disruptive stimuli or suppress behavioral reactions, leading to low concentration or changing behaviors. (Wilens & Spencer, 2010). Kids with ADHD can be overwhelmed by events around them, but they can perform very well.

Wilens & Spencer (2010), discuss that selective attention, choosing to focus on specific tasks, may be somewhat deceptive with respect to ADHD. Children with ADHD will concentrate more on enjoyable activities, which is because of the idea that these activities give their brains more energy. For example, some video games can provide explicit auditory and visual stimuli, as well as many contextual changes. Specific environments are considered friendly to the child with ADHD because of the belief that their brains are happy, and the need for stimulation is fulfilled. On the opposite, tasks such as homework or household chores may not provide the ADHD child with much stimulation, so the brain may look for other ways to get the stimulation needed. Children with ADHD may be able to choose activities that are more enticing to them because of higher levels of brain stimulation than those that are less relaxing. These data are currently promising and support the need for further study, but they are not sufficient to recommend the widespread use of interventions such as a comprehensive exercise program for children

with ADHD. The proposal is for an observational study involving an exercise program in a local school district.

Without getting specialized help, ADHD children can struggle or fail in school. Some children with ADHD are also frustrated, leading to a dysfunctional behavior schedule that can be very hard to break. The proposed exercise program can help acquire more evidence if exercise can help improve the cognitive functions of children with ADHD in the classroom. Exercise can function as an endogenous stimulus to cause a cascade of molecular neuroplastic processes that eventually lead to nervous system structural changes (Basso & Suzuki, 2009). Nearly 20 years ago, in the dentate gyrus of the hippocampus in rats, Van Praag and colleagues showed that voluntary treadmill running led to increased neurogenesis bilaterally (Basso & Suzuki, 2009). These findings were later extended to include morphological adaptations in areas of attenuated ADHD development, including the prefrontal cortex. It has also been found in several cross-sectional studies in humans that higher levels of fitness are associated with structural and functional differences in multiple cerebral structures that are strictly involved in cognitive functioning (Basso & Suzuki, 2009).

Existing research by Christianse, Beck, Bilenberg, Wienecke, Astrup, & Lundbye-Jensen (2019) has documented performance deficits in tests of cognitive, including executive functions in children with ADHD. A meta-analysis suggests that pediatric ADHD is correlated with consistently lower output in response inhibition studies, behavioral avoidance, variability in reaction time, cognitive versatility, the impulsiveness of choice or delayed gratification, and delay discount tasks (Christianse, et al, 2019).

The proposed observational study is in hopes of measuring if a morning exercise program in the classroom will decrease forgetfulness, improve organization skills, and increase perseverance. The goal of the study is to see if the exercise decreases hyperactivity and impulsivity and reduce difficulties in inhibition of untimely and inappropriate motor responses as well as increase the ability to dampen motor activities to appropriate levels for a given situation. The research study is within one school district, so there is a limitation of a small sample size.

A theoretical article discusses how people involved in a child's life can influence the child with ADHD is discussed in the next section. The evidence in this article is interpreted as a motivation for parents and teachers to act on finding with ways to help children with ADHD, exercise being one of them. The findings of the theoretical article, " Child ADHD Severity and Positive and Negative Parenting as Predictors of Child Social Functioning: Evaluation of Three Theoretical Models," involved significant effects of the frequency of ADHD, as well as parenting, on child social capacity and violence. Much research-supported that parenting styles serve as a mediator of the interaction between the intensity of ADHD and social capacity and frustration of children. There was no evidence of significant moderation effects found. Parenting and seriousness of ADHD have separately correlated with child social skill and aggressive behavior to the degree that the correlations were causal, multimodal therapy that promoted both symptom relief and better parenting can be highly effective in treating childhood ADHD-related social issues (Kaiser, McBurnett, & Pfiffner, 2011). Proof of parenting as a mediator of the interaction between frequency of

ADHD and child outcomes show that improvements in child symptoms can also strengthen parenting habits, leading to better child outcomes (Kaiser, McBurnett, & Pfiffner, 2011). The research findings support the idea that parents can have a positive or negative impact on the child with ADHD and his/her relationships. Encouraging exercise is a way parents can have a positive impact.

Benzing, Chang, & Schmidt (2018), conducted a study on how acute exercise can improve cognitive functions in children. They noted that physical activity of moderate to extreme intensity had enhanced cognitive functions in children, but there is still little empirical evidence associated with Attention Deficit Hyperactivity Disorder in children, particularly where different cognitive functions are advantageous (Benzing, Chang, & Schmidt, 2018). Their study examined the effects of an acute episode of physical activity in children with ADHD on various aspects of executive functions such as inhibition, transitioning, and visual working memory. Benzing, Chang, & Schmidt (2018), randomly assigned 46 children (8–12 years old; 82. 6% boys) to either 15 minutes of acute exergaming (the physical activity of moderate intensity) or a sedentary control condition. Benzing, Chang, & Schmidt (2018), assessed executive function performance in inhibition, switching and visual working memory before and after each condition, using a modified version of both the Flanker and the Color Span Backwards Task. The results showed that participants in the exergaming group responded significantly faster than those in the control group in terms of resistance and transitioning, but there was no significant difference in the precision of the two tests or the output of the visual memory (Benzing, Chang, & Schmidt,

2018). Benzing, Chang, & Schmidt (2018) findings suggest that for adolescents with ADHD, acute physical activity using exergaming has potential with improving specific aspects of executive functions, inhibition reaction times, and transitions.

The article titled, " Effects of Exercise on Cognitive Performance in Children and Adolescents with ADHD: Potential Mechanisms and Evidence-based Recommendations," also supplied evidence supporting exercise in reducing the symptoms of ADHD in children and adolescents. The findings suggested that children with ADHD are likely to benefit the most from acute exercise. Various aspects of cognitive functions, including children with ADHD, in several experiments exploring the effects of acute exercise, found positive effects on performance. Unless the positive effects observed are purely temporary, the beneficial effects of acute exercise could, in turn, persist in variations in rates of cognitive functioning over weeks or months (Christianse, et al, 2019). The acute exercise produced positive associations after long-term treatments regarding memory, levels of physical activity, and improvements in cognitive performance.

Christianse, et al, (2019) discussed a cross-sectional study in a sample of children that utilized diffusion-tensor imaging to demonstrate that white matter integrity in frontal temporal bundles is higher in individuals with higher aerobic fitness levels. The findings of a single retrospective randomized controlled trial of undiagnosed children found that eight months of training increased the fractional anisotropy of the uncinate fasciculus, which connects frontal and temporal areas. The results are based on the 18 individuals enrolled in the study, indicating greater integrity of white matter

in the after-exercise intervention group (Christianse, et al, 2019). The children's results suggest that markers of physical activity or exercise correlate with minor structural changes in some of the nervous system's mechanisms and networks displaying delayed or anomalous development in individuals diagnosed with ADHD and related to results in several cognitive areas, including executive functioning (Christianse, et al, 2019). They concluded that exercise-induced behavioral modifications improved the results of the assessments of executive functions in children and adolescents with and without ADHD (Christianse, et al, 2019). However, where this is the case, further reviews are needed, as the present bulk of research is predominantly cross-sectional and depends on a repeated survey of people, and the few longitudinal studies are confined primarily to individuals in the study (Christianse, et al, 2019).

Since not all elementary schools offer physical education classes every day, a daily morning exercise program offered in the AM before school begins is proposed. The exercise program could help improve attention and reduce selective attention, where children only focus on what is attractive to them, therefore reducing symptoms of ADHD. The exercise program would be optional, with exercises directed towards helping children focus and relax, such yoga. This program would be different from physical education classes, which are more structured and regulated per state curriculum guidelines.

The proposed study has potential to be a realistic beginning to a permanent exercise program offered for children before school, and possibly throughout the day, so that the teachers can see if the program is helping to improve students' cognitive function and performance in the classroom all day. The

teachers are required to keep track of how long they feel the benefits of the morning exercise last before another interval of exercise is suggested. The program is not meant to disrupt teacher's schedules, the teachers need to see progress in their students from the morning exercise before a schedule change is warranted. The program plan is to collaborate with the teachers to find a way to improve cognitive functions in children in the classrooms suffering from attention issues. The program should not unethically uproot the classroom curriculum and schedule. Communication and collaboration with teachers are of top priority.

Adding an exercise program for research would need to be approved by the school board and may require financing. The exercise program should be optional to students, and the children would only be allowed to participate if they are respectful of other children. If a child is not trying to participate or is consistently disruptive, the child should not be allowed to participate as this would be cumbersome to those participating in the activity. Children and school professionals could benefit from an exercise program in their school, but it would be a change in their daily routine, so some adjustments may need to occur. For example, children and parents would need to change their morning schedule to allow time for the morning exercise.

The proposed study may not be received well by those that do not like change, but if the exercise is successful in improving student’s performance, the change may be rewarding to the families and teachers involved in the children’s lives. The idea is for not for extensive exercise but for about 15-30 minutes of moderate activity. It could also be in the form of sports or games that children enjoy if there is physical activity and focus involved. In

some school districts, teachers have a required number of hours to participate in extracurricular activities within the school, so teachers implementing the exercise is an option.

In conclusion, there is a large amount of evidence supporting the theory that with the support of parents and teachers, an added exercise program may help children and youth with ADHD by reducing attention issues and improving cognitive function in the classroom. Several experiments exploring the effects of acute exercise on various aspects of cognitive functioning found positive effects on performance. Positive parental influence on children with ADHD can aid in encouraging ADHD children to participate in a morning exercise program. Markers of physical activity or exercise correlate with minor structural changes in some of the nervous system's mechanisms and networks displaying delayed or anomalous development in individuals with ADHD, and related to results in several cognitive areas, including executive functioning.

More research on the effects of exercise on children with ADHD in kindergarten to third grade may lead to other schools with different age ranges to consider implementing exercise into their daily schedule. The research could also expand to higher grades if a higher number of positive correlations are found with exercise and reducing symptoms of ADHD. The proposed research is a positive direction in helping those who have ADHD as well as the people involved in their lives. The research findings of the study and proposed improvements could be interesting and beneficial to other settings, such as in the workplace.

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