

Original article

Parental perceptions of the effects of exercise on behavior in children and adolescents with ADHD

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Received 30 August 2012; revised 29 November 2012; accepted 14 January 2013

Available online 30 March 2013

Abstract

Background: Anecdotally, parents often report that children with attention deficit hyperactivity disorder (ADHD) who engage in regular physical activity (PA) experience positive behavioral changes. The purpose of this study was to examine this anecdotal relationship to provide preliminary evidence relevant to the potential benefits of PA on ADHD symptoms.

Methods: Parents ($n = 68$) of children diagnosed with ADHD completed an Internet survey assessing perceptions of how PA influences their child's symptoms.

Results: A significantly greater percentage of parents reported that regular PA positively impacted symptoms. However, there were no uniform effects for all types of ADHD symptoms. The results indicate that there may be more positive benefits for symptoms of inattention and hyperactivity than for those of impulsivity.

Conclusion: This is the first study to empirically document parents' perceptions of how PA influences ADHD and suggests that PA can be a viable strategy for reducing symptoms. PA may have greater benefits for specific symptoms of ADHD, providing critical information for developing PA interventions for children and adolescents.

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Keywords: Attention deficit; Behavior; Pediatrics; Physical activity

1. Introduction

Attention deficit hyperactivity disorder (ADHD) is one of the leading childhood psychiatric disorders in America and is a costly major public health problem. ADHD affects approximately 3%–7% of school age children¹ and successful school outcomes for children with ADHD depend upon the degree to which treatment components meet the needs of a particular child. ADHD is characterized by age-inappropriate core symptoms of inattention, hyperactivity, and/or impulsivity

which occur for at least 6 months in at least two domains of life, beginning prior to the age of 7 years.¹ These core symptoms persist into adulthood and can cause numerous impairments in a host of life domains. ADHD is most commonly treated through the use of stimulant medications, primarily methylphenidate (e.g., Ritalin) and amphetamines (e.g., Adderall). The second most common form of treatment is the use of behavioral interventions such as parent training and contingency management. Both pharmacological (e.g., stimulant medications) and behavioral interventions are effective in mitigating symptoms of ADHD,^{2,3} however both have their limitations suggesting that research on alternative and/or complementary treatments is necessary. One limitation is that while both treatment types have proven efficacious in

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Peer review under responsibility of Shanghai University of Sport.

treating the core symptoms of ADHD in the short-term, there are few long-term benefits^{3,4} and poor compliance rates.^{5,6} An additional limitation of pharmacological treatment are side effects such as sleep disturbance, appetite suppression, headaches, and stomachaches, which all can negatively influence health outcomes and academic performance.⁷

Given that pharmacological interventions are not effective or viable options for some patients in managing their ADHD symptoms and that current behavioral treatments have limitations, the identification of other forms of treatment is warranted. Previous research has identified desirable characteristics of effective treatments which include that the treatment is socially valid and acceptable,⁸ functionally based,⁹ applied with a high degree of treatment integrity,¹⁰ and has a benign side effect profile. Physical activity (PA) appears to fit these characteristics well and may be an effective adjunctive treatment intervention for ADHD. Anecdotally, parents and teachers often report that children with ADHD who are physically active experience positive changes in behavior patterns. However, PA has been relatively unexplored empirically as a behavioral treatment for children with ADHD.

The potential of PA as a treatment for ADHD is supported by the fact that PA has been found to positively impact many of the same neurobiological factors that are implicated in ADHD. An extensive body of evidence coming from animal models and recent studies with humans supports this statement. First, fMRI studies of individuals with ADHD show reduced cerebral blood flow and reduced activation in prefrontal and striatal areas of the brain for behavioral control tasks.^{11,12} Animal models show that PA results in increased cerebral blood flow^{13,14} and in human studies participants that are more aerobically fit show benefits in brain activity within regions associated with behavioral conflict and attentional control processes.¹⁵ Additionally, PA increases the availability of dopamine and norepinephrine in synaptic clefts of the central nervous system.^{16,17} These neurotransmitters play essential roles in attention, maintaining alertness, increasing focus, and sustaining thought, effort, and motivation. Consequently, albeit indirect, this evidence suggests the possibility that for children with ADHD, PA may be beneficial in reducing symptom severity.

Only a few studies have examined the impact of PA on ADHD and the focus has been on acute exercise and its effects on the hypothalamic-pituitary-adrenal axis¹⁸ or dopaminergic responses.¹⁹ Only one study has examined the impact of PA on behavioral symptoms in children with ADHD and results demonstrated that behavior, as measured by parent ratings on the Conners Parent Rating Scale, improved after a 5-week exercise program.²⁰ Further, no studies have explored the possible impact of chronic or regular exercise on behavioral symptoms of ADHD. Therefore the purposes of this study were two-fold. The primary purpose was to examine the anecdotal relationship between PA and ADHD symptoms to provide preliminary evidence for the benefits of regular PA in reducing ADHD symptoms. The second purpose was to collect qualitative data about parents' perceptions of the effects of PA on ADHD symptoms.

2. Materials and methods

2.1. Participants

Participants were recruited via email and Internet message boards affiliated with Children and Adults with Attention Deficit/Hyperactivity Disorder (CHADD) regional chapters in the month of September. The study was also posted on the CHADD website. In order to be included in the study participants had to be parents and/or guardians of a child or adolescent between the ages of 5–18 who had been diagnosed with ADHD by a medical professional.

Since this was a pilot exploratory study and we had a limited time frame of 1 month to collect data, we aimed to recruit 100 participants. A total of 96 participants completed the survey, however only 68 participants provided complete data and met the requirements of the study. The final sample consisted of 68 parents of children diagnosed with ADHD. Descriptive information for the children are summarized in Appendix. Based on parent report, all participants were previously diagnosed with ADHD by a medical professional. The majority of the sample (85%) reported using medication to treat ADHD.

2.2. Procedure and measures

This project involved using a web based survey to collect information from parents of children with ADHD relative to how PA impacts ADHD symptoms. The Internet survey assessed demographic information, ADHD diagnosis and history, PA participation and questions that obtained the parent(s) perceptions of how PA affects their child's ADHD symptoms. These questions were generated by the research team to assess perceptions of how PA influences their child's ADHD symptoms. These were exploratory and used for descriptive purposes. More specifically, parents were asked if when their child was physically active, they noticed a difference in ADHD symptoms broadly; in symptoms of inattention, hyperactivity, or impulsivity specifically; and in academic performance. If a difference was reported (participants marked "yes"), then they were asked to indicate how and whether the difference was positive or negative or both positive and negative. For example, to assess symptoms broadly the question stated: "Very broadly, have you noticed a difference in ADHD symptomology when your child is regularly involved in PA and/or organized community/school sports? If yes, please describe these differences. Are they positive or negative?" The same question format was used for symptoms of inattention, hyperactivity, impulsivity, and academics to create a total of five questions. For the purposes of this study, regular PA was defined as "activity that causes rapid breathing and fast heart beat for 30 consecutive minutes or more at least three times per week." This definition of regular PA was derived from the Physical Activity Questionnaire for Children and Adolescents (PAQ-C).²⁰ Participants were asked to indicate whether or not their children participated in regular PA by

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