



Exercise Effects in Individuals with Autism Spectrum Disorder: A Short Review

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Introduction

Individuals diagnosed with autism spectrum disorder (ASD) present with a range of physical, cognitive, social, and behavioral deficits [1,2]. These deficits can include self-stimulating motor stereotypy and repetitive behaviors such as hand flapping, head nodding, and spinning coins [1,3]. These individuals with ASD also display pronounced motor coordination impairments when compared to those without ASD [4-6]. Additionally, children with ASD have been found to have a lower physical activity level than those without ASD [2,7]. Decreased physical activity has been associated with obesity. This is confirmed in this population as obesity rates have been found to be higher in those with ASD (30.4% as compared to 23.6% of those without ASD) [2]. Interventions in children with ASD seek to decrease stereotypical or aggressive behavior, while improving physical, cognitive, and social development [8]. One such intervention is physical activity or exercise. The effect of exercise and physical activity on children with ASD has been examined to determine the impact on behavior, academic performance, social skills, and physical fitness. A short review of relevant research was performed to explore the use of exercise as a viable approach to decrease unwanted behaviors and maximize potential for learning.

Antecedent Exercise

Detrimental stereotypy behaviors in children with ASD can impact their academic and social performance [3]. The effects of antecedent exercise interventions have been studied in children with ASD. In these studies, various types of aerobic exercise were applied before instructional sessions to determine the effect on cognitive, social, and behavioral skills [3,9,10]. Jogging is one of the most common exercise studied in ASD followed by water based exercises and then others various aerobic activities [11].

Jogging/running

In one study, jogging for 8-20 min before an instructional (academic) session or community-based workshop was used with adolescent males and found to decrease self-stimulating behaviors while improving academic and work performance [3]. Another study found that 15-20 min of group jogging before classroom activity improved academic response in children with ASD, but did not significantly impact stereotypy [10].

Trampoline exercise

In a single subject designed study, individuals were sequenced through conditions of no precondition exercise, brief exercise jumping on a trampoline, and jumping on a trampoline until satiation before participating in instructional activities two to three days a week for 10 weeks [9]. In this study, when the children were allowed to determine

the length of time jump on the trampoline (until individualized, pre-identified indicators of satiation were demonstrated), a decrease in stereotypy and increase in attention during the instructional session were determined [9]. It has been noted, however, that exercise may produce the same sensation for these children as stereotypy [11].

Water-based exercise

Swimming based exercise interventions have been used to impact children with ASD [6,12]. In one study, children with ASD were enrolled in a 10 week swimming program (2 sessions per week) to determine the effects of exercise on swimming ability, behavioral, and social skills [12]. The authors determined an improvement in motor ability (swimming) and a decrease in antisocial behaviors, but did not see a significant improvement in social skills [12]. The children were divided into groups with two for every one instructor. As such, they were given a high amount of individualized treatment [12]. A meta-analysis of effects of exercise of ASD determined that individual treatment sessions have been shown to be more beneficial than those in a group setting [8].

Conclusion

Multiple studies have been performed to assess the effects of physical exercise and activity on behavioral, social, academic, and physical performance. However, the majority of research in this area has focused on the effects of exercise on behavioral, cognitive, or social skills function [2,3]. Physical activity and exercise has been shown to have positive effects in physical fitness and other factors in this population [11] with more rigorous activity shown to provide a more pronounced effect [2,11]. Aerobic exercise has been shown to increase academic performance for these children [9]. Some studies have found exercise has been associated with a short-term decrease in self-stimulation through stereotypic behaviors [13,14]. However, more rigorous studies should be performed to study the effects of exercise on ASD [13,15]. Individualized attention during exercise [7] and the ability to exercise until satiated [8] appears to have a positive impact on decreasing unwanted behaviors and promoting desired ones with children with ASD.

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