

Exercise's Effect on Children with Autism

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Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by differences in social communication and interaction, typically involving repetitive behaviors and limited interests in social communication and activities (1). ASD is accompanied by unusual sensory experiences, such as sensitivity to noise and light (1). ASD affects multiple aspects of the child's physical and psychological health correlating with diminished motor skills, such as poor hand-eye coordination and unstable balance (1). ASD also causes deficits in social communication, social cognition, pragmatics, language processing, verbal and non-verbal communication (6). Physical activity has been shown to improve the physical, psychological, and emotional traits in children with ASD (8). Recent studies have shown a positive relationship between physical exercise, symptomatic improvement, and reduction of damage caused by a sedentary lifestyle (4). Children with ASD are recommended to engage in physical activity, preferably in group settings to provide a structured routine, physical movement, and communication with their peers (1). The purpose of this article is to provide the evidence-based benefits of exercise for children with ASD in order to educate family members, caregivers, and educators of those with ASD loved ones.

What is Autism?

ASD is a developmental disorder of variable severity that impacts the nervous system (1). Autism presents with differences in emotional and cognitive processing functions, which are necessary for decision making (1). Common symptoms include difficulty with social communication, difficulty with social interactions, obsessive interests, and repetitive behaviors (1). The etiology includes genetic events, metabolic disorders, infectious diseases, neuroanatomical and structural abnormalities in the brain as well as others still being researched (3). The prevalence of ASD has increased dramatically over the years due to improvements in screening and diagnosis methods (6). As of 2020, 1 in 68 children in the United States were diagnosed with ASD (6). ASD is also more common in males than females, roughly five males to one female are diagnosed in the United States (3).

Children with ASD typically have high levels of disruptive behaviors, self-absorption, and hyperactivity, contributing to difficulties processing and expressing emotions (7). Since ASD affects the nervous system, it is very common for children with ASD to have problems with emotional regulation and social communication, which contributes to differences in cognitive processing that are necessary for social and life skills (1). Sleep disturbances and eating issues are also common in individuals with ASD due to heightened brain activity (10).

The Importance of Exercise

Children with ASD exhibit social and motor impairments along with limited interests that contribute to lower physical activity (6). Due to these impairments, children with ASD are more likely to have difficulties with balance, postural stability, gait, joint flexibility, and speed (7). However, recent studies have documented that children with a higher physical fitness level caused by regular physical activity have higher amounts of superior white matter integrity, which is an extension of brain tissue and strongly associated with improvements in children's gaits, balance, flexibility, and speed (3). Therefore, it is recommended that children with ASD start daily exercise immediately after being diagnosed with autism and participate in structured physical activities with their peers (1).

A major area of concern for children with ASD is their tendency to adopt a sedentary lifestyle (6). Low levels of physical activity can cause overweightness and obesity issues, putting ASD children at high risk for adverse health effects (1). Children with ASD show impairments in the physiological response during exercise (i.e., abnormal heart rate and blood pressure responses) which are made worse by a sedentary lifestyle (7). The positive effects of physical training on cardiovascular fitness are widely recognized, and it is a strong indicator of present and future health for ASD children (7). Physical activity has been reported to reduce impairments in heart rate adaptations, fine and gross motor skills, and improve insomnia in children with ASD (7). Wilson and Kayla (2019) article showed that participants slept longer and fell asleep faster after 30 minutes of aquatic exercise. (9). Pace and Bricout (2015) study found that eight weeks of regular physical activity improved balance, posture stability, movement speed, gait, and joint flexibility (7). Arslan et al. (2020) study found that handgrip strength (both right and left), reaction times (visual and auditory), and flexibility all improved after three 60-minute aerobic exercise sessions per week for 12 weeks (1). Exercise reduced these children's physical impairments common in ASD children and helped improve their overall

health. Exercise could be used as a sensory break in school or physical stimulation for enjoyment (9). However, anything over 10 minutes has appeared to have less of an effect on behavior because it can lead to the ASD child becoming fixated on the stimulus resulting in increased problem behaviors (9).

There are independence barriers that some ASD children are unable to overcome, depending on the level of severity, therefore only certain modes of exercise may be feasible (9). These modes include playing tag/ running games, interactive video games (9). For those with a more severe diagnosis, any type of activity easily done without complex instructions and supervision like going on a walk is recommended (9). A great example is swimming because it involves repetitive motions and requires fewer social cues (9). Basketball training has also been proven a successful intervention for those who can follow more complex instructions, because it is a team sport requiring individuals to set goals, make decisions, communicate, and manage conflicts in a supportive and trusting atmosphere (3). This can help children to alleviate their social communication skills, which has correlations to improve future professional and personal relationships. (3).

Exercise's Effect on Emotional and Behavioral Problems

Emotional and behavioral problems pose challenges for children with ASD in daily functioning and social communication that can result in poor social development and increased caregiver stress (9). Some examples of these emotional or behavioral problems are throwing objects, pinching, hair pulling, hitting, and biting others or themselves (8). Evidence-based ASD therapies (i.e., applied behavior analysis, discrete trial training, and pivotal response training) have been proven successful and used to improve these emotional and behavioral problems (i.e., social communication) (3). To maximize the positive effects of treatment exercise should be incorporated as an adjuvant therapy for ASD children within their usual behavioral therapies (3).

Following bouts of physical activity negative behaviors in children with ASD decreased and improved challenging activities for children with ASD such as holding a conversation, reading, or retelling events (7). Researchers believe that benefits will decrease and return back to baseline levels after exercise-based interventions are completed (3). It is important that exercise is continued, even after the intervention, and incorporated into the child's daily routine to prevent any regression in the benefits (i.e., improvements in social skills) that could possibly occur if the therapy is stopped (3).

Exercises Effect on Eating and Sleeping

ASD is associated with abnormal eating behaviors such as, food responsiveness, emotional over- or under-eating, extreme thirstiness, abnormal satiety responsiveness, slowness in eating, and food fussiness (3). These eating behaviors can lead to a very limited diet that has little variation in food groups (3). The potential of undernutrition with negative consequences for growth and development, makes eating behaviors an important target during therapy (3). The Cai et al. (2020) study found that after a 12-week basketball training program with 5 days of training a week with forty minutes each session improved these unusual eating behaviors (3). Research has stressed that exercise should be implemented with the child's other therapies, such as Applied Behavior Analyst therapy, to maximize the benefits and insure the maintenance of the newly learned eating habits (3).

Autism Spectrum Disorder is also associated with sleep disturbances that include bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night waking, parasomnias, sleep disordered breathing, and daytime sleepiness (3). Factors specific to ASD that may underlie many common sleep difficulties are biological abnormalities (i.e., abnormal rapid eye movement cycle/ REM cycle) affecting circadian rhythm and melatonin levels which are lower in ASD individuals (9). Sleep is especially important for children with ASD if because poor sleeping habits, routines, and schedules are not addressed, other behavioral interventions will be unsuccessful (9). These conditions can lead to insomnia, which also decreases their caregivers' sleep time, increasing caregiver stress (9). Exercise has been shown to improve sleep for neurotypical individuals and improve sleep for children with autism (9).

Incorporating Exercise into Daily Routines

The daily routines and family life for children with ASD get disrupted by normal changes that come with life. The COVID-19 pandemic is an example, causing the closure of special education schools, therapy clinics, and rehabilitation centers (10). It is possible that these changes can lead to excessive weight gain, obesity and sedentary life, which are prevalent in children with ASD (10). During Covid-19 many schools switched to online but online learning environments are often not suitable for children with ASD and contribute to a decrease in physical movement during the day (10). A lack of in-person services and support systems essential for ASD children also caused additional parental stress and had a negative effect on both the child and caregiver's mental health (10). It is recommended these children engage in

regular physical activity at home in order to stay healthy and keep familiarity when routines change (10). This can easily be done by going on walks after a meal, daily chores, interactive video games on stations such as Wii, Xbox, or PlayStation (10). Family involvement has been shown to have a positive effect encouraging children with ASD to engage in exercise (10). Establishing positive experiences with regular physical activity, even at home is an important strategy for a healthy lifestyle that will promote healthy habits, decrease problem behaviors and parental stress, and increase physical and mental health (10).

Conclusion

Exercise has clear benefits in overall health for children with ASD. Children with ASD have deficits in fine and gross motor skills, and increased risk for health issues due to their likeness for sedentary lifestyles (1). Exercise has been shown to improve their motor skills and decrease sleep disturbance (9). Exercise aids in emotional and behavioral problems and decreases repetitive and stereotyped behaviors by replacing the type of stimulus being sought (8). Exercise can be used as a sensory break in school or during therapies to help ASD children maintain their attention (9). Exercise should be incorporated for children with ASD, and it is encouraged to establish exercise routines at home in the event traditional support services are not available (10).

4 Elements

Apply It

- Exercise can be easily incorporated into children with ASD daily routines by going on walks after a meal, daily chores, interactive video games such as just dance on stations such as Wii, Xbox, or PlayStation.
- Basketball training has also been a successful intervention for those with autism who can perform more complex activities', Basketball is helpful because it is a team sport requiring individuals to set goals, make decisions, communicate, and manage conflicts in a supportive and trusting atmosphere.
- Swimming is also a successful intervention for those with autism who can perform fewer complex activities.
- Exercise could be used as a sensory break in school or physical stimulation for enjoyment for those with autism.

Bridging the Gap

Establishing positive experiences with regular physical activity, even at home is an important strategy for a healthy lifestyle that will promote healthy habits, decrease problem behaviors and parental stress, and increase physical and mental health. For children with ASD exercise improves motor skills, sleep disturbances, aids in emotional and behavioral problems and decreases repetitive and stereotyped behaviors, such as self-biting, hitting, or mouthing. Exercise should be incorporated in children with ASD routines. It is encouraged to establish exercise routines at home in the event traditional support services are not available.

Summary Statement

The purpose of this article is to provide the evidence-based benefits of exercise for children with Autism Spectrum Disorder in order to educate family members, caregivers, and educators of those with ASD loved ones.

Pulled Text

“Physical activity has been shown to improve the physical, psychological, and emotional traits in children with ASD (8). Recent studies have shown a positive relationship between physical exercise, symptomatic improvement, and reduction of damage caused by a sedentary lifestyle (4). Children with ASD are recommended to engage in physical activity, preferably in group settings to provide a structured routine, physical movement, and communication with their peers (1).”

BIO

Samantha Urban is an undergraduate at the University of New Mexico where she is pursuing her B.S in exercise science and plans to attend Clarke University DPT program after graduation. Her areas of interest are autism and vestibular research.

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