

# Autism Spectrum Disorder: An Evaluation of Sports Therapy as an Effective Treatment Plan

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## ABSTRACT

Autism spectrum disorder (ASD) describes a diverse range of conditions characterized by challenges with motor skills, social interactions, and verbal and nonverbal communication. According to the Centers for Disease Control and Prevention (CDC), about 1% of the world's population has ASD, approximately 75,000,000 people. The prevalence of ASD is not entirely surprising, as the disorder is most influenced by a combination of genetic and environmental factors. With the increasingly affected population comes a greater need for effective therapies, primarily based on cost-effective and engaging environments. Many therapists are currently exploring the possibility of sports therapy to directly influence the communication and motor skills of children with ASD. Sports therapy additionally presents the potential to reduce the risk of depression caused by ASD-induced stresses. Despite the benefits of sports therapy, it can be largely ineffective in some types of ASD, specifically low-functioning and classic ASD. This review article aims to present sports therapy as an effective treatment plan for ASD when used strategically to enhance the communication skills and motor skills necessary to foster self-confidence and reduce the risk of ASD-specific depression.

## **Introduction**

Autism spectrum disorder (ASD) describes a diverse range of conditions characterized by challenges with motor skills, social interactions, and verbal and nonverbal communication. According to the Centers for Disease Control and Prevention (CDC), about 1% of the world's population has ASD, approximately 75,000,000 people (1). The prevalence of ASD is not entirely surprising, as the disorder is most influenced by a combination of genetic and environmental factors. With the increasingly affected population comes a greater need for effective therapies, primarily based on cost-effective and engaging environments. Many therapists are currently exploring the possibility of sports therapy to directly influence the communication and motor skills of children with ASD. Sports therapy additionally presents the potential to reduce the risk of depression caused by ASD-induced stresses. Despite the benefits of sports therapy, it can be largely ineffective in some types of ASD, specifically low-functioning and classic ASD. This presents one primary question: To what extent does sports therapy present long-term benefits for children diagnosed with autism spectrum disorder (ASD)? Notwithstanding barriers to comprehensive implementation, sports therapy for ASD is effective when used strategically to enhance the communication skills and motor skills necessary to foster self-confidence and reduce the risk of ASD-specific depression.

## **Social Interaction**

A typical behavior characteristic of children with ASD is the significant challenge associated with social interaction. They are often self-involved and appear to exist in an exclusive world with a restricted ability to communicate proficiently with others. Contrary to the popular belief that children singularly struggle with verbal

communication, they may also struggle with nonverbal communication, primarily through facial expressions, hand gestures, and eye contact. Taken together, these obstacles restrict the ability of children with ASD to interact with their peers, an essential component of long-term social development. However, tight-knit communities built through sports present a way to overcome communication barriers. An example of this social influence can be seen through Hoops, an exhibition that ran at the National Building Museum in Washington, DC, from March 9 through December 1, 2019 (2). Hoops presents a rich and diverse selection of private and community basketball courts worldwide through nearly 22,000 photographs. While these scenes showcase the enduring and universal appeal of the sport, they predominantly demonstrate the character, friendships, and community that can be established through the game. Mengxian Zhao and Shihui Chen of the School of Sports Media and Information Technology at Shandong Sports University and Texas A&M University conducted an ASD-specific quasi-experimental study to investigate the effects of a 12-week structured physical activity program on the progression of social interaction and communication in children with ASD (3). The 12-week structured physical activity program was implemented with 60 minutes per session for 24 exercise sessions. Over the course of the experiment, sports participation was shown to be beneficial in enhancing interpersonal relationships and increasing the frequency of social interaction. The positive influence of the program intervention on the social skills of the ASD participants was shown in improved overall scores in the Social Skills Improvement System Rating Scales (SSIS-RS), a system to evaluate the improvement of social skills in children with social and behavioral problems. Thus, with a dually enforced and encouraged method of social interaction, the ASD participants socialized to a greater extent and subsequently achieved a baseline level of verbal communication. Alternatively, non-verbal communication may be inadvertently assumed by children with ASD through basic observation. The inability to establish prolonged eye contact is a distinguishing behavior of ASD, acting as a severe impediment to social interaction. Participating in a collaborative sport encourages children to watch their peers, establishing a measured form of eye contact that can be augmented with increased game duration. This effect can be amplified through sensory integration training (SIT), which uses collaborative sports to provide a sense-centered approach to ASD therapy; consistent SIT therapy can significantly improve nonverbal communication. An intervention study conducted by Xu et al., reported in the open-access *Psychiatria Danubina Journal*, demonstrates the effectiveness of SIT therapy compared to controlled traditional ASD therapy (4). SIT therapy may consist of playing sports requiring increased hand-eye coordination or adding sensory-specific considerations to a sport. Although conventional therapy is useful in reducing ASD symptoms, SIT therapy demonstrated substantial gains with a total effective rate of 87 percent, as compared to the 64 percent rate of the control group. This illustrates the ability of SIT to enhance non-verbal communication by improving ASD-affected senses, thus positively affecting general social cognitive functions. Overall, any form of collaborative sport alongside specific sensory considerations will increase opportunities for direct social interaction and non-verbal communication.

## Motor Skills

In addition to encouraging communication, sports therapy for ASD also contributes to improvements in motor skills that promote physical and cognitive development. Motor skills deficits are another characteristic feature associated with ASD, ranging from mild to severe and impacting several motor systems of the body. According to Green et al., based at the Newcomen Centre at St Thomas' Hospital, motor deficits such as clumsiness, poor muscle tone, and difficulty with fine and gross motor skills occur in some 80 percent of children with ASD (5). Participation in sports presents a resolution through the coordination of specific physical activities and movements. The learning of a physical skill is known as motor learning, and at the beginning of this process, the brain forms a neural pattern (schema) to ensure skill completion. Practicing the skill over an extended period strengthens the established neural connection, making the skill more manageable to achieve. This improved

neural connection essentially acts as memory representations of movements or sensory consequences of movements; in children with ASD, this can provide the psychological basis for the progression of core motor skills. Najafabadi et al. conducted a quasi-experimental study published in the *Pediatrics and Neonatology Journal* to evaluate the effectiveness of a selected group exercise known as Sports, Play and Active Recreation for Kids (SPARK) on the motor and behavioral skills of children with ASD (6). The SPARK program consisted of 36 sessions, 3 sessions of 40 minutes per week, with various health and skill-fitness activities. As a result, researchers found that the program significantly improved static and dynamic balance, bilateral coordination, and social interaction. Najafabadi et al. explain that the play component of the SPARK program was sufficiently intense and specific to enhance the motor skills of the participants. Thus, if programs of similar intensity, volume, and duration were implemented as a form of sports therapy for ASD, motor skill development could be optimized.

## ASD-Specific Depression

The positive effects of sports on motor skills may also supplement feelings of self-confidence, which can lead to relieved ASD-specific depression. Claudia List Hilton, instructor in psychiatry at Washington University School of Medicine in St. Louis, explains how motor skill impairments can lead to more significant problems in the long term (7). “Some kids aren’t socially aware enough that it bothers them, but others are aware, and they feel bad about themselves,” she says. “They may have low self-esteem, so even if they have delays only in the motor skills, there is a lot of impact on their well being into adulthood.” As mentioned earlier, participating in sports significantly contributes to the improvement of motor skills in children with ASD. Adolescence is a transitional period in which children suffer low self-esteem, especially in terms of physical appearance and athletic competence; this is infinitely more difficult for children with ASD (8). As a result of developing motor skills, children may feel a sense of achievement and a boost in self-esteem, and mastering a new sport will foster confidence to increase participation in further activities. Additionally, children who play sports are often exposed to a lot of positive reinforcement, which can motivate them to improve their athletic performance to elicit praise; this similarly culminates in overall increased self-confidence in their abilities. This positive mindset acquired from playing sports can potentially lower the risk of ASD-specific depression through subsequent physiological changes post-activity. Depression is a prevalent constituent of ASD, as both share the common characteristics of attentional bias toward negative materials. In fact, a 2019 meta-analysis found that autistic people are four times more likely to experience depression than those who are not autistic (9). Thus far, most studies in the scientific literature that have investigated the correlation between physical activity and depression indicate a potential prevention or moderate reduction of depressive symptoms through sports. According to Alicia Garcia-Falgueras of the Official College of Psychologists in Madrid, Spain, “While there is no conclusive evidence that exercise causes a change for the better in the mood, exercise appears to be strongly associated with quite a number of positive changes in mood” (10). Psychologists support Garcia-Falgueras’s claim in a randomized controlled trial demonstrating such positive changes in a group that regularly exercised, compared to a control sedentary group (11). During exercise, the hypothalamus, a major hormone producer of the brain, produces endorphins released into the blood circulation by the pituitary gland. The endorphins block the nerve cells that receive pain signals when the body experiences pain or stress from exercise. Over time, endorphins work to a level that naturally reduces everyday stress and promotes positive mood changes. Stress is a considerable contributor to depression; therefore, reducing stress through sports is a principal way to reduce the potential progression of depression (10). An additional hypothesis to explain the correlation between physical activity and a reduced risk of depression is based on attentional strategies. To further elaborate, playing sports requires significant focus and, as a result, acts as a distraction from daily stresses. The frequent practice of sports may improve attention resource allocation to focus primarily on positive feelings and block out negative stimuli. Increased attention resource allocation is evident in a study by Chang et al., in which basketball players chose congruent stimuli after an intense exercise session (12). As response times and errors are decreased when

choosing congruent stimuli relative to incongruent stimuli, the study shows that sports are beneficial in improving attentional distribution. Children with ASD often hyper-fixate on their surroundings, making them keener on stressful situations that can gradually lead to depression. Using sports to remove attention from stresses will prove highly effective in reducing the risk of developing depression. Thus, sports promote self-confidence through personal achievement and professional encouragement while reducing the risk of ASD-specific depression.

## Limitations

Despite the ability of sports therapy to promote increased communication skills, refine motor skills, and limit ASD-specific depression, various types of ASD may pose barriers to effective treatment implementation. The different types of ASD are classified into three levels based on severity: high-functioning, low-functioning, or classic. In high-functioning ASD, people typically can not communicate effectively verbally, limit eye contact, and avoid social interaction. Low-functioning ASD types have extreme difficulty communicating and may exhibit severe behavioral problems, including both externally and internally violent actions. People with classic ASD have the most severe communication problems, are very socially withdrawn, and become gradually disabled over time without extensive support. Low-functioning and classic ASD diagnoses usually require extensive treatments consisting of, among other therapies, behavior, speech-language, and occupational therapy. Sports therapy is a strong treatment option for high-functioning ASD, as the interventions of sports therapies better target the milder symptoms. While high-functioning children may exhibit the typical ASD symptoms, they are more compliant to change, especially in the engaging and diverse environments presented by sports therapy. Consequently, while sports therapy may not be entirely effective in low-functioning and classic ASD types, it is exceedingly beneficial in children with high-functioning ASD.

## Conclusion

ASD is attaining an increasingly prevalent role in society, with a significant 1 in 36 children being diagnosed as of 2020 (1). Accordingly, it is important to consider easily accessible solutions to treat the affected populations successfully. Despite the variety of ASD types and related treatments, the ultimately mild nature of high-functioning ASD makes it the prime target of a sports therapy treatment plan. In an effort to implement sports therapy as a foremost treatment for high-functioning ASD, healthcare workers should consider all aspects of an effective treatment plan. Thus, through early-intervention sports therapy with sensory intervention training considerations, children with ASD would enhance the communication skills and motor skills necessary to foster self-confidence and reduce the risk of ASD-specific depression.

## Acknowledgments

I would like to thank my advisor for the valuable insight provided to me on this topic.

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