

Children and Teens With Autism Spectrum Disorder: Considerations and Basic Guidelines for Health and Fitness Professionals

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ABSTRACT

THE PURPOSES OF THIS ARTICLE ARE TO INTRODUCE THE READER TO AUTISM SPECTRUM DISORDER (ASD), TO ESTABLISH THE IMPORTANCE OF PHYSICAL ACTIVITY IN THIS POPULATION, AND TO HIGHLIGHT SOME OF THE UNIQUE CHALLENGES FACED WHEN WORKING WITH CHILDREN AND TEENAGERS WITH ASD IN THE HEALTH AND FITNESS SETTING. THE AUTHOR PROVIDES SOME BASIC GUIDELINES AND RECOMMENDATIONS TO SUPPORT PROFESSIONALS WHEN DEVELOPING EXERCISE PROGRAMS TO ACHIEVE POSITIVE OUTCOMES AND LONG-TERM ADHERENCE. AN IN-DEPTH DISCUSSION OF ETIOLOGY, DIAGNOSTICS, CLINICAL PRESENTATION, AND TREATMENT IS BEYOND THE SCOPE OF THIS ARTICLE.

INTRODUCTION

Overall public awareness of autism and autism spectrum disorder (ASD) has increased dramatically over the past decade. This

is partly because of public awareness campaigns but mostly a result of the dramatically rising incidence in the United States and throughout the world. Most people today know someone whose life is affected by autism in some way. According to the most recent estimates by the Centers for Disease Control and Prevention (CDC), 1 in 88 children is diagnosed with ASD, and the disorder is nearly 5 times more common among boys (1 in 54) than among girls (1 in 252) (11,12).

ASD is a general term for a group of developmental disabilities that cause significant difficulties in social interaction, verbal and nonverbal communication, and behavior (5,9). Disabilities that fall under the diagnostic category of ASD include autism, pervasive developmental disorder not otherwise specified and Asperger's syndrome. According to some resources, ASD also includes Rett's syndrome and childhood disintegrative disorder (5,9). ASD is usually diagnosed in childhood and is a lifelong condition. Aside from the characteristic difficulties mentioned above, individuals with ASD may also

present with other issues and comorbidities, including impaired motor coordination, depression, anxiety, attention deficit disorder, sensory processing disorder (SPD), seizure disorder, and intellectual disability (1,22,37). Because of the spectral nature of ASD, clinical presentation varies widely among individuals affected by the disorder.

IMPORTANCE OF PHYSICAL ACTIVITY AND FITNESS IN CHILDREN AND TEENAGERS WITH AUTISM SPECTRUM DISORDER

Like their typically developing peers, children and teenagers with ASD benefit greatly from physical activity. Physical activity is essential in maintaining health and well-being, and preventing childhood obesity. Childhood obesity has more than tripled in the past 30 years (7). In 2008, more than one-third of children and adolescents were overweight or obese (28,31). Current estimates indicate that 17% of children

KEY WORDS:

autism; autism spectrum disorder; exercise; physical activity; special populations; children; teens

and adolescents aged 2–19 years are obese (8).

There is evidence that obesity rates are even greater in children with ASD (38,39), and some research indicates that children with autism are 40% more likely to be obese than children without autism (13). Childhood obesity is the result of eating too many calories and not getting enough physical activity (7), and this holds true for children with ASD (21). Children and teenagers with ASD, however, are at greater risk for becoming overweight or obese because of the unique challenges they face that limit their opportunities and abilities to exercise. Social and communication impairments, behavioral issues, sensory processing difficulties, and motor incoordination may preclude participation in school-based or recreational physical activities. Obesity rates are greater for older children with autism because recent studies indicate that they are significantly more physically inactive than younger children (21), and this can have important ramifications as these children transition into adulthood, such as the development of diabetes or other obesity-related health issues.

One of the biggest barriers to physical activity for youth with ASD is the primary social-behavioral impact of the disorder. Individuals with ASD have difficulty interacting with peers because of poor social skills (29). They often fail to recognize or understand social cues and lack verbal and nonverbal communication. They often engage in repetitive and self-stimulatory behaviors, which interfere with the activity at hand, and may distract others around them. These children often have difficulty engaging with their peers in unstructured physical play at school, on playgrounds, or the backyard. Difficulty with social interactions and a lack of cooperative skills impact group dynamics, and children with ASD often require social cues for appropriate interactions (27). They may also be prohibited from participating in organized recreational sports because of staff concerns regarding behaviors, or

staffs' inability to deal with them effectively.

Sensory processing impairments pose another barrier to effective participation in physical activity. The presence of sensory processing disorder (SPD) in most children and adults with ASD is well documented, although the severity of symptoms varies greatly (19,20). SPD is an umbrella term for a range of difficulties (or dysfunctions) in sensory functioning (23), and a detailed discussion of the complexities and varying presentations of the disorder are beyond the scope of this article. In very simple terms, sensory processing is the ability of the central nervous system to process information gathered through the senses, integrate it with information stored in the brain from previous experience, make a meaningful response and self-regulate. There are 3 components of sensory functioning: sensory responsiveness, sensory reactivity, and arousal (23).

For the purposes of this article, the discussion will be limited to a brief description of sensory responsiveness and reactivity as observed in youth with ASD. Sensory reactivity is a physiological response to sensory information in the environment. Some individuals may be overreactive to sensory stimuli, including sound, touch, smell, movement, and visual information. Some individuals may be underreactive. Sensory responsiveness is the observable behavior caused by sensory input. Although simplified, a good example to illustrate sensory overresponsive behavior is when a child covers his ears and cries in response to a sound, such as a ringing phone or school bell. The reaction does not match the intensity of the stimuli. Aside from overt sensory responses, SPD can also manifest in other ways, such as self-stimulatory behaviors (e.g., hand flapping, twirling, rocking), sensory avoidance behaviors, difficulty with attention and focus, poor motor planning, difficulty in organizing and sequencing tasks, difficulty in following verbal instructions, low motivation, poor self-esteem, and difficulty in self-monitoring. Each of these can impact an individual's ability to perform

physical activities and participate in group sports.

Bullying by peers is also a potential barrier to participation in group physical activities for this population (17). Decreased motor skills, poor social communication, and low self-confidence can cause these children to be targeted for bullying during group physical activity, which can further magnify the social impact of the disorder. Peer bullying not only facilitates physical inactivity, it further socially isolates youth with ASD.

THE BENEFITS OF PHYSICAL ACTIVITY

The benefits of physical activity for youth with ASDs reach beyond those already well documented for the non-disabled population. As with all youth, physical activity at recommended levels improves health and well-being, improves physical fitness, and prevents comorbidities including obesity. There is additional evidence that children with ASD experience other positive effects from exercise, including improved motor function and exercise capacity (35), reduced self-stimulatory behaviors such as rocking, spinning, and hand flapping (34,40,47), and improved self-esteem, mood, and attention (32,36). Even more exciting is the positive impact of exercise on social interaction and participation. The positive effects of physical activity and exercise mentioned above can ultimately lead to improved ability and desire to participate in peer group physical activities and sports. This type of engagement can improve social and communication skills, improve self-esteem, reduce depression, reduce social stress, and facilitate self-management skills (24,33). Improved endurance, strength, and motor skills can give these youth self-confidence to participate in community/recreational peer activities, an important step toward independence as an adult.

EXERCISE GUIDELINES

The general guidelines for exercise training for youth with ASD are basically the same as with all youth. The CDC and the U.S. Department of Health and Human Services developed

National Physical Activity Guidelines recommending that children get a minimum of 60 minutes of moderate-to-vigorous physical activity each day, which may occur in bouts of >10 minutes (10,42). Vigorous-intensity aerobic activity, however, should be performed at least 3 days per week.

Physical activity should also include muscle strengthening activities (e.g., gymnastics, push-ups, or free weights) (10). When planning strengthening activities, professionals should consider strength and conditioning guidelines for children as outlined by the National Strength and Conditioning Association (30). A well-rounded program should also emphasize core strengthening activities, as a strong core can facilitate improved balance and coordination required for higher-level motor skills (3,4,18).

Although exercise testing guidelines are basically the same as for adults, it is important to remember that children's physiological response to exercise differs from adults. These are described clearly in American College of Sports Medicine (ACSM) Guidelines for Exercise Testing and Prescription (2). Aerobic fitness in this population may be difficult to determine because of the disorder's impact on social understanding, motivation, motor function, and focus. The following tests are relatively easy to administer and serve as a baseline to mark progress:

- ½ or 1-mile walk/run.
- 3-, 6-, or 12-minute walk test.
- 600-yard walk/run.

Professionals can use the ACSM FITT model to guide program design and determine frequency, intensity, time, and type of exercise (2). As with all children, it is helpful to include activities, props, games, and music to motivate and encourage participation.

Although exercise testing and training guidelines are the same for children with ASD and healthy nondisabled children, there are some special considerations and strategies to make exercise training more successful in this population.

SPECIAL CONSIDERATIONS

As discussed, the 3 main characteristics of ASD are impairments in social interaction, communication, and behavior. These are the key areas to be aware of when engaging individuals with ASD in physical activity or recreational activities (27). Strategies to address these key areas are discussed in the following section. Two other important considerations when working with this population are the presence of seizure disorder and impaired cognition.

Approximately one-third of children with ASD have seizure disorders (16,45,46). Fitness and health professionals working with this population must identify the presence of seizures and whether they are controlled through medication. This information should be gathered from the family when obtaining health history, medical clearance, and consent to participate in a physical exercise program. Parents may be fearful that physical exertion will trigger a seizure. Most children with medically controlled seizures, however, can safely participate in physical activity. The literature is inconclusive regarding the impact of physical exertion on seizures. Some studies report cases in which children may have exercise-related seizures (26,41), whereas other studies suggest reduced incidence of seizures with increased physical activity (14,15,25). Regardless, child-specific precautions regarding physical exertion and seizures must be discussed with the physician and family before program initiation. Professionals must also be aware that some antiseizure medications may alter exercise response and even cause impairments that impact balance and gait. Although children with seizures can engage in most physical activities, certain activities, such as swimming, must be monitored for safety. Activities that have a potential for impact injury to the head should also be avoided, although evidence for increased seizures from head trauma is inconclusive (6).

Another important consideration for working with this special population is the child's cognitive status, which

can impact ability to follow instructions, level of independence, and overall safety to the child and those around him. Health and fitness professionals must determine the appropriate level of supervision needed for a child or teen with ASD based on cognitive level, as well as the age of the child. The use of simple instructions and visual aids may be helpful in obtaining child understanding and improve their ability to perform the exercises correctly and safely. The special considerations for children with ASD, as discussed above, are presented in (Table 1).

PRACTICAL SUGGESTIONS AND STRATEGIES FOR SUCCESS

There are several ways fitness and health professionals can implement strategies to improve motivation, reduce characteristic behaviors, improve outcomes, and obtain long-term compliance to exercise programs in children and teenagers with ASD. These children are each unique in their presentation of characteristic behaviors and specific challenges they face when it comes to participating in physical activity and exercise programs. Professionals should evaluate each child's specific needs through observation, as well as consultation with family members and other health providers who work with the child, to design an individualized program. Each of the following suggestions may not apply to each child with ASD, and it is up to the professional to determine which strategies are appropriate for the child. Program planning is also a process, often through trial and error, and modifications based on the child's response. Nevertheless, with careful, flexible planning, this population can be successfully trained and benefit greatly.

SPDs and associated behaviors can impact learning, attention, and physical performance. Vigorous aerobic activities, such as running, jumping, biking, and swimming, provide proprioceptive sensory input. Intense proprioceptive input can provide short-term reduction of sensory behaviors and improve attention and focus. Begin an exercise routine with these types

Table 1
Questions to consider when planning exercise and fitness training for youth with autism spectrum disorder

Does the child have seizure disorder? If so, are there specific activities that induce seizures? Are the seizures controlled with medication? What medications?	Check with the physician for special precautions regarding the seizures, though physical activity is usually not contraindicated. In some cases, the family and physician may identify specific types of activities that trigger the seizures.
	If the child is taking the medications, check side effects (e.g., balance problems) and impact on exercise response.
	Determine appropriate response in the event of a seizure during exercise. In some cases, seizures are mild, and the child can continue to exercise. In some cases, the seizures can be physically draining, and exercise should be discontinued for the day.
	Consider safety when selecting physical activities/exercise modes (e.g., swimming would require close supervision at all times).
	Avoid activities that have a potential for head injury (e.g., boxing).
Does the child have anxiety about transitions or schedule changes?	Use visual schedules and follow an exercise routine so the child knows what to expect.
	Use flow sheets and checklists so the child can mark his/her progress through the routine and from session to session.
Does the child require an extrinsic reward system for motivation, compliance, and behavior management?	Use a positive reward system to reinforce good behavior/exercise goal achievement.
	Select strategies/reinforcers based on needs of each individual child.
Does the child have sensory processing issues?	Start exercise sessions with heavy work activities and aerobic exercise to provide proprioceptive input (e.g., jump rope, trampoline, sprints, treadmill walk/run, vertical jumps, agility drills, and core stability exercises).
	Consider the child's responsiveness to stimuli and plan sessions and location accordingly (e.g., noisy gym, bright lights, and crowds).
	Use visual aids and written aids to improve understanding.
Does the child have cognitive impairments?	Select simple motor activities that do not require multiple steps.
	Keep verbal instructions short and simple.
	Use visual aids and written aids to improve understanding.

of activities before initiating exercises that require more control and focus. For example, have the child jog on a treadmill for 20 minutes before working on resistance machines or sport-specific skills like throwing and catching.

Anxiety, repetitive behaviors, and a desire for rigid/predictable schedules are common in individuals with ASD. Provide children with a detailed schedule of activities at the start of each session, as well as a prescribed exercise routine to follow at home. This external structure helps alleviate anxiety by letting the child know what's next, and improves cooperation and motivation. It can also facilitate self-management in older children. Written instructions may be sufficient for higher functioning children; however, using pictures along with brief written instructions can improve understanding in younger or more impaired children. For example, if incorporating free weights or resistance machines in an exercise program, include an image of the machine or a picture/video clip of the child performing the exercise correctly using the equipment or weights. Schedules for exercise routines can also be incorporated into a visual calendar the child can keep and refer to at home.

Several behavioral management techniques and motivational strategies have evidence to support their success in children with ASD (43,44). One well-documented approach, most applied by behavioral analysts, is a positive reinforcement system. In this system, extrinsic reinforcers are used to reward desired behaviors. Over time, and with progress, the rewards are delayed and eventually faded until the child can manage his own behavior and/or feel motivated by intrinsic rewards, such as a feeling of accomplishment. Incorporating an extrinsic positive reward system is an effective strategy for achieving compliance with an exercise program. Discuss appropriate and meaningful rewards with the parent or caregiver. Rewards can be immediate or delayed, based on the level of the child. Examples of reinforcers and a description of

when and how to apply them are presented in Table 2. No matter what type of reward system the child requires, provide consistent and frequent positive praise to let the child know exactly what they did well (e.g., “I like the way you moved on to the next machine without a reminder,” or “You did a good job of controlling the weight and slowly lowering it back down.”).

Progress charts and checklists allow the child to note those tasks that have been successfully completed, as well as document improvement over time (i.e., number of repetitions, resistance, distance, time) and provide a sense of

accomplishment. This sense of accomplishment can boost self-esteem and motivation to continue the program. It also supports self-organization, self-direction, and independence in older children/teenagers by giving them a tool to perform their routine with little prompts from an adult.

Another strategy that benefits most children with ASD is to keep visual or verbal instructions short and simple. This is especially important for children and teenagers with more severely impaired language, difficulties in processing auditory information, and/or impaired cognition.

CONCLUSIONS

The incidence of ASD is growing at an alarming rate. Professionals in fitness and health settings will likely interact with individuals with ASD and should therefore have a basic understanding of the disorder, special considerations, and strategies related to exercise training. Professionals should encourage the recommended levels of physical activity because improved fitness can benefit this population greatly. This article provides information and strategies that can be easily and immediately applied to improve outcomes and adherence in this special population.

Table 2
Suggested guidelines for extrinsic positive reward system

Type of reward strategy	When to use	How to apply	Examples of rewards/reinforcers ^a
Immediate	To improve motivation; to manage behaviors. Typically indicated in younger or lower functioning kids who are unable to focus on long-term goals.	Provide specific verbal praise with an immediate reward periodically throughout session (e.g., after each exercise activity; after a specified amount of time).	Edibles (while this is not the best choice, it is very effective for some kids. Select healthy options. Get parent approval or have parent provide the food. A few pieces of popcorn, a fruit chew, small pretzel, or carrot sticks are some examples). Stickers, stamps, tickets, toy coins, toy dollar bills (these work well alone or once the child accumulates specified amounts, he/she can trade them in for bigger prizes). Favorite song.
Delayed (short term)	This strategy works well with kids/teens who are beginning to demonstrate some behavior control but still need some extra support/reinforcements for consistency.	Provide specific verbal praise throughout session. Provide the reinforcer at the end of the session.	Toys (child can choose a small toy from a “treasure box”). Fun activity or game (child can choose a short activity to do either at the end of the session or when they get home, such as 5–10 minutes of video game or computer time, a game of “Simon Says,” or a few minutes on the trampoline).
Delayed (long term)	For higher functioning kids/teens who are generally motivated and cooperative during sessions but still need reinforcement for confidence and long-term compliance.	Set exercise-related goals that are measurable (time period, level of difficulty, amount of resistance) and agree on reward. Have the child keep a visual record of progress toward goals using flow sheet or checklist. Once goals are met, provide reward.	Gift card (small amount) to favorite store. Certificate of achievement. Ticket to movie.

^aProvided by the fitness/health professionals or parents.

Conflicts of Interest and Source of Funding: The author reports no conflicts of interest and no source of funding.



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