



# Physical Activity for Children With Autism Spectrum Disorder

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Autism is a developmental disorder affecting the lives of thousands of children. According to the Centers for Disease Control and Prevention (CDC), approximately 34 in 10,000 children ages 3 to 10 years of age have autism (CDC, 2004). The Autism Society of America (ASA) reports that 1 in 166 babies born today will develop autism spectrum disorder (ASD). While 1.5 million Americans, including children and adults, have autism, another 15 million Americans (e.g., family, educators, and health care workers) are affected by it.

The essential features of autism include a significant impairment in social interaction and communication and a highly restricted area of activities and interests (American Psychiatric Association, 2000). Similarly, individuals with Asperger's Syndrome and other disorders on the autism spectrum also display a sustained impairment in social interaction and develop restricted and repetitive patterns of behavior, interests, and activities, often referred to as *stereotypical*. Stereotyped behaviors include repetitive mannerisms such as finger flicking, whole body rocking, and repetitive behavior with tangibles (e.g., rubbing a string between the fingers); but in children with high functioning autism or Asperger's, this may also include restricted interests, such as dinosaurs. Concurrent with the deficits in social interaction and stereotyped behaviors, children with autism may develop challenging behaviors such as screaming, hitting, and biting (Sigafos, 2000), thus creating substantial obstacles for individuals charged with their education and well-being (Durand & Merges, 2001). For example, when children are forced to stop rocking or playing with items of restricted interests, they often respond by screaming and/or hitting. Such social deficits and challenging

behaviors, combined with the increased prevalence of autism, creates significant demands to adequately respond to these children's needs at home and in educational settings.

Several researchers have developed programs that use physical activity to benefit children with autism. Richmond (2000) found a decrease in stereotypy after children with autism participated in jogging sessions and ball throwing. Similarly, Levinson and Reid (1993) discovered that vigorous activity reduces stereotyped behavior in children with autism. Further, O'Conner and colleagues (2000) have developed effective methods of exercise that allow children with autism to remain engaged in the developmental process. The purpose of this paper is to examine appropriate physical activity for children with autism and its effectiveness in addressing deficits associated with ASD. Specifically, this article discusses (a) organized play, (b) the importance of physical activity, (c) a sensorimotor approach, and (d) programming based on five physical education objectives.



## Treatment of ASD

The key to any treatment program is to start early (*Health & Medicine Week, 2004*). Early detection often leads to early treatment; therefore, parents, caregivers, and teachers should be watchful for symptoms of ASD in children. There are several approaches to treating ASD that can be utilized individually or in

concert. Any treatment program should be based on the strengths and weaknesses of the child. Early identification of particular strengths assists the educator in finding activities that are interesting to the child and, therefore, help to engage the child's greatest abilities.

## Organized Play and Physical Activity

Research in the area of organized play and physical activity generally focuses on reducing stereotypical behaviors in children with ASD, including finger waving, arm flapping, body rocking, toy chewing, flicking light switches, and, in some cases, hand biting, head banging, and hair pulling (Wolfberg, 1999). Children with ASD may also engage in ritualistic behavior, such as organizing objects or collecting items of unusual interest, including toys, blankets, paperclips, and the like.

Before organizing play activities, educators should understand basic characteristics of the organized play concept. Typical children display the following characteristics when playing in an organized manner (Wolfberg, 1999, p. 25-26):

*Play is pleasurable. Normal children commonly laugh or smile, and possibly sing to themselves.*

*Play requires active engagement. Engagement may include daydreaming, but mostly involves experimentation and exploration as the child actively creates new scenarios.*

*Play is voluntary and intrinsically motivated. True play activities are chosen by the child. Any reward, then, for play arises from an internal perspective. The major goal of play is enjoyment, not necessarily extrinsic or tangible reinforcers like praise or candy.*

*Play involves attention to means over ends. There is no overt goal in play. It focuses more on the process. So, there is no specific end result, as would be the case in goal-directed activities.*

*Play is flexible and changing. There are no hard-and-fast rules as in goal-directed activities. The scenery, main objectives, and rules change flexibly.*

*Play has a non-literal orientation. Objects used in play may be imaginative. An example of this is a broomstick being used as a horse, instead of for sweeping.*

Children without ASD have no trouble with imaginary play. But children with ASD have a difficult time understanding abstract concepts. They do not exhibit much flexibility in the objects they play with. Such children often seem to be mechanical, acting in ways that are out of context. For example, a child with ASD may focus on the individual dots on a basketball instead of using the ball to pretend they are in a game situation (Beyer & Gammeltoft, 2000).

Using an *adult-centered play* approach to work with children with ASD involves a systematic set of prompts from adults and peers during play (Wolfberg, 1999). It is not effective from a general perspective (in that the prompts do not transfer well to other activities), but it can improve social interaction among children with ASD. Another approach, *child-centered*, allows the child to initially decide which activity to participate in, with an adult then furthering the process. This approach has

also been called *incidental teaching* or *milieu therapy*. Minimal involvement of the adult is necessary. In most cases, the only responsibility of the adult is to reinforce behavior through imitation of the child. Spontaneity is important, that is, having the child initiate conversation via open-ended questions (Potter & Whittaker, 2001).

Several research teams have discovered that increased physical activity helps reduce stereotypical behaviors. Rosenthal-Malek & Mitchell (1997), investigating the effects of exercise on self-stimulatory behaviors, found a decrease in such behaviors after twenty minutes of jogging and stretching, compared to students who did not exercise.

Richmond (2000) found similar results in a study that used multiple forms of physical activity, including walking, jogging, and a ball toss exercise. Each activity lasted 15 minutes, combined with a 30-minute post-exercise observation. The incidence of stereotypical behaviors was recorded over a three-week period. The largest decrease in stereotypical behaviors came after the jogging sessions, followed by the ball toss, and then walking. Richmond concluded that individual activities such as these help reduce stereotypical behaviors.

In an earlier study, Levinson and Reid (1993) investigated the effects of exercise *intensity* on stereotypic behaviors. Three participants completed a 15-minute walking program and a 15-minute jogging program. Jogging (vigorous activity) was more effective, reducing stereotypic behaviors by 17.5%. The reduction lasted up to 90 minutes after the exercise session.

Such studies indicate that guidelines should be developed for organized play and physical activity. To increase physical activity in children with ASD, it may be necessary to ignore inappropriate behaviors until a motivational precedent has been set. Physical educators can increase motivation in children with ASD by changing activities frequently, using different learning stations, and planning transitions to help overcome short attention spans (O'Connor et al., 2000). In particular, changing activities every two to three minutes helps keep students engaged.

After initially getting the child engaged in the activity, inappropriate behaviors can then be addressed. Activities that work well to influence inappropriate behaviors include rhythmic activities that involve large muscles and are continuous (e.g., running, cycling, or swimming).

It is important for both the educator and parents to observe a child's repetitive behaviors and design exercises that decrease the need for such behaviors. The selection of activities must reflect the child's individual interests as well as strength, age, peer interests, parent interests, social and cognitive demands, and attitude toward competition and cooperation (Reid & O'Connor, 2003). Individual interests increase intrinsic motivation. Give the child a choice of activities to participate in through either demonstration or pictures. The activities must be age-

appropriate, according to what a normal child would be interested in and able to do at that age, but adapted to the current skill level of the child with ASD. Peer interests can also drive motivation. These are mostly region-dependent, like skiing in northern states or swimming in southern states. Parental interests are almost as important as individual interests. Engaging the parents' interests encourages them to get more involved in their child's rehabilitation.

Social and cognitive demands reflect the nature of ASD. Children with ASD may not be able to participate in activities that rely heavily on communication, such as lacrosse, basketball, or soccer. However, learning the *skills* used in these sports, such as throwing and catching a baseball, are important and appropriate (Reid & O'Connor, 2003).

Finally, competition and cooperation are important concepts that may not be recognized by children with ASD. For example, "Peter was an adolescent with ASD who loved competition but acted out in physical education class if he did not finish first. His teacher had to remind him that no one, even professional athletes, always finished first" (Reid & O'Connor, 2003, p. 21).

Instructional considerations must also be considered when designing organized play activities. Reid, O'Connor, and Lloyd (2003) point out that when teaching children with ASD, teachers should promote eye contact, use clear language, be aware of sensory preferences and over-selectivity, balance social skill training and physical activity objectives, use prompts and reinforce appropriate behaviors, adapt tasks, and motivate.

Increase eye contact in by touching the child's cheek or by using verbal prompts. After gaining eye contact use clear language, without sarcasm, to engage the child in an activity (Reid et al., 2003).

Children with ASD have a tendency to be oversensitive to certain stimuli, such as direct contact with another person or loud music. So, useful instructional strategies include demonstrating certain activities or presenting activities in different ways (such as through pictures or verbal cueing). Combined visual and verbal prompting is an effective way to explain an activity or skill to a child with ASD (Reid et al., 2003; Reid, Collier, & Cauchon, 1991). No single type of cue is better than another. Utilization of these suggestions must be according to individual needs.

The same is true when attempting to reinforce proper behaviors. Some children respond well to a "high five" or being given their favorite toy. As a rule, adaptation of equipment and tasks is necessary to reduce the frequency of failure. Failure in a task may cause the child to become unmotivated. So, while it is important to make tasks challenging, they should not be impossible.

In developing activities and instructional strategies, be careful not to interpret poor understanding as a lack of interest. Whether related to organized play, in the form of goal-directed behaviors, or in response to

prompting by another person, social behaviors are less frequent, less self-initiated, and less complex in children with ASD (Ruble, 2001). It is important not to get discouraged if activities do not seem to be working at first. It may also take extra time for children with ASD to respond to cues that are auditory or visual (Szlag, Kowalska, Galkowski, & Poppel, 2004). It is helpful to organize play and physical activity in conjunction with other forms of treatment, such as Huebner's sensorimotor approach (1991).

## Sensorimotor Approach

Occupational therapists commonly utilize the sensorimotor approach. They believe that children possess the resources needed for growth and adaptation but may need some assistance from another person to show them the way. The sensorimotor approach for children with autism focuses on remediation of sensory dysfunction, encouraging play, and enhancing coordination and motor control (Huebner, 2001). By controlling sensory overload, the therapist makes the child more comfortable with the surroundings, resulting in improved motor abilities. The sensorimotor approach involves two basic principles. Primitive reflexes form the basis of equilibrium reactions. Related responses must be learned by experience, as in actually completing the motions (Huebner, 2001). A therapist using this approach teaches the child proper reflex actions, as well as balance and flexibility, through a variety of exercises.

Occupational therapists are rarely available in education settings for children with ASD. But, it is appropriate for physical educators to utilize and help these children practice stretching techniques and balance exercises. The proprioceptive neuromuscular facilitation (PNF) stretching technique is quite useful because each stretch invokes a neurological component. In this technique, a muscle group is stretched passively (with the assistance of a peer or the teacher). While being stretched, the child contracts the antagonist muscle group, effectively trying to move the joint in a direction opposite the passive stretch. This is followed by relaxation of the antagonist muscle group. This typically allows for an increase in the passive stretch (see Example).

Balance exercises can be as simple as standing on one foot with the knee either bent or straight. The use of exercise balls also helps increase proprioception, a key contributor to balance, in the back and arms. To enhance balance while supporting oneself on the arms, have the child make a push-up position, with hands on the floor and thighs on an exercise ball. The ball can be placed anywhere from under the hips to the ankles to change balance characteristics on the arms. Have them try to stay on the ball for up to 30 seconds at a time. An added benefit for the physical educator is that these are exercises that can easily be integrated into the normal physical education program, providing benefits for other children as well.

## Example: PNF stretch

With child lying supine, lift one leg up. Gently push the leg toward the head until a comfortable stretch is reached. Once the passive stretch position is reached, instruct the child to gently push his or her heel into your hand, making a strong contraction but keeping the knee straight. Use physical cues to help the child maintain correct technique (i.e., immobilize the other leg, place a hand on the knee to keep it straight). Have the child push against your hand for at least 10 seconds, and then relax. As the child relaxes, try to gently push the leg a bit further toward the head.

## Physical Education Objectives: An Outline for Children with ASD

The following is a description of five physical education objectives specific to children with ASD.

### Organic

Proper functioning of body systems is a foundation for the development of fundamental skills. For children with autism, this serves as a basis for learning proper balance and coordination. Muscle strength, muscle endurance, cardiovascular endurance, and flexibility are also important components. The most important components for a child with autism are cardiovascular endurance and flexibility because both are required to move and learn fundamental skills successfully.

Exercises for a child with autism include running or biking and daily stretching of the major muscle groups. Running, and other similarly vigorous exercise, has been shown to help reduce stereotypical behaviors. The daily stretching should include static stretching, with each stretch held for at least 30 seconds. This helps to permanently lengthen muscles and allow the child to relax.

### Neuromuscular

The nervous and muscular systems work together to produce coordinated movements. Neuromuscular activity encompasses locomotor and non-locomotor skills, game-type skills, motor factors, sport skills, and recreational skills. The most important activities for an autistic child are locomotor and motor factors. Locomotor skills, such as walking, leaping, skipping, and hopping, give the child different options for traveling. They can use such skills in game-type situations as well as engaging in alternative methods of cardiovascular exercise. Motor factors can include balance, rhythm, reaction time, and kinesthetic awareness, all of which are often delayed or compromised in a child with autism.

Whether the child is not yet delayed or already delayed, special attention in this area at a young age

helps improve overall locomotion later in life. Children who receive this training will be more successful movers as they get older. Simple activities, such as having the student sit or lie on a scooter while holding onto a hula hoop, incorporate both organic and neuromuscular components. This particular exercise requires the child to have some amount of muscle strength and endurance as well as vestibular awareness, which enables them to balance on the scooter without falling over.

### Interpretive

The ability to acquire knowledge and make judgments in game activities encompasses strategies, techniques, and knowledge of body functions. Children with autism may have difficulty with such concepts, but it is important to include them, especially for older children. Such activities give the child with autism the confidence and ability to operate in real-world situations, including occupational settings.

### Social

Communicating with others is a key to integrating into a larger *society* (even if that *society* is gym class) and developing an attitude that reflects good moral character. Though communication is often a particular difficulty for children with autism, try pairing them with students who are not autistic. Through this type of direct interaction, the child with autism may begin to copy and understand the patterns of the other student.

Communication does not always have to occur through speaking. This is a challenging portion of autism-related disorders. Rather, communication can be through sign language or pictures. Sign language, when utilized at an early age, gives the child an outlet for communicating their own ideas and should not be regarded as a step backward. Any social exchange between children with autism and other individuals is considered worthwhile.

### Emotional

Children with autism may lack the ability to show fulfillment from an activity. It is common for children with autism to not display emotions other than the

occasional tantrum. And, because they may lack the ability to be creative, this is an extremely important area to work on.

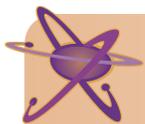
Praise children when they are successful in an activity, but do so in a way that shows them how to be excited. Children with autism may imitate behaviors they observe, and it is imperative that an individual understands positive emotions and welcomes them. Related activities might include making faces for a variety of emotions and verbally cueing the student to either point to a picture of that emotion or demonstrate it themselves.

It is also important that children with autism develop the ability to control violent or tantrum-like behavior. Instead of simply disciplining students for these behaviors, take a deeper look into what causes the behavior, for example, changes in routine or proximity of other students. Also pay attention to ideas communicated by the child, rather than simply choosing every activity for them. It may take longer for a child with autism to respond to questions, so it is also imperative to be patient in this area.

In conclusion, the high prevalence and incidence of autism, along with its social skill problems and stereotypy, requires an adequate and appropriate response from educators. Research has led to the development of physical activity programs specific to the strengths and weaknesses of children with autism. The benefits of such programs include decreased stereotypy and improved social skills. With slight modifications, many more children with autism may possibly achieve similar benefits.

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## Project ACES: Wednesday, May 6, 2006

Project ACES (All Children Exercise Simultaneously) takes place on the first Wednesday in May as part of National Physical Fitness and Sports Month along with National Physical Education Week. It has been labeled as "the world's largest exercise class" by the media. Since 1989, millions of children from all over the world exercise together to promote proper health and fitness habits. There are now Project ACES coordinators in many states willing to help you set up your own school event. Visit the ACES web site ([www.projectaces.com](http://www.projectaces.com)) for downloadable materials to help with your planning, as well as certificates and press releases.

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