

Mehmet Yanardağ¹
İlker Yılmaz²
Özgen Aras³

Approaches to the Teaching Exercise and Sports for the Children with Autism

Abstract

Autism is a developmental disorder that appears during the first three years of life and is characterized by communication problems, social interaction deficits and repetitive/restricted interests and behaviors. Although a diagnosis criterion of autistic spectrum disorders does not involve incapacitating to cover motor skills, studies indicated that motor deficits and delays in children with autism are possible. Sports and exercise are useful in that they decrease these motor failures and provide social integration. However, although these useful effects, exercise and sports activities are not supplied enough for children with autism, and it is observed that family, teachers and other specialists have some difficulties in adapting physical activity in the daily life activities of children with autism. This article focuses on what type sports activities can be introduced to children of certain ages with autism, the strategies followed and the measures adopted.

Key words: Autism, Exercise, Sports, Teaching Strategies.

Autism or autistic disorder is defined as a developmental failure, one of the categories under the heading of “autistic spectrum disorders” or “pervasive developmental disorders”. Autism that appears during the first 3 years of life is characterized by communication and social interaction problems, and restricted/repetitive behaviors and interests (Doyle & Iland, 2004). Autism is one of the developmental disabilities in the Pervasive Developmental Disorders category, also known as PDD. It is a sub category of

¹ Ph.D., Asst. Prof., Anadolu University, Research Institute for the Handicapped, Email: myanardag@anadolu.edu.tr

² Ph.D., Prof., Anadolu University, School of Physical Education and Sports, Email: ilkery@anadolu.edu.tr

³ Ph.D., Asst. Prof., Dumlupınar University, School of Health Science, Department of Physical Therapy and Rehabilitation, Email: ozgena@yahoo.com

the autistic spectrum disorders such as asperger's syndrome, rett syndrome, a typical autism, and childhood disintegrative disorder. Below are the common features described as the diagnostic criteria for children with autism (American Psychiatric Association, 2001).

A. Impairment in social interaction, with at least two of the following:

1. Failure in the use of nonverbal behaviors such as eye contact, gesture and mimic, and body posture.
2. Marked impairment in developing peer relationship appropriate to the developmental level.
3. Lack of spontaneous seeking to share enjoyment, interests, or achievements with other people.
4. Failure of social or emotional reciprocity.

B. Impairment in communication as manifested by at least one of the following:

1. Delay in, or total lack of, the development of spoken language; inability to say a word in 2 years of age, and a simple phrase with two words in 3 years of age.
2. Marked impairment in the ability to initiate or sustain a conversation with other individuals with adequate speech.
3. Repetitive use of language or idiosyncratic language.
4. Restriction on social play or symbolic play appropriate to the developmental level.

C. Restricted/ repetitive interests and behaviors, showing at least one of the following:

1. Intensive and abnormal interests
2. Strict adherence to specific, nonfunctional routines or rituals.
3. Stereotyped and repetitive motor behaviors (e.g. hand flapping, twisting whole-body movements and rocking).
4. Persistent preoccupation with parts of objects.

For the diagnosis of autism, a child should retain at least six of the 12 features stated above, including at least two from section A, at least one from section B, and at least one from section C. Additionally, one of the features has to be seen before the first 36 months (American Psychiatric Association, 2001). In addition to these six features, behavioral fluctuations should also be seen in the child who was supposed to have autism. Several disorientations and issues in daily life activities are seen in autism, such as aggression displayed to oneself or environment, nutrition difficulties, sleep disorders, and toilet problems. Moreover, one of the basic incapacitates on children with autism is an intellectual restriction. It is claimed that up to 75 percent of all people with autism may have learning difficulties (Bryson, Bradley, Thompson & Wainwright, 2008; Graziano, 2002).

Owing to the children's features such as peer and social integration difficulties, communication failures, repetitive/restricted interest and activities, children with autism cannot play with peers and participate in physical activities and various sports branches

(Block, Block & Halliday, 2006; Reid, 2005). On the other hand, because of restricted opportunities like social organization, which is necessary for the children with autism, is not enough and correctly provided by the community, it is discussed that physical activity level of the children with autism is lower. In addition to the existing incapacities of children with autism, limitation of support for physical activity opportunities and people's ignorance of physical activities for children with autism are frequently observed issues in the literature (Reid, 2005; Sandt & Frey, 2005; Pan & Frey, 2006). Although there are no criteria related to motor failure and movement disorder, many studies showed that children with autism have lower motor performance than their peers (Baranek, 2002; Dewey, Cantell and Crawford, 2007; Piek & Dyck, 2004; Todd & Reid, 2006).

Participating physical activity and sports have been reported to have various benefits such as an opportunity for social integration (Berkeley, Zittel, Pitney & Nichols, 2001; Pan, 2010), decreasing stereotypic behaviors (Burns & Ault, 2009; Levinson & Reid, 1993; Prupas & Reid, 2001), developing motor performance and physical fitness (Bumin, Uyanık, Yılmaz, Kayıhan & Topçu, 2003; Todd & Reid, 2006; Yılmaz, Yanardağ, Birkan & Bumin, 2004) and enhancing self-determination (Reid & O'Connor, 2003; Pan, 2010). Although many positive effects of the sports and physical activity were reported by the studies, this subject has been an ignored area (Todd & Reid, 2006). There is limited number of research in literature concerning sports and physical activity application on children with autism. A part of these studies aimed to decrease the autistic symptoms such as stereotypic behaviors (Celiberti, Bobo, Kelly, Harris & Handleman, 1997; Levinson & Reid; 1993; Rosenthal-Malek & Mitchell, 1997), other studies focused on improving the motor performance and physical fitness, and gaining skills (Lochbaum & Crews, 2003; Pitetti, Rendoff, Grover & Beets, 2007; Todd & Reid, 2006; Yanardağ, Ergun & Yılmaz 2009; Yılmaz, Yanardağ, Birkan & Bumin, 2004). Since these studies, which attempted to reduce the autistic symptoms of the children with autism by sports and physical activity, lack teaching strategy, research model and systematic applications, none of them were evaluated as evidence-based practices (National Standards Report, 2009). Together with the fact that autistic children need more time and have difficulties to learn the new movement and skills during participation sports, teachers and academic personals working in special education, rehabilitation, and sports are in difficulty in carrying out a curriculum. Furthermore, lack of certified physical therapist and physical educators for education of children with autism might cause this restriction. Thus, there are few studies related to intervention of the sports and exercise of children with autism in the literature.

This article focuses on elimination of the difficulties that specialists and families experience during applications, strategies and precautionary measures through the perspective of special education. Additionally, sample sports branches and activity prescriptions for various age groups of children with autism will be described.

Exercise and Sports for Children with Autism

There are several broad areas of motor skill development essential for participating daily life and several physical activities for most children. These areas include body awareness, motor planning, bilateral motor integration, balance skills, and fine motor control (Kurtz, 2008).

Body awareness is defined as an unconscious sense of body position, movement and force that comes from special sensory receptors located in the joints and muscles. This sense can be developed by several activities such as push-ups, sit-ups, chin-ups, and jumping on a trampoline for children with autism (Kurtz, 2008; Moor, 2008).

Motor-planning is an ability to conceptualize a plan, and perform an unfamiliar motor task or motor sequence. In order to perform motor-plan successfully, the child with autism must be aware of what will happen when s/he performs the target motor task.

This skill can be improved by games and activities such as digging in rice, sand or putty to find small hidden objects; guessing textures or shapes with eyes closed. In addition, dodge ball, tetherball or badminton are other useful activities to help in teaching motor-planning for children with autism (Kurtz, 2008; Moor, 2008).

Bilateral motor integration can be defined as the coordination of the two sides of the body in order to complete a motor task correctly. Jumping and hopping games are beneficial to develop bilateral motor skills. The child should be encouraged to try to hold an object in each hand and practice various bilateral patterns (Kurtz, 2008).

Balance skills are based on inputs from several sensory modalities such as a vestibular and proprioceptive system for gravitational pull, motion, and speed. Swings, slides, rocker toys, trampoline and tightrope walking are examples for the activities to develop balance skills for children with autism (Kurtz, 2008; Moor, 2008).

Fine motor control is essential for the pre-school age and young school age child for coloring, pasting, and using manipulative toys and materials. A child should learn how to hold arm, elbow and wrist in a stable position during isolating finger movements for performing several tasks such as writing and using scissors. General upper extremity strengthening exercises (animal walks), non-writing activities (messy play, using ink stamps), floor time (lie on his/her tummy while playing games) are important activities to develop fine motor control for children with autism (Kurtz, 2008; Moor, 2008).

Although many studies show that children with autism in a pre-school period have motor failure, a motor deficit does not take place in the autism diagnosis criteria. Especially, sensory-perceptual-motor functions, grasping and playing skills should be focused in this period (Auxter, Pyfer & Huettig, 2001; Moor, 2008).

Children with autism can perform some sports in the pre-school period. These sports and activities are walking, running, pool activities and games (Table 1), riding on three-wheeler bicycle, and tracking on game toys in parks (Auxter, Pyfer & Huettig, 2001; Beckerleg, 2009; Martinez, 2006; Moor, 2008).

Table 1
An example of aquatic exercises and play skills

- Leg kick while sitting on the pool deck
 - Leg kick with a prone body position on the pool deck
 - Forward walking in the pool
 - Snake play as group
 - To pedal in supine position on the water
 - Paired kangaroo jumps
 - Slow jog
 - Free style swimming with standing position in the water
 - Shoulder abduction and adduction in the water (flap playing)
 - Throw ball into life ring
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Cardiovascular and muscular endurance should be developed in the children with autism who are aged between 6 and 8. There are various sport activities for these children such as running, riding on bicycle, balance activities (spinning and walking on the line), water games, swimming, walking, riding stationary bike, two or three-wheeler bicycle, tracking, dancing, and using trampoline (Auxter, Pyfer & Huetting, 2001; Lerner-Baron, 2007; Menear & Smith, 2008; Moor; 2008).

Fundamental approaches for teaching exercise and sports

Owing to the characteristics of the children with autism, special education techniques are essential to teach behaviors and skills. For almost fifty years, applied behavior analysis (ABA) has been used for decreasing inappropriate behaviors, increasing appropriate behaviors, teaching new skills, and generalizing and maintaining learned skills (Steege, Mace, Perry & Longenecker, 2007). Special education methods and approaches have to be utilized to teach skills and behaviors owing to characteristics of the children with autism. Various ABA-oriented teaching techniques were developed for effective teaching. Direct teaching, errorless teaching, and discrete trial teaching techniques were developed based on ABA for effective teaching to the children with autism. Especially, errorless teaching strategy is extensively used on individuals with autism (Colozzi, Ward & Crotty, 2008; Dogoe & Banda, 2009; Tekin-İftar, 2008).

The basic elements of the errorless teaching strategies are providing attention clues for the children with autism, delivering task direction or doing environmental arrangements, delivering prompting, providing a response from the child, delivering reinforcement when the child responds appropriately, and frequent assessment performance of the child before, during and after teaching. Task direction (e.g. “throw ball”) with prompt should be given to the child for initiating target skill, since the child could perform target

have difficulties in terms of generalization of learned behaviors or acquired skills in natural environment (Reid, O'Connor & Lloyd, 2003; Steege, Mace, Perry & Longenecker, 2007). Researchers state that learning in natural environment and with student-centered techniques promote generalization of the new acquired skills (Cowan & Allen; 2007; Reid, O'Connor & Lloyd, 2003). Attractive and interesting objects for the child initiate a teaching process by the child himself. During teaching sessions, objects or games are delivered to the child as a natural result of child's reactions (Grisham-Brown, Hemmeter & Pretti-Frontczak, 2006; Noonan & McCormick, 2006). For example, when Ali goes to a sports center, he gets on the trampoline and hops. The activity improves his balance skill, and bottom extremity is used for it. The skill is a suitable activity, and it is initiated by the child. The activity is continued by the child for a certain period, and then Ali's favorite toy car is given to him to play for reinforcement. After playing with the toy car, Ali throws the balls on the floor to various directions. The throwing ball activity is maintained during the session. Instructor recommends Ali as "You should throw the balls to the basketball hoop". If Ali does not want to perform it, reinforcement is not provided to Ali.

There are many studies in related literature on teaching single and chain skills such as teaching relative names (Akmanoglu & Batu, 2005), toilet training (Cicero & Pfadt, 2002), security (Winterling, Gast, Wolery & Farmer, 1992), communication skills (Charlop & Trasowech, 1991), leisure skills (Kurt & Tekin-İftar, 2008), and daily living activities (Batu, Ergenekon, Erbas & Akmanoglu, 2004) to the children with autism to benefit from errorless teaching strategy.

In addition to its practice in developing academic, self-care and language skills, errorless teaching strategies can also be used in teaching exercise skills and sports (Yanardağ, Ergun & Yılmaz, 2009; Yılmaz, Birkan, Konukman & Erkan, 2005; Yılmaz, Konukman, Birkan, Özen, Yanardağ & Çamursoy, 2010). Findings of these studies, which focused play and swimming skills in the pool by errorless teaching strategy on children with autism, showed that the teaching method was effective for providing exercise skills and sport drills (Yanardağ, Ergun & Yılmaz, 2009; Yılmaz, Birkan, Konukman & Erkan, 2005; Yılmaz, Konukman, Birkan, Özen, Yanardağ & Çamursoy, 2010).

Yanardag, Ergun and Yılmaz (2009) investigated the effects of a 12-week water and land-based exercise training on the development of cardiovascular endurance, grip strength, speed and agility, flexibility, and body composition of eight children with autism, who were aged between 5 to 7. Pool group's activities included leg kicking while sitting on the pool deck, walking in the pool, kangaroo play, snake play, pedalling in the water, and throwing a ball into a life ring. Land group's activities included walking in treadmill, hopping/jumping on trampoline, throwing a ball at target, and mounting on a hobbyhorse. Both land and water exercise trainings were performed by using special education intervention called "most to least prompting procedure" by one-to-one teaching format. These training programmes were performed for 1 hour, 3 days per week for 3 months with each group. The results showed that there were significant differences within the groups in scores of cardiovascular endurance, grip strength, speed

and agility, flexibility tests ($p < .05$) in pre- and post-tests results. The comparison of both post-test results between groups, there were no significant differences ($p > .05$).

Yılmaz, Birkan, Konukman and Erkan (2005) examined the effects of constant time delay procedure in aquatic play skills (kangaroo play, snake play, pedalling in the water) of four children with autism, from 7 to 9 years old. A single subject multiple probe model across behaviors was used. Data were collected over a 10-week period using the single opportunity method as an intervention. Results showed that all subjects maintained their successful play skills. Additionally, this trend was protected during the first, second, and fourth week of maintenance phases. Findings of the study revealed that constant time delay procedure was an effective way of teaching and maintaining aquatic skills of children with autism.

Yılmaz, Konukman, Birkan, Özen, Yanardağ and Çamursoy (2010) investigated the effects of constant time delay procedure in swimming rotational skills of three children with autism, from 8 to 9 years old. A single subject multiple baseline model across behaviors was used. Data were collected over a 10-week period using the single opportunity method as intervention. After the study, all of the subjects performed aquatic rotational skills correctly, this success maintained for the first, second, and fourth week of generalization phases. Findings of the study showed that constant time delay procedure in errorless teaching strategies was an effective way of the teaching swimming rotational skills for children with autism.

When the literature was reviewed it was observed that there are various studies which did not utilize errorless teaching strategies while dealing with performing sports and exercises with children with autism (Fragala-Pinkham, Haley & O'Neil, 2008; Pan, 2010). Fragala-Pinkham, Haley and O'Neil (2008) examined the effects of underwater exercise training on cardiovascular endurance of six children with autism and ten children with other developmental disabilities, who were aged between 6-11 ages. The underwater exercise training was performed as a group arrangement in the pool over 14-weeks, and two sessions per week. Cardiovascular endurance, muscle strength, motor skills and heart rate were measured before and after training. The results of this study showed that cardiovascular endurance was developed, but muscle strength and motor skills were not improved significantly. Conclusion of the study was that underwater exercise training enhanced cardiovascular endurance by keeping target-training heart rate for children with special needs.

Pan (2010) investigated effects of ten-week aquatic exercise program on pool skills (HAAR) and social behaviors (SSBS-2) of sixteen children with autism, from 6 to 9 years old. Measurement of social behaviors in Pan's (2010) study covered both social competences (peer relations, self-management/compliance, academic behavior), and anti social behaviors (hostile-irritable, antisocial-aggressive, defiance). In the first 10-week phase (phase I), eight children (group A) received aquatic exercise training while other eight children (group B) did not. A second 10-week phase (phase II) immediately followed, with exercise training reversed. At the end of the study, the aquatic skills were improved in both groups. After phase I, social improvements were seen in group A.

Subsequent to phase II, social improvements were seen in the group B. The improvements in aquatic skills were only maintained in the group A after phase II. Results of this study showed that aquatic exercise program have potential effect on the development of social skills for children with autism.

Beyond errorless teaching strategy, visual activity schedule should be used during teaching and performing sports and physical activity. Visual support is placed to the center of the sports hall for following the next activity (Figure 1). Children with autism can predict the order of activities, and transition independently by the schedule (Fittipaldi-Wert & Mowling, 2009; Reid G. & O'Connor, 2003).

While performing physical activities via visual support, child with autism has difficulties to follow the visual schedule; thus picture exchange should be preferred to avoid these difficulties. When the teacher gives the picture of the next activity to the child, the following activity can be predicted more easily (Groft-Jones & Block, 2006; Housten-Wilson & Lieberman, 2003).

Concerning the teaching of sport activities, children with autism should be provided opportunities to select his own choice. The child could gain self-control if provided with a choice opportunity (Reid, O'Connor & Lloyd, 2003, Reid & O'Connor, 2003). The teacher may provide two options or opportunities to the child during sport. For example, "Ali, which one would you like to throw to your friend? The red ball, or the blue ball in your hand?"

It is known that participating level in physical activity and sports in children with autism is not adequate because of their social restrictions and characteristics. Moreover, another restriction is the lack of opportunities related to engaging sports and physical activity (Reid, 2005; Pan & Frey, 2005). While special education methods must be utilized to get physical activity and sports for children with autism, some additional measures, which are mentioned below, may be adapted in activities.

Issues to be considered in Exercise and Sports

Once the children with autism get into a new physical environment, they need time to orientate there. Therefore they need an adaptation period in the sports hall or play field at first, as well as they need to become familiar with other children and the teacher. In the orientation phase, the children with autism may exhibit inappropriate behaviors, however, exhibiting such behaviors is a temporary occasion, but this is a temporary condition (Reid, O'Connor & Lloyd, 2003).

A routine is maintained during sport activities; each child's daily routine should be taken into account. During the activities performed in the new place, the child's routine and favor should be considered by the specialists (Menear & Smith, 2008; Groft-Jones & Block, 2006). Same routine should be sustained for various activities. When the order of activities on the list is changed, child does not perform the activity that replaced by the

previous one. This leads to an increase in inappropriate behavior and terminates the focus on the lesson (Reid & O'Connor, 2003).

Warm-up exercises are performed with music and the same melody should be played in every training session. In the transition from a melody to a new one, old melody should be completely taught, and then the new melody should be integrated in the routine sports program (Auxter, Pyfer & Huetting, 2001).

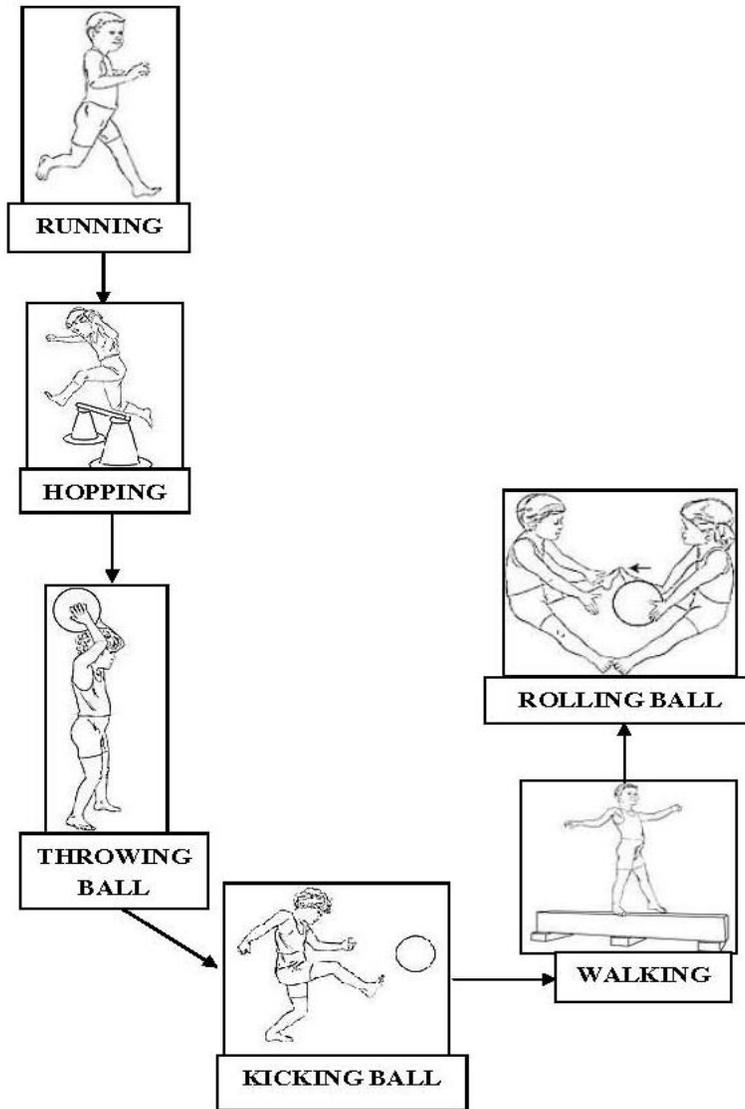


Figure 1. Daily Activity Schedule

Since children with autism show uneven reactions to the environmental sensory stimulus, the level of stimulants such as light, voice and temperature on the sports hall are important. Sports hall or field should not be large, loud, and crowded; if it is large, a part of the sports hall should be divided by a funnel or color marks, and this part of the sport hall should be used as the playground. When the sports hall is too noisy, and child with autism is disturbed by this noise, an earflap might be used to reduce the noise in this setting, so as to make the child to focus on the activity easily. In the meantime, the program can be practiced effectively. The best choice is to make a schedule on the quiet days of the sports hall (Groft-Jones & Block, 2006; Menear & Smith, 2008).

Every physical activity or sports consist of motor skills and movements, and these skills are practiced frequently. While performing these movements, both physical environment and instruments should be identical. If the child with autism is practicing throwing a ball towards the teacher, the same sized and colored ball should be used in each session; because these children would prefer maintaining the same routine (Auxter, Pyfer & Huetting, 2001; Groft-Jones & Block, 2006).

Teachers should use eye contact during sports, because these children have difficulty in keeping eye contact. The poor eye contact influences poor participation in physical activity and sports, and social integration (Reid, 2005). Teacher should keep the level of the child's eye to provide eye contact during sports and playing, and touch cheek or fingers of the child, and then provide a verbal stimulant like "Ali! Look at me". Teacher should give task direction such as "throw the ball" to the child for beginning the activity while maintaining eye contact. Task direction should not be given when the eye contact is lost (Reid, O'Connor & Lloyd, 2003).

Task direction, which is describing the movement, should be simple, and the same words should be used in each time. These children can easily misunderstand the meaning of complex verbal stimuli. If the child is familiar with the phrase "plastic ball" while exercising with family, teacher should not use the phrase "plastic disc" at school (Auxter, Pyfer & Huetting, 2001; Reid, O'Connor & Lloyd, 2003).

Teacher should interact with children with autism during sports. While coming into the sports hall, teacher should welcome them with phrases such as "hello, good morning" as verbal or gesture. This connection between teacher and child promotes children's motor skills (Groft-Jones & Block, 2006; Housten-Wilson & Lieberman, 2003).

The teacher should get the information concerning the subjects the child is interested in; and provide them the opportunity to talk on these subjects before the exercise. The child should be encouraged to attend the activity, and guided throughout the activity. Child's motivation to participate in sport activities should be maintained by the teacher. Some verbal feedback such as "go on" or "good shoot" should be given to child with autism while s/he is participating to the sports or physical activities. Child's inappropriate behaviors should be eliminated. If the child with autism shows aggressive behaviors such as kicking the walls or doors, he/she should be directed to kick sports equipments

like a ball instead of a wall or a door. When the child cries, the teacher should give a break. The child should be taken out the sports hall for a walk until s/he stops crying, and then they should come back to the hall to continue the activity (Menear & Smith, 2008; Groft-Jones & Block, 2006; Housten-Wilson & Lieberman, 2003; Auxter, Pyfer & Huetting, 2001).

Appropriate behaviors of the children with autism should be reinforced, and rewarded for performing activity that is planned Reinforcement, which was defined by the teacher prior to the session, should be practiced systematically. These reinforcements and rewards should be preplanned, such as after every three activities or every five minutes or after all the activities in such a way that addiction to reinforcement is avoided. Comic stickers, coins, foods, free time for playing his/her favorite toys might be appropriate rewards (Groft-Jones & Block, 2006; Housten-Wilson & Lieberman, 2003; Reid, O'Connor & Lloyd, 2003).

A verbal expression or prompt by the teacher may not be as effective as a visual prompt. A child with autism who hops on the trampoline should not be waited on the the trampoline after finishing the exercise, and s/he should be allowed to go away. The teacher should use visual support, such as the picture of a pair of feet stepped on the floor, instead of using verbal prompt such as "wait". Visual prompt could be more effective for placing his/her foot on the picture and waiting on it after hopping on the trampoline.

Conclusion and Suggestions

Children with autism cannot sufficiently benefit from leisure skills such as sports and physical activities owing to social isolation, restricted communication skills, poor eye contact, stereotypic movements and behaviors, inadequate opportunity for activity, and difficulties to maintain activity. Sports and physical activities for children with autism should be developed according to their preferences and requirements in the natural environments. Size and noise in the sports hall, number of people in the setting, material choice, the teaching strategy, behavior control strategies, and maintaining routines are essential topics for performing sports and acquiring benefits. These strategies specified above have been beneficial for solving problems encountered during sports and physical activities, and lead children to be much more willing to participate in daily life activities and active throughout their lives. Physical activities and sports, which are preplanned by people close to children with autism in their environment such as parents, siblings, special education teacher, physical educator or other specialists in the natural environments such as school yard, sports hall, park, play field and swimming pool, will be beneficial in generalization of appropriate behaviors. During the transition from adolescence to adulthood, young people with autism should be provided with exercises designed to engage in community-based activities in addition to sports and physical activities. The motor skills and pre-occupational works for community-based activities should be inserted in their programs. Sports and exercise for children with autism provide not only developing the physical performance but also improving social

integration and communication skills, and reduce the possibility of showing inappropriate behaviors.

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