



## EFFECTS OF SPORTS TRAINING ON SOCIAL AND ACADEMIC SKILLS IN AUTISTIC INDIVIDUALS<sup>i</sup>

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### **Abstract:**

Autistic Spectrum Disorder (ASD) is an important public health problem. It refers to a developmental disability and can cause significant social, communication and behavioral challenges. According to the previous studies there is no precisely treatment for individuals with ASD. However, they can be improved and can be taught important skills such as expressing their feelings, overcoming their fears, developing their physical abilities and working and bonding with their peers by especially sport education. Sport education or training was implemented with 10 participants with ASD aged 5,5–29 years. One parent from each family who accompanied ten individuals with ASD during sporting events participated in this study. A standardized open-ended interview method was applied to the parents. Social Skill Interview Questions and Academic Skill Interview Questions were applied to the interviewees. The interviews were recorded, transcribed and analyzed. The purpose of the current study was to explore the effect of sports training on social and academic skills in individuals with ASD. Sport helped individual with ASD make progress in social skills such as communication, participation in the game, social relations, behavioral problems and waiting in line, body awareness and balance control, interests, following rules and instructions. On the other hand, it did not yield to the ability to transition from activity to activity and it did not contribute to a few individuals with ASD, while it contributed positively to many individuals with ASD, although some had rather slow success. In the academic skills of sports, perception studies supported skills

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such as preparation for first literacy, sound words and sentences, listening, relations between objects, and rhythmic counting. While it was recognized that sports contributed considerable improvement to some of the individuals in skills such as writing their own names, grammar, natural numbers, operations, and measures, unfortunately it did not help some of them in progress. It was observed that the majority of those who did not progress were younger. Sport training or education did not support to the ability to perform operations using division and calculator. Evidence suggests that sport education has ultimately a positive effect on the social and academic skills of individuals with ASD.

**Keywords:** autism, social skills, academic skills, sports education

## 1. Introduction

In 2013, the American Psychiatric Association (APA) defined autism spectrum disorder (ASD) in the Diagnostic and Quantitative Manual of Mental Disorders (DSM-V). ASD is a neuroimprovemental disability in which limited and repetitive behaviours are observed, lifelong inadequacies in social communication and interaction, excessive commitment to routine behaviours, and overreaction to sensory stimuli (APA, 2013).

Eichstaedt and Lavay (1992) stated that autism is a neuroimprovemental disorder that appears in the first years of life and would continue throughout the life of the individual. Although genetic and metabolic disorders, some infectious diseases, neuroanatomical and biochemical structural abnormalities can be causes of ASD, there is no specific reason for it (Ferreira et al. 2019). Meanwhile it is not linked to racial, ethnic and socioeconomic situation yet it estimates that it happens about four times more common among boys than among girls and also there is not exactly the reason that causes the problem. At the same time, Eichstaedt and Lavay (1992) emphasized the need to include trainings that would enable individuals with autism to get to know themselves and gain life skills so that they could continue their lives without support from other individuals. Precisely, when compared to ordinary people, individuals with ASD are more likely to have some difficulties.

The concepts of learning disability and social disability have been among the most important problems for individuals with ASD and their families. However, not being able to participate in social activities properly and experiencing difficulties in this regard also negatively affects the social relations of the autistic individual with their peers (Toth et al., 2006; Er, 2018).

Lang et al.'s research shows that sport education has an important place in the lives of individuals with autism. They observe that the education positively and greatly affects the motor improvement of individuals with autism (Lang et al., 2010; Taner, 2020). It has been emphasized that sport activities that improve movement skills would be included in the training programs organized for individuals with autism. Movement skills gains through these trainings affect the social communication of individuals with autism (Eichstaedt et al., 1992).

## 2. Literature Review

### 2.1 What is Autism?

It is supposed that the word 'autism' was first defined by Eugen Bleuler. Bleuler uses autism to mean people who isolate themselves from the environment (Helfin et al., 2007; Schreibman, 2005).

The primary characteristics of Autism Spectrum Disorder (ASD) is a lifelong neuropsychiatric disorder that causes problems in communication and relationships with individuals in social life, and problems in behavior and cognitive improvement that occurs early in people's lives. Eventually, ASD certainly affects the lives of individuals with autism and their families (Aydın, 2008).

Ruştiöđlu and Pişkin (2018) identified that ASD is a neuroimprovemental disorder that affects the behaviors of individuals that prevent the social improvement of the individual and the improvement of communication skills (Ruştiöđlu et al., 2018; Taner, 2020).

It is very important early diagnosis and early treatment in autism spectrum disorder because the previous researches show that early diagnosis of and interventions for autism may have substantial positive effects on symptoms and skills before the child reaches the age of two. In some countries, such as the Netherlands, is possible to diagnose before the age of one and a half. However, there are some problems in early diagnosis of autism due to the lack of knowledge of families in Turkey (Yalçın, 2017; Er, 2018).

ASD is a lifelong disorder and source of ADS is not the wrong attitudes and behaviors of families. These people overreact to stimuli from the environment. It is four times more common in men than women. On the other hand, there is no cure for autism, some various interventions to the individuals with ASD, in other words, trainings can provide positive improvements in their lives (Ekici, 2013; Er, 2018).

### 2.2. Symptoms of Autism

Individuals with autism behave differently than individuals with normal improvement and it can be noticed (Erol, 2014; Er, 2018). Er (2018) indicates the main behaviors observed in individuals with autism. Erol states that they avoid eye contact with others. They can show aggressive behavior and sometimes hurt themselves. Besides these people may also be more active or inactive than usual. And also, some of the individuals may not like other individuals to touch them. They may exhibit more than normal sensitivity to sound, smell and light. Moreover, these people do not play with toys the way normally developed individuals do.

### 2.3. Sports and Autism

Sports enable people to socialize and integrate with the society, and also to make use of their spare time. It can be done individually or collectively with certain tools and equipment by adhering to certain rules (Uzunlular, 2018).

Sports enhance many positive behaviors for individuals, for example, socializing with people ensures that individuals gain their self-confidence and that individuals take

their place in society. For this reason, doing sports at a young and child age is very important in terms of physical and social improvement (Uzunlular, 2018).

It is possible to prevent behaviors such as anger, aggression and jealousy caused by the attitudes and behaviors of the society towards them in individuals with disabilities (Kabasakal et al., 2013).

One of the most important benefits of sports is that it helps individuals with autism take into account of problems such as not being able to communicate with others and not being accepted by others in the society. In this respect, sports are important for individuals with autism (Er, 2018).

The main reason of the individuals with autism while doing sports is to improve their communication skills and social behaviors by imitating the sounds and movements in the environment (Er, 2018). Besides, with sports activities, positive improvements occur in the adaptation to the environment in the relations of individuals with autism with their peers. Sports are so important for individuals with ASD, unfortunately, their need for sports activities is ignored (Penny, 2005).

Sportive activities such as competitions, mutual passing, etc. during the sport activity programs in which individuals with ASD take the steps of socializing while doing sports, this activity performed independently for the autistic individual who has not been in an activity independently before is quite a significant gain. Individuals with ASD who have not participated in sporting activities before, and individuals with ASD who have communicated completely with the support of their family and others, develop social relations of the individual with autism, gain self-confidence, and communicate with others alone with this independent activity. However, individuals with ASD generally keep themselves away from social activities. However, individual activity leads these people apart the other people, they cannot communicate with others on their own. (Sevimay, 2010; Uzunlular, 2018).

### **3. Material and Methods**

In this study, the effect of sport education on social and academic skills of individuals with autism was examined. The study used the "standardized open-ended interview" method, one of the qualitative research techniques. Getting prepared to begin the research, the questions and the order of the questions in the interview were determined in advance for the people who will participate in the interview. Interview questions were asked to the interviewees in the same order as the same basic questions. The questions were asked exactly as open-ended (Büyüköztürk et al., 2013).

The population of this research was formed by a center that continues its activities with the support of Gedik University and Istanbul Pendik Municipality. The sample was composed of sports parents of 10 individuals with autism of individuals with special needs in the Physical Activity Center. The study was started after the ethics committee decision was taken from Istanbul Gedik University.

The interview responses were recorded with the voice recording program on the phone, and they were transcribed using the Office Program Word 2019 Application on

the computer. These interview records, which were turned into texts, were analyzed by thematic coding method. The interviews that were transcribed using this method were coded around themes. The themes of the research were revealed by classifying these codes according to their differences and similarities (Neuman, 2009).

**Table 1:** Interviewee profiles

	Inter viewee1	Inter viewee2	Inter viewee3	Inter viewee4	Inter viewee5	Inter Viewee6	Inter viewee7	Inter Viewee8	Inter viewee9	Inter viewee10
interviewee	mother	mother	mother	mother	mother	mother	mother	mother	mother	mother
age of person	6	14	29	11	6	12	5,5	16	8	10
mother's age	34	44	52	40	33	45	34	41	46	36
father's age	34	47	63	40	67	45	34	54	50	44
mother's educational background	high school	high school	elementary	secondary	elementary	high school	high school	high school	high school	high school
father's educational background	high school	high school	elementary	secondary	elementary	high school	high school	high school	high school	elementary
economic background	a bit more than minimum wage	medium level economic status	medium level economic status	minimum wage	medium level economic status	medium level economic status	a bit more than minimum wage	medium level economic status	medium level economic status	a bit more than minimum wage
number of children	3	2	3	3	2	2	3	1	2	3
duration of attendance to facility	1-2	7-8	4	5	4	6-7	1	10	3	5

The table includes information about the demographic characteristics of the interviewees.

All of the parents who participated in the interview were the mothers of individuals with ASD. The youngest of the individuals with ASD was 5.5 years old and the eldest was a 29-year-old adult. The youngest of the mothers was 33 years old and the oldest was 52. The youngest of the fathers was 34 years old and the oldest was 67 years old. Of the mothers, 3 were primary school graduates, 6 were high school graduates, and 1 person was university graduate. Among the fathers, 3 people were primary school graduates, 1 person was secondary school graduate, and 6 people were high school graduates. The economic level of the parents was one person at the minimum wage, three people slightly above the minimum wage, and 6 people at the middle level. The number of children each family had was between 1 and 3. The duration of time for individuals with autism to attend the Sports Complex is at least 1 year and at most 10 years.

In the planning stage of this research, the study was considered as an application when it was first planned. However, due to the COVID-19 pandemic conditions, the method and technique of the research were changed. In the first planning stage of the study, it was planned to conduct a pre-test by applying a scale to the parents accompanying individuals with ASD during the activity. In the second stage, it was planned to apply a 12-week physical activity program to individuals with autism, and at the end of this program, the same scale would be applied to the parents accompanying the individuals with ASD, and a post-test would be administered. All these transactions were planned to be recorded.

## 4. Results

### 4.1. Results Regarding Social Skills

#### 4.1.1. Results Regarding the Effect of Sports on Disabled Persons

In general, when the effects of sports on the disabled are investigated, it becomes clear that there are many benefits. In particular, when examined on individuals with ASD, it has been observed that it provides benefits in many areas such as taking commands and following instructions, body awareness and balance control, self-confidence, behavioral problems and waiting in line, socialization.

The parent of the individual with ASD who was coded with the name Duru said,

*“Children like Duru never like our command sentences. For example, would you still do it to my daughter? can you? I’m talking like you can. They do not take instructions. They don’t follow the rules. They refuse to follow the rules. They have learned a lot about following the rules in sports. They have learned a lot about taking directions”.*  
(interviewee 6)

#### 4.1.2. Results Regarding Sports and Communication Skills

In the findings related to sports and communication skills, there was a positive improvement in the individuals' conversation skills and communication with sports. While these positive improvements were more advanced in some of them, they were less in others. Positive improvements were observed, though with a small step.

One of the interviewees said,

*“Before sports, he would not talk. He wouldn’t chat. Muhammad was only concerned with eating and drinking. In other words, he did not care about chat environments and was acting indifferent. This uninterested behavior was the same both to us and to his friends. After he started his sport activities, he changed his behavior a bit. He now joins the conversations. If we are chatting or if I am crying, if we are doing something, he always comes and asks the reason, why. What happened?, what’s wrong honey?, is it hurting your body? He also uses a very polite language, he says it will be ok, I will be always with you, I will not leave you, he says such things, it has changed so much.* (interviewee 2)

#### 4.1.3. Results Regarding Sports and Gaming

The results obtained show that the effect of sports on participation in the game positively affected the participation of children in the games after they started sports. In some children, these improvements were little and required guidance, however, positive progress was achieved. For example, these individuals invited their friends to the game.

#### 4.1.4. Results Regarding Sports and Social Relationship

According to the results of the study, it revealed that the social relations of individuals with ASD in the society progressed positively with sports. At the same time, there were positive effects on children's initiation of interaction with other children with sports.

Some individuals made more progress and played games, met with friends from time to time and made friends.

An interviewee said,

*“There has been a lot of improvement in her child’s social relations since she started doing sports. She used to stay away from people before, when a guest came to the house, Şevval would run away from her room. Now she meets the guests and says welcome. She greets the guest at the door, she did not behave like this before. I did not believe that Şevval would ever change like this. She greets the guests who come after participating in sports activities and says welcome before us. She treats those she does not know in the same way.”*  
(interviewee 5)

#### **4.1.5. Results Regarding Transition from Sports and Activity to Activity**

The results of the study found that some of the children still had difficulty transitioning from activity to activity. In some, a slow progress was made in the sportive activities they liked and with the commands, there was a slow progress in the transition from activity to activity in more than one person with the effect of sporting activities.

An interviewee stated that his child progressed positively in the transition from activity to activity:

*“He had difficulties in adapting at the beginning of sports activities. Now I picture what happened inside the hall. Over time, she started to have no difficulties and learned that she was going according to a plan, along with the program, along with the sports activities.”*  
(interviewee 9)

#### **4.1.6. Results Regarding Sports and Fear, Anxiety**

The results of the research suggested that sports had a positive effect on some children by enabling them to overcome their fear of climbing, fear of heights, fear of being outside, fear of strangers Another interviewee talked about fear of climbing stairs,

*“Yes, it shows fear of climbing stairs. He was very afraid of it. He overcame many of his fears by participating in sports activities. I also calmed him down. I patiently helped him do it.”* (interviewee 2)

#### **4.1.7. Results on Sports and Interests**

Interview records carried out that when some individuals with ASD went to the park, they were not interested in the playgrounds and the families forced their children to play with the toys and the tools. After taking part in sport activities, when they came across the same tools they used while doing sports in the park, their interest in these tools in the park increased and they started to play and use these tools on their own. In addition, it was witnessed that some children added new activities to their previous sports activities. In fact, the activity that was done once or twice before has started to be done more

frequently after sports. Within all these observations, it was perceived that the interests of individuals with ASD improved positively with sports.

Some of the participants on this subject expressed the following views:

*“Before he started his sports activities, he did a lot of math. As I mentioned before, he was doing a lot of puzzles. I mean, he was always doing puzzles. Even when I mention it all the time at home, I go crazy like this. There were always little bits and pieces around. He used to go crazy when any of them were disappeared from the pieces from time to time. Then we started sports, we started to go to matches more. We went to the games years ago, but we took a long break. He didn’t want to go to the games. After we started the sports activities, the training coach told us to take him to the matches and we started going to the matches and we continued. We used to go occasionally.” (interviewee 3)*

#### **4.1.8. Results on Sport and Rule, Commands, Guidelines**

With the analyzing of interview records of interviews with the parents of individuals with ASD, these individuals showed positive progress in taking commands, obeying instructions and rules, together with sports activities. In other words, sportive activities had a positive effect on skills such as taking commands, obeying instructions and rules.

The observations of the interviewees on this issue were as follows:

*“She has no difficulty in expressing herself. She throws the ball into the basket. She is running. She is obeying many commands. She was not responding to any commands before, but now she is responding to many commands. When we ask Elvin to do something, she does it. Elvin does whatever we ask of him. But she had never done this before.” (interviewee 8)*

*“I mean, he made little progress in many subjects, but there was no improvement in the speaking skill, which I consider very important, besides, there was a lot of progress in rule recognition. Semih has made great progress in obeying the rules for waiting in the queue.” (Interviewer 3)*

## **4.2. Findings Regarding Academic Skills**

### **4.2.1. Findings on Sport and Perception Studies**

The results of the interviews provided that individuals with ASD made positive progress in subjects such as obeying verbal instructions, using words correctly, reacting to visual stimuli, and responding to auditory stimuli. Some progressed very slowly, demonstrating positive progress, although not exactly at the desired level.

One interviewee explained the issue of responding positively to verbal instructions as follows:

*“He never followed verbal instructions before starting sports activities, but of course he started to obey more after sports.” (interviewee 8)*

Another interviewee, in his observations about reacting to verbal stimuli,



*“It wasn’t there before he started. Even when Ahmet Emin was called by his name, he did not give any response or reaction. Yes, it has made progress. Now when you call him by his name, the answer is positive.”* (interviewee 10)

#### **4.2.2. Results Regarding Preparation for Sports and First Literacy**

The results show that with the participation of the individuals with ASD in sports activities, it was observed that there were positive improvements in finger exercises, muscle strength and coordination skills, hand-eye coordination skills, and the skills of using handwriting tools. One interviewee stated:

*“It is difficult express myself but I honestly say that my child had some difficulties in using his fingers before he started sports activities. After that, his fingers gets a little stronger over time and he makes better movements. However, it is not using his fingers precisely what we want but much better.”* (interviewee 1)

#### **4.2.3. Results for Sport and Sound, Word, Sentence**

The results of the interviews showed that autistic individuals made positive progress in terms of distinguishing sounds and forming words and sentences after sports. Some individuals with ASD had distinguished some sounds. However, they gradually improved their abilities. Although the skills of vocalizing words and constructing sentences were not at the desired level, some of them showed positive progress. One of the interviewees expressed the following views on this issue:

*“He was very poor by distinguishing sounds, and most of the time he couldn’t distinguish them. He got better after starting sports activities.”* (interviewee 1)

*“Before, he could not distinguish sounds at all, almost never. At least now he can sound out words. Although he cannot form sentences, he can use words exactly.”* (interviewee 5)

#### **4.2.4. Results Regarding Sports and Literacy**

The results indicate that along with sports, the individuals with ASD showed positive progress in their sentence reading skill. Although some individuals were not at the desired level, they progressed in a positive direction. Some were able to write the names of their close relatives and friends. Those who did not have previous writing skills, on the other hand, made improvements. But some failed to make positive progress. The age of the individuals who did not make progress was younger than the other individuals.

One interviewee expressed her observation:

*“No, my child was illiterate before he started sports. Now he can read sentences correctly. He can write. He began to distinguish uppercase and lowercase letters. He realizes the rules that he has to start the sentence from the beginning of the line. He is able to understand what he reads.”* (interviewee 10)

#### **4.2.5. Results Regarding Sports and Listening**

The interview records states that when questions were asked about fairy tales and stories that individuals with ASD listened or read, positive progress was made in answering the questions. In addition, after participating of these people in sports activities there have been obvious improvements in the ability to recite a text after reading it. One interviewee says:

*“No, she couldn't tell. She can tell a story or a tale. After starting sports activities she can. She can explain the text. She reads. She can answer questions about the story or fairy tale.”* (interviewee 10).

*“Before she started sports activities, it had a long story however, she remembered only a few words, details. For example, the story is about a stork in the forest. She could say only the forest and the stork, very few words. You know, however, there are many details about the stork in the forest. After the sports activities, there were changes. She started sports, she tried to give the details about the tales.”* (interviewee 2)

#### **4.2.6. Results Regarding Sports and Grammar**

The results of the research showed that some of the autistic individuals had the ability to use punctuation marks before, while some of them did not have the skills to use them and they gained these skills as a result of participating in sports activities. But in some, it was seen that it still did not. Except for one person who did not have these skills, the others were still younger. While some of these individuals were pre-existing in the ability to follow the spelling rules, some of them improved this skill after participating in sports activities. Some of the interviewees stated that sport education also contributed to these individuals on this ability. However, in some there was no improvement. Except for one person who did not improve, the others were younger.

#### **4.2.7. Results Regarding the Relationship between Sport and Objects**

After the taking part of individuals with autism in sports activities, these individuals showed improvement in their ability to distinguish objects more or less, long, short, thick, thin and empty. Some people enhanced these skills with sports activities that they had previously developed. Regarding the ability to sort objects according to their weights, some of the interviewees said that their children did not recognize these subjects. In others, they stated that they had acquired these skills before, and they improved these abilities after the sportive activity program. Some developed these skills, though a little, after they participated in sports activities that they could not develop before. But the others have never developed these skills.

#### **4.2.8. Sports and Rhythmic Counting Skills**

The research results indicated that individuals with ASD achieved in the rhythmic counting skills after they took part in the sport activities. The findings of the existing research shows that one interviewee's view on this issue:

*“Before participating in sports activities, he could merely count to 10 rhythmically. But now she can count to one hundred. He can count by five. Besides, Ahmet Emin can read four-digit numbers”.* (interviewee 10)

#### **4.2.9. Results Regarding Sports and Natural Numbers**

In many of these individuals had the ability to grasp the natural numbers 1,2,3,4,5,6,7,8 and 9 before they started sports. However, most of them got better by taking part in sports activities. Individuals with ASD who previously had very weak skills about grasping natural numbers gained progress. Some of them could not recognize these numbers or could not reveal these skills before, moreover they developed their skills with sports. However, some still did not have this skill. The individuals without these skills were quite young, except for one person. As a result of the research, it shown that sports had positive effects on these skills. If they had had this skill before, they developed more it, and if they had not had this skill before and they developed it eventually.

#### **4.2.10. Results Regarding Sports and Mathematics Operations**

Some individuals were previously good at adding, subtracting, and memorizing the multiplication tables. There were those who participated in sports activities did not know the basic arithmetic operations. Some of them learned the basic arithmetic operations, but some of them could not make positive progress. From these people, except for one person, the others were younger. In general, sports had not exactly effect on skills in division and computing using the calculator.

*“He had no skills for sports and arithmetic operations. But he learned. He multiplied until nine.”* (interviewee 4)

#### **4.2.11. Findings Regarding Sports and Measures**

According to the results obtained from the interview records, some of these individuals had measurement skills before. However, they developed their skills after the sports. Some of them did not have these skills, but there was a positive development after the sport. But in some, they did not have any improvement in measuring even after participating in sports activities. All but one of those who did not improve themselves were quite young. The interviewees expressed their views on this issue:

*“He had no ability to perceive the concept of measurement. There has never have such a thing. After the sport, he took measurements with a ruler from time to time, but he did not try it much.”* (interviewee 2)

*“He had no skills for measurements. There are now. Sometimes he takes the meter and measures his height.”* (interviewee 10)

#### 4.2.12. Results Regarding Sports and Geometric Shapes

The research results indicates that most of the individuals with ASD improved the ability to distinguish geometric shapes after the sport education. Parents of the children stated that the children could distinguish geometric shapes and they developed more. The views of the interviewees on this issue were as follows:

*“Before he started his sports activities, he knew some of the geometric shapes but he could not show this skill every time. As he had said before, there were shapes and he correctly put them places. For example, he would paste them with the paste triangle or square command. With his participation in sports activities, we made both colors and shapes very well. Here he got better after starting the sport. We made it clear there.”* (interviewee 7)

#### 4.2.13. Results on Sports and Patterning

The study of the results indicates that the ability to complete the missing items in a pattern in some autistic individuals showed a positive progress after sports.

One of the interviewees said,

*“He never had such a talent, but now he is completing the patterns.”* (interviewee 8)

### 5. Discussion

This study tried to investigate the effects of sports training on social and academic skills in individuals with ASD. As a result of the study, most of the individuals who received sports training and participated in sports activities showed significant improvements in their social and academic skills.

In cases where medicine is not sufficient, special education and sports contribute to children's social skills, academic skills and sensory development. In particular, sports support improvements in visual perception and balance skills, daily living activities, self-confidence, self-care skills and communication skills. In addition to these, all of the studies aimed at reducing aggressive attitudes, hyperactivity and attention deficits can be achieved with sports (Eripek, 1984; Çamlıyer, 1994; Şeker, 2019; Durgut et al., 2020).

The data obtained from the interviewees; the effects of sports training on social skills were seen positively. For example, the effect of sports education on social skills, communication skills, social relations, play, rules, commands and instructions, fears and anxieties had a positive effect on many of them. Many of the interviewees stated that their children did not communicate verbally before the sports education, and they started to chat after the sport education.

Taner's research (2020) examined the effect of sports training program applied for 16 weeks on physical fitness, self-care, social and academic skills of individuals with ADS. In the study, the experimental design of pre-test and post-test without control group was used. Six individuals with ASD participated in the study and their age range is 16-23. He applied a sport training program for 7 hours a day, 4 days a week for 16 weeks. As a result of the training, he stated that the sport training program contributed to the social skills of individuals with ASD. The results of this study support the conclusion that sport

education, which is one of the main results of our study, contributes to the social skills of individuals with ASD.

According to the results of the study, the results that emerged after sports training in individuals with ASD showed a significant improvement in motor skills, social skills, attitudes and behaviors of these individuals. Şansi (2019) also revealed similar results in his study. He studied the effects of the Integrated Physical Activity Program on children's motor skills, social skills and attitudes in individuals with and without autism spectrum disorder. Twenty-three children with autism spectrum disorder and 24 normally developing peers aged 6-11 participated in the study.

One of the most important results of our research is that sports improve the communication skills of individuals with ASD. Ince (2017), in his study, aimed to reveal the perspectives of families with children with ASD towards sports. It also aimed to examine the effects of sports on the problems these children experience. Volunteer parents of 41 individuals with ASD (24 mothers, 17 fathers) participated in the study). The result of the study demonstrated that sports have a positive effect on communication skills on individuals with ADS.

In another study, Yarım kaya, İlhan and Karasu (2017) conducted a research to examine the changes in communication skills of individuals with ASD. 1 autistic individual and 3 normally developing peers participated in it. They used a case study model in the research. As a result of the research, they observed that there was a positive increase in the eye contact, joint interest, communication initiation and response to communication skills of the autistic individual during the activity program. Follow-up measurements three weeks after the study proved continued positive progress on these individuals.

Along with sport activity programs, movement training and educational games in individuals with ASD increased the quality of life of these individuals and showed significant progress. In a similar study, Er (2018) examined the relationship between movement training and educational play and quality of life in children with autism in a study involving 13 children (1 girl, 12 boys). It was concluded that the movement education and educational game program made significant progress in the quality of life of children with ASD.

Our findings establishes that participation in sports activities increased the academic skills of individuals with ASD. Taner (2020) conducted a study by using the pretest posttest experimental design without a control group. In this study, the effect of sports training applied for 16 weeks on physical fitness, self-care, social and academic skills of individuals with autism was examined. Six individuals with autism aged between 16 and 23 participated in the study. The sports training program was applied for 16 weeks, 4 days a week, 7 hours a day. The author stated that this program contributes to the academic skills of individuals with ASD. The findings of this academic research approve our research's results.

From the interview records of the parents participating in our study is that sport education has a positive effect on their children and makes their children's lives easier. Ince (2017) in his research aimed to examine the effect of sports on the problems

experienced by individuals with ASD. Ince (2017) also found similar results to our study with his study. 41 volunteer parents of individuals with ASD participated in the author's study (24 mothers, 17 fathers).

The data based on the standardized open-ended interview of the parents of individuals with ASD, sport education/sport activities contributed to significant improvements in the social and academic skills of these individuals.

## **6. Recommendations**

It is recommended to include more sport activities in the education program of individuals with ASD. In addition, sports activities in public and private institutions should be supported, new projects should be produced and implemented.

The centers where individuals with ASD can participate in sports activities without any charge can be increased so that those who are not in good financial condition can attend these training centers.

The number of sports training centers for individuals with ASD should be increased and they should be in locations that individuals can easily reach.

In the sport education process, the majority of parents are mothers, and fathers should be encouraged to participate in this program.

The inclusion of students studying at the Faculty of Sports Sciences in these educational processes will be extremely beneficial in expanding the sports education of individuals with ASD.

It should be ensured that university students participate in support services in public and private institutions under the special education umbrella of universities, municipalities and education directorates.

Normally developing brothers or sisters of individuals with ASD should also be included in this education program and they should be allowed to participate in sports activities together with individuals with ASD.

## **7. Conclusion**

The objective of this study was aimed to investigate the effect of sport training on social and academic skills in individuals with ASD.

According to the research findings, it revealed that sports had positive contributions to many skills related to social skills of individuals with ASD, such as communication, participation in games, social relations, behavioral problems, waiting in line, body awareness and balance control, interests, obeying rules and commands, and taking instructions. However, participation in sport activities did not contribute to the ability to transition from activity to activity in some of the individuals. In the following days, positive effects have been observed in some individuals with ASD.

Sports training provided many skills development on individuals with ASD, such as perception studies, preparation for first literacy, sound, word and sentence, listening, relations between objects, and rhythmic counting. In addition to all these, sports activities

contributed positively to some skills such as writing the names of their relatives, grammar, natural numbers, measurement, and arithmetic operations of individuals with ASD, but could not provide this contribution to others. The main reason why sports education did not provide success in some individuals could be described as the fact that these people were not old enough. It would be possible to connect it to the age factor. Division of arithmetic operations is relatively more difficult than other arithmetic operations. Sports did not contribute to some individuals' division and calculation skills. All these results showed that sport education had a positive effect on social skills in individuals with ASD. In addition, the positive contribution of sport on academic skills was significantly higher.

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### **Conflict of Interest Statement**

The authors declare that they have no conflict of interest related to the study or preparation of the manuscript.

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