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RESEARCH ARTICLE

The Effects of Family-Mediated Physical Activities on Communication Skills of a Student with Autism Spectrum Disorder: A pilot study

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Abstract

Effective strategies to address communication skills are critical to students with Autism Spectrum Disorder (ASD) participating in inclusive education. The purpose of this pilot study is to investigate the effects of family-mediated physical activities on the communication skills of a student with ASD. One inclusive student with ASD and his mother participated in the study designed in the pretest-posttest experimental model. For 8 weeks, family-mediated physical activities were carried out with the student with ASD and his mother. 6 sessions of family education programs were organized before family-mediated physical activities. The data were obtained with the Observation Form developed in line with the literature, and communication skills of the student with ASD. According to the findings of the study, it was determined that the communication skills of the student with ASD increased significantly after 8 weeks after family-mediated physical activities. As a result, it was obtained the impression that family-mediated physical activities had a positive effect on the communication skills of the student with ASD.

Keywords

Autism Spectrum Disorder, Communication Skills, Family-Mediated, Physical Activity

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neuro-developmental disorder that manifests itself with limited and repetitive behavior patterns, as well as inadequate social interaction and communication skills (American Psychiatric Association [APA], 2013). ASD has a wide range of effects of behavioral, cognitive and mental functions on individuals with this diagnosis (Newschaffer et al., 2007). Individuals with ASD experience deficiencies in the fields of social interaction, understanding others' feelings and thoughts (Sani-Bozkurt & Vuran, 2014), joint interest (Ingersoll & Dvortcsak, 2010), eye contact (Reichow et al., 2011), sedentary life-obesity (Phillips et al., 2014)

and motor skills (Pan, 2014). These deficiencies cause individuals with ASD to exhibit various behavioral problems in their lives (Hoevenaars-van den Boom et al., 2009; Webber & Scheuermann, 2008) and especially inadequacy in their communication skills (Paul & Wilson, 2009).

Communication skills are one of the basic requirements for individuals with ASD to interact and learn with their environment (Prelock et al., 2011). While individuals with TD can easily learn their communication skills in various environments (Trent et al., 2005), individuals with ASD find it difficult to learn their communication skills due to the deficiencies they show in development areas (Özen, 2015). The difficulties

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experienced by individuals with ASD in evaluating their communication opportunities have a negative effect on their social adaptation skills (Aydm, 2016) and direct them to social isolation (Bellini et al., 2007; Kasari et al., 2012). For this reason, education programs aiming to improve the communication skills of individuals with ASD have a vital importance in terms of adapting these individuals to social life as well as making it easier for them to adapt to school programs (Prelock et al., 2011).

In the literature, it is possible to come across many training programs that are used to eliminate the negativities that individuals with ASD experience in the field of communication and that provide flexibility to be designed in parallel with the development areas of individuals with ASD. Some of these training programs are: game (Yoder, 2006), joint interest (Charman, 2003), verbal behavior (Paul & Sutherland, 2005), language teaching (Freeman & Dake, 1997), replicating (Macduff et al., 2007), social stories (Litras et al., 2010), video modeling (Charlop et al., 2010) and physical education activities (Staples et al., 2011).

Physical education activities have emerged as a method that can be used in the process of supporting the development areas of individuals with ASD in recent years (Prupas & Reid, 2001). As a matter of fact, participation in the training program enriched with physical education and sports activities supports the multidimensional development of individuals with ASD (Srinivasan et al., 2014; Movahedi et al., 2013) and contributes to their development especially in social skills (Bass et al., 2009), self-confidence (Todd, Reid & Butler-Kisber, 2010), cognitive functions (Anderson- Hanley et al., 2011), stereotypical behaviors (Bahrami et al., 2012) and academic aptitude (Nicholson et al., 2011). Despite the mentioned effects of participation in physical education programs on the development areas of individuals with ASD, few studies seem to offer results on communication skills, one of ASD's main characteristic challenges (Bass et al., 2009; Hameury et al., 2010; Pan, 2010). In addition, it is understood that studies on physical education and ASD cover short experimental periods (Matson et al., 2007) and do not include family involvement (Alexander et al., 2011; Bahrami et al., 2016; Garcia-Villamizar & Dattilo, 2011). However, the

principles of special education involve that families are actively involved in all stages of the education of their children with special needs. In the current study, this was taken into consideration and it was focused on examining the development of communication skills of the student with ASD who participated in family-mediated physical education activities. It is predicted that the results obtained in the study will provide empirical evidence for the use of family-mediated physical education activities in acquiring communication skills for children with ASD. In the light of this information, the aim of the study is to examine the effects of physical education activities with family participation on the communication skills of the student with ASD. The main problem sentences that guide the study towards this basic purpose are as follows:

- How are the changes in the communication skills (eye contact, joint interest, initiation of communication and respond to communication) of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the eye contact skill of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the joint interest skill of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the initiation skill of verbal communication of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the initiation skill of non-verbal communication of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the skill of respond to verbal communication of the student with ASD participating in the family-mediated physical activities?
- How are the changes in the skill of respond to non-verbal communication of the student with ASD participating in the family-mediated physical activities?

METHODS

This section includes research model, participants, dependent variable (communication skills), independent variable (family-mediated physical activities), data collection tool and data analysis process.

Research Design

In the study, pretest-posttest experimental model was used to determine whether the program

has an effect on the communication skills of the student with ASD. In this model, the independent variable is applied to the participants in the study group and if the post-test scores are higher than the pre-test scores, it is accepted that this is due to the independent variable (Ekici, 2008). The experimental design of the present study is presented in Table 1.

Table 1: The experimental design of intervention

Participant	Pre-intervention	Intervention	Post-intervention	Folow-up
Student with ASD	Communication skills was assessed 1 week before the family-mediated physical activity program	Intervention program was implemented for the 8 weeks	Communication skills was assessed two days after the family-mediated physical activity program	Communication skills was assessed 1 month after the family-mediated physical activity program

Autism Spectrum Disorder (ASD)

As seen in Table 1, prior to physical activity program, communication skills of the student with ASD were assessed. Then, family-mediated physical activity program was implemented throughout 8 weeks. Two days after physical activity program, communication skills of the student with ASD were assessed. Finally, one month after physical activity program, follow-up measurement related to communication skills of the student with ASD was obtained

Participants

One student with ASD and his mother residing in the district of Keçiören in Ankara province participated in this study. Detailed information about the participants is presented below under separate headings.

Student with Autism Spectrum Disorder

One student with ASD, who participated in the study, is receiving full-time inclusive education in one official secondary school in Keçiören district of Ankara. In addition, inclusive student with ASD receive two hours of individual special education per week in a private education and rehabilitation center. In addition to the diagnosis in the process of determining the inclusive student with ASD, the following prerequisites were sought: 1) showing limited communication skills, 2) not having any health problems, 3) not being disturbed by social interactions (touch), 4) having motor skills and 5) not participating regularly in

any family-mediated training or physical activity to support communication skills before. In order to identify the inclusive student with ASD who have these prerequisites, the director and teachers of a special education and rehabilitation center in the district of Keçiören in Ankara was contacted. During the meeting, the director and teachers of the institution were informed about the study and the prerequisites sought in the student to be included in the study were explained, and support was obtained for the determination of the inclusive student with ASD. As a result of the meetings, male an inclusive student with ASD was selected as target student. Necessary permissions were taken from the families of the target student, who was planned to participate in the research, in written and verbal form. The target student participating in the research was codenamed (Berke). Berke is a male student aged 9 years and 5 months and diagnosed with ASD. Having language skills, Berke has generally limited expressive language skills. Berke answers the questions posed to him with very short sentences. It is observed that Berke does not react to communication from time to time. Berke generally spends time alone and does not communicate much with his peers.

Mother

In order to ensure family participation, one-to-one interviews were held with the parents of the positive effect on the target behavior (communication skills) of their children. It is stated that it is not possible to achieve educational gains in terms of both children and family without active participation of the family in the educational processes of individuals in the disability groups (Diken, 2009; Sameroff & Fiese, 2000). However, in the meeting with the mother and father, the father stated that he could not participate in the study due to the intensity of work, so only mother participation from the family was ensured in the studies. The mother who participated in the study is 43 years old and is a university graduate. A consent form was signed with the mother on voluntary participation in the study.

Family Education

In the study, 6 sessions of family education were organized before the physical activity program in order to present physical activities as a family-mediated. Family education was planned in order to provide the mother with the necessary knowledge and skills for family-mediated physical activities. The relevant literature (Esentürk, 2019; Lequia Machalicek & Liyons, 2013; Mazurik-Charles & Stefanou, 2010; Olçay-Gül, 2012; Ward-Hoerner & Sturmey, 2008) was used in the process of preparing family education systematically. In this regard, family education consists of three parts: informative education presentations, modelling physical activities and experimenting physical activities. In this context, the mother was informed about the purpose of the study and activities at the beginning of the family education. During the teaching sessions, the skills of the mother to start a game during the activities, to offer instructions and to reward were emphasized. Then, by creating role play environments, the mother was taught how to behave in exemplary situations. In this process, necessary feedbacks and corrections were made by giving tips and suggestions to the mother.

Independent Variable (Family-Mediated Physical Activity Program)

Independent variable of the study is the family-mediated physical activity program prepared as a result of the literature (Özen et al., 2012; Yarımkaaya et al., 2017; Yarımkaaya, 2018) and expert opinions. The program was presented to

inclusive student with ASD. The content of the interview focused on the fact that participation of the family in educational practices can have a the inclusive student with ASD who participated in the study through the family (mother). It was noted that the program have a structure in which inclusive student with ASD can interact socially with his mother and positively affect their communication skills, and in this direction, activities based on cooperation, rhythm and music, which are suitable for the level of the family, were emphasized. The program consists of warm-up movements (rhythm and music), functional exercises (paired and individual), station tracks, relay baton races, educational games (paired, cooperative, grouped, regular, rhythm and musical games), sportive competitions and stretching-cooling (paired, group and individual) as a general content. The program was carried out for 40 minutes a day and 3 days a week for 8 weeks.

Dependent Variable

The dependent variable of the study is the communication skills of the student with ASD (eye contact, joint interest, initiation of communication and respond to communication). In order to determine the dependent variable, primarily the opinions of parents of the student with ASD and of his classroom and special education teachers were consulted. In addition, student with ASD were observed by the practitioner in an inclusive and special education environment and records were kept to determine the indicators of target behaviors. In particular, records were kept on the expressions, initiation of communication and response behaviors in communication of the target student during communication with the peers with typically development in the inclusive environment, and the most frequently repeated expressions and behaviors of the target student were tried to be determined. Considering the interviews and records about the communication skills of the target student, the dependent variable was defined as in Table 2 and indicative behaviors were determined (Yarımkaaya et al., 2017).

Data Collection Tool

The data of study were obtained with the Observation Form developed in line with the literature, and communication skills of the student with ASD (Yarımkaaya et al., 2017). Observation Form was developed by the researchers to examine

the changes in the communication skills of the inclusive student with ASD who participated in the study. In the process of developing the observation form, based on the opinions of the family and observation form. The first column contains target behaviors (eye contact, joint interest, initiation of communication and respond to communication), and the second and third columns include two separate note-taking sections to record the interactions of inclusive student with ASD. In order to create observation records in a healthy way, the researcher placed two separate cameras at the two corners of the gym. He went to another

experts, the communication skills of the inclusive student with ASD, desired to be developed, were emphasized. There are three columns in the

corner and created an environment where he can effectively observe the behaviors of the target student and his mother. While the researcher kept his written records personally, he later watched the video recordings of the student behaviors that he may have missed during the activity and compared them with his written records and finalized the observation records.

Table 2: Definitions and indicative behaviors of dependent variable

Target Behaviors	Indicator Behaviors	Indicator Behaviors
Eye Contact	Maintaining eye contact for at least 2 seconds while in verbal and non-verbal communication with mother before, during and after the activity	Maintains eye contact with mother for at least 2 seconds in actions directed towards mother (pass, throwing ball, holding ball, speaking, feeling sad and rejoicing, and wanting-waiting reactions) before, during and after the activity.
Joint interest	Interacting verbal and non-verbal with mother towards common activities and equipment before, during and after the activity	Shows reactions such as looking at the activity or equipment in the environment with his mother, pointing at the equipment, or verbally attracting attention there, before (during promotion, editing), during and after the activity.
Initiation of Communication	Verbal and non-verbal communication with mother before, during and after the activity	Exhibits communication initiative behaviors to the target student mother, such as speaking (hello, goodbye etc.) offer (shall we play etc.), request (can you throw the ball), greeting (bravo, awesome, etc.), instruction (run to the right, throw slow, etc.) and suggestion (don't worry next time etc.) before, during and after the activity.
Respond to Communication	Verbal and non-verbal respond to verbal and non-verbal communication initiated by mother before, during and after the activity	Fulfills the proposal (shall we play? etc), the request (will you run? etc) and instructions (start from the right, etc.) made by the target student mother, before, during and after the activity. Responds verbally and non-verbally (saying no, of course, yes, etc., approving or shaking head, hand and arm meaning yes or no, happy and unhappy facial expression, etc.) to speech, proposals, requests, greeting, instructions and suggestions made by the target student mother before, during and after the activity.

Autism Spectrum Disorder (ASD)

Data Analysis

In the study, the data obtained through the observation form during the family mediated physical activities were analysed graphically. In the graphical analysis, the data obtained during the research are quantified and processed on the graph and then evaluated (Tekin-İftar, 2012). In the study, column graph, one of the graphical analysis methods, was used. While the frequencies of inclusive student with ASD to display their communication skills during the activities are shown on the vertical axis of the column chart, the periods of evaluation of the communication skills of the student with ASD are specified on the horizontal axis. With this method, the development trend of the communication skills exhibited by the student with ASD during each evaluation period during the family-mediated physical activities can be monitored. In addition, data on some parameters (communication skills) were collected

to determine whether physical activities with the family participation applied in the study differ in terms of efficiency, and these data were compared and analysed.

RESULTS

As a result of the study, the findings regarding the communication skills of the student with ASD, who participated in the family-mediated physical activities, are presented below according to the sub-problem sentences, answers of which are sought in the study.

Findings Related to the First Sub-Problem Sentence of the Study

“How are the changes in the communication skills (eye contact, joint interest, initiation of communication and respond to communication) of the student with ASD participating in the family-mediated physical activities?”

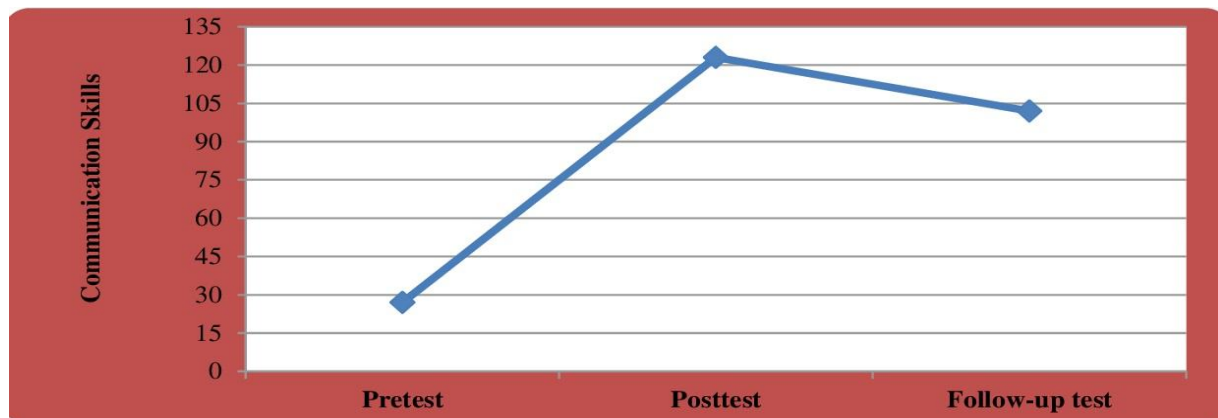


Figure 1: Findings regarding the communication skills of the student with ASD

As seen in Figure 1, it is determined that the student with ASD who participated in family-mediated physical activities exhibited his communication (eye contact + joint interest + initiation of communication + respond to communication) skills 27 times before the study,

123 times after the study and 102 times in the follow-up test obtained 1 month after the study.

Findings Related to the Second Sub-Problem Sentence of the Study

“How are the changes in the eye contact skill of the student with ASD participating in the family-mediated physical activities?”

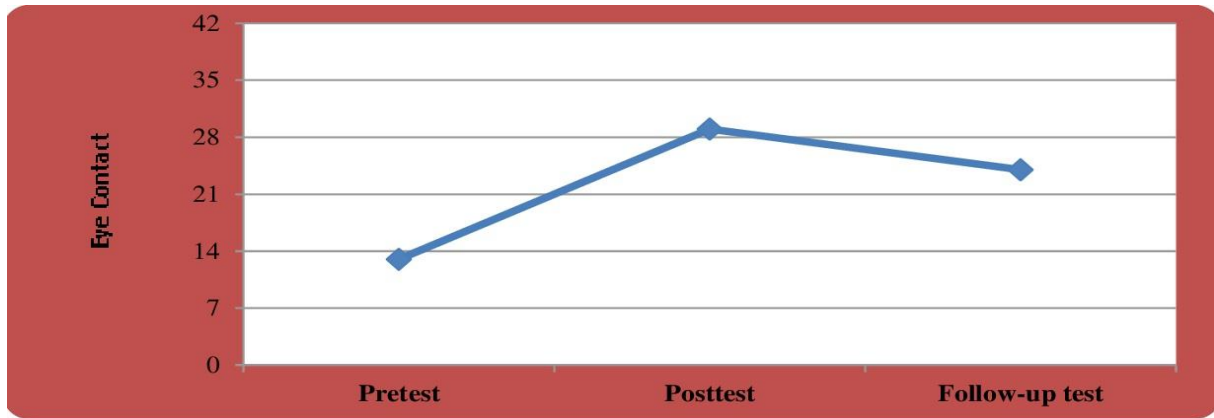


Figure 2. Findings regarding the eye contact skill of inclusive student with ASD

As reported in Figure 2, it is found that the student with ASD who participated in the family-mediated physical activities exhibited his eye contact skill 13 times before the study, 29 times after the study and 24 times in the follow-up test obtained 1 month after the study.

Findings Related to the Third Sub-Problem Sentence of the Study

“How are the changes in the joint interest skill of the student with ASD participating in the family-mediated physical activities?”

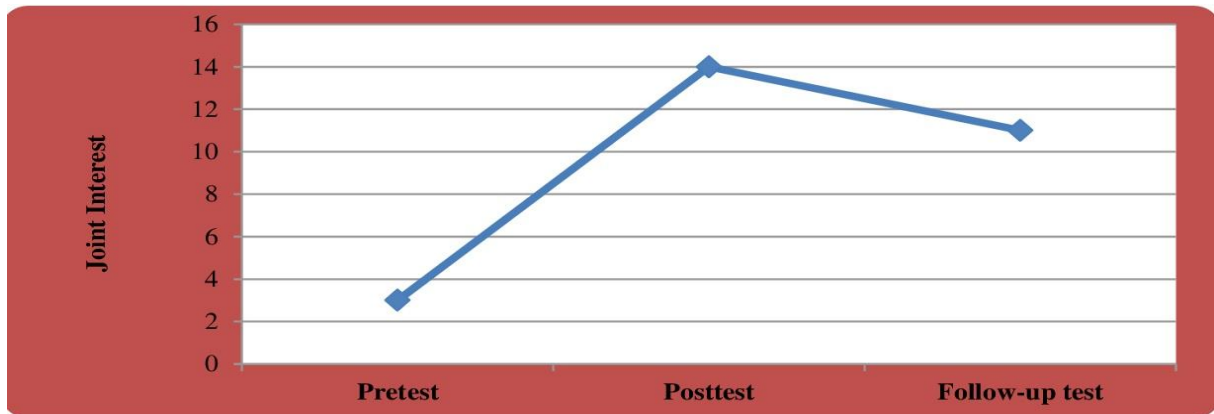


Figure 3. Findings regarding the joint interest skills of the student with ASD

As seen in Figure 3, it is determined that the student with ASD who participated in the family-mediated physical activities exhibited his joint interest skill 3 times before the study, 14 times after the study and 11 times in the follow-up test obtained 1 month after the study.

Findings Related to the Fourth Sub-Problem Sentence of the Study

“How are the changes in the initiation skill of verbal communication of the student with ASD participating in the family-mediated physical activities?”

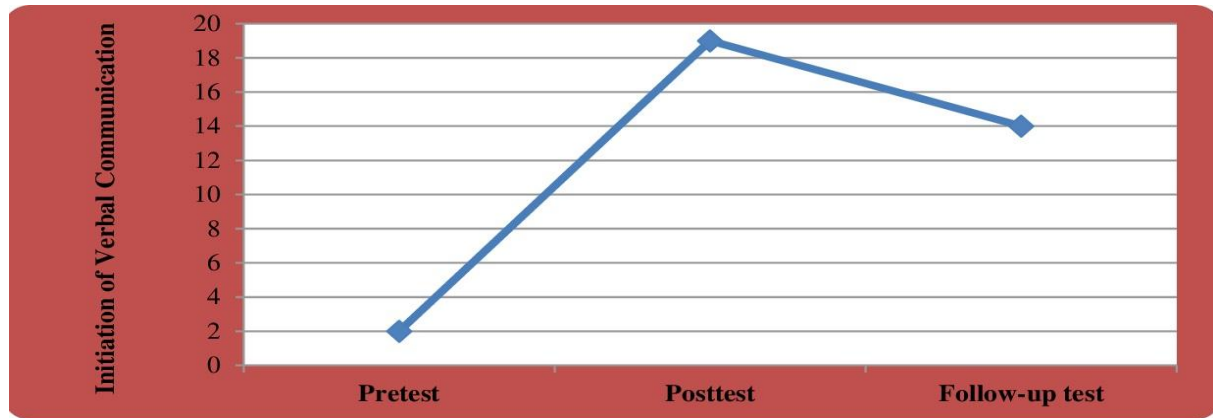


Figure 4. Findings regarding the initiation skill of verbal communication of the student with ASD

As reported in Figure 4, it is seen that the student with ASD who participated in the family-mediated physical activities exhibited his initiation skill of verbal communication 2 times before the study, 19 times after the study and 14 times in the follow-up test obtained 1 month after the study.

Findings Related to the Fifth Sub-Problem Sentence of the Study

“How are the changes in the initiation skill of non-verbal communication of the student with ASD participating in the family-mediated physical activities?”

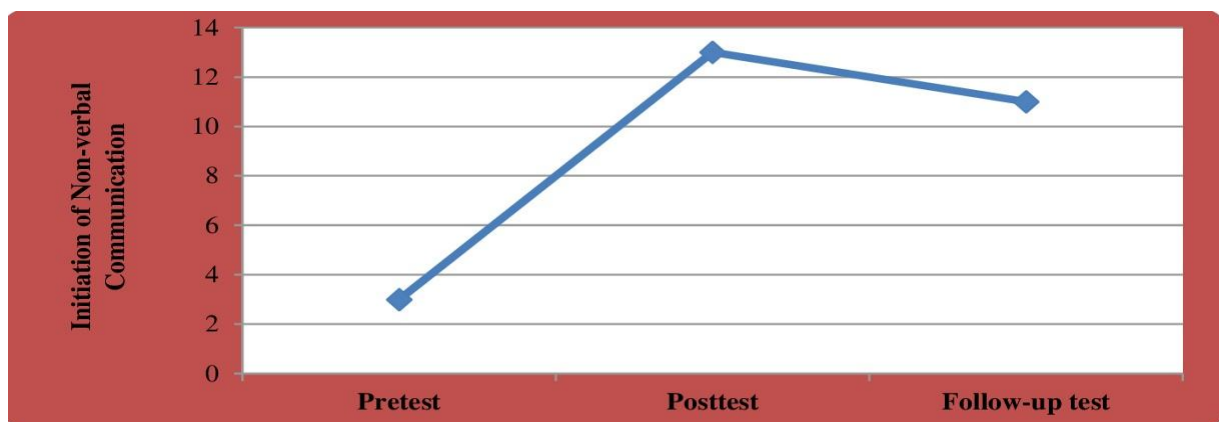


Figure 5. Findings regarding the initiation skill of non-verbal communication of the student with ASD

As seen in Figure 5, it is found that the student with ASD who participated in the family-mediated physical activities exhibited his initiation skill of non-verbal communication 3 times before the study, 13 times after the study and 11 times in the monitoring measurement obtained 1 month after the study.

Findings Related to Sixth Sub-Problem Sentence of the Study

“How are the changes in the skill of respond to verbal communication of the student with ASD participating in the family-mediated physical activities?”

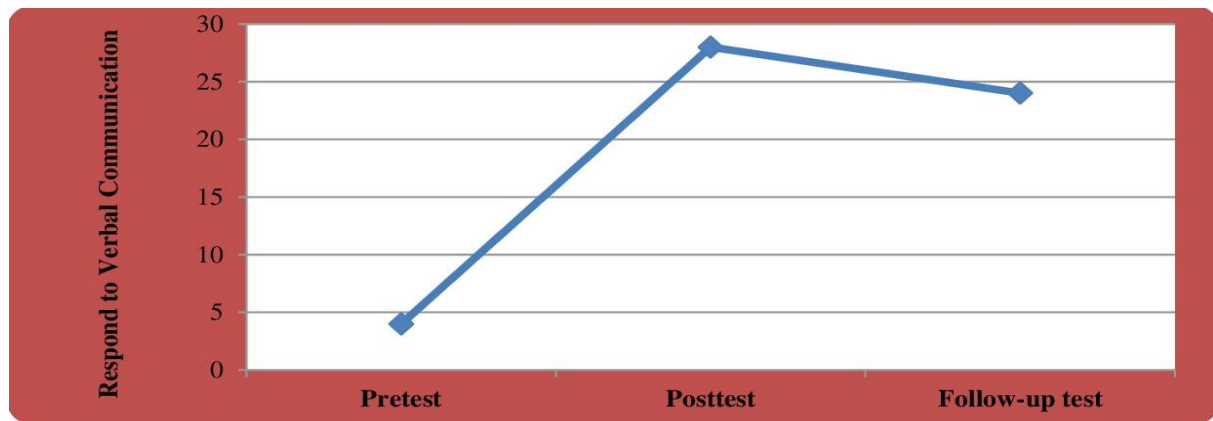


Figure 6. Findings regarding the skills of respond to verbal communication of the student with ASD

As reported in Figure 6, it is seen that the student with ASD who participated in family-mediated physical activities exhibited his skill of respond to verbal communication 4 times before the study, 28 times after the study and 24 times in the monitoring measurement obtained 1 month after the study.

Findings Related to the Seventh Sub-Problem Sentence of the Study

“How are the changes in the skill of respond to non-verbal communication of the student with ASD participating in the family-mediated physical activities?”

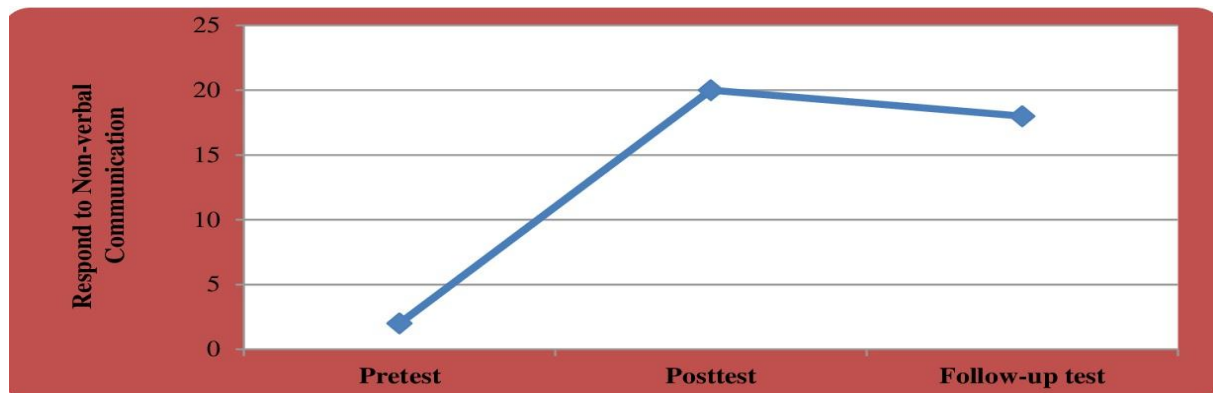


Figure 7. Findings regarding the skills of respond to non-verbal communication of the student with ASD

As seen in Figure 7, it is determined that the student with ASD who participated in the family-mediated physical activities exhibited his skill of respond to non-verbal communication 2 times before the study, 20 times after the study and 18 times in the follow-up test obtained 1 month after the study.

DISCUSSION AND CONCLUSION

The results of the studies that show that student with ASD have limited communication skills make it important to support their communication skills. Considering that student with ASD whose communication skills are not supported may face social isolation in the school environment, the importance of supporting communication skills of student with ASD will be

better understood. In this context, in the present study, family-mediated physical education activities were designed for the development of communication skills of an inclusive student with ASD and the effects of these activities on the communication skills of inclusive student with ASD were examined.

There was a positive change in the communication skills of the inclusive student with ASD, who participated in family-mediated physical education activities for 8 weeks. In addition, it was found that the increase in the communication skills of the student with ASD after family-mediated physical education activities continued in the monitoring measurement obtained 1 month after the study. Studies in many different areas showed that the practices offered by family members were effectively implemented (Becker-

Cottrill et al., 2003; Brookman-Frazer et al., 2006). When the literature is analysed, studies involving families in the physical education activities of children with ASD are gathered in two groups. In the first group, there is only one study in which families participate in the application process only as intermediaries (İlhan et al., 2017). However, this study did not focus on the communication skills of children with ASD, and the level of awareness of families was examined after the applications. In the second group, there are studies where families were involved in at the point of practicing physical education activities and applications were carried out by families. Esentürk (2019) revealed that there was a positive development in the communication skills of children with ASD after the UFA program carried out by the mothers with their children with ASD in their study, which aimed to examine whether the UFA program, which was implemented by the families, was effective on the communication skills of children with ASD. Solomon et al. (2014) found that the UFA program applied by mothers made positive contributions to the communication skills of children with ASD in their study where the UFA program implemented by mothers dealt with the effects of the children with ASD. Solomon et al. (2007) investigated the effect of game-based interventions applied by family members in the communication skills of individuals diagnosed with ASD, in the study titled PLAY Project. Within the scope of the study, family members were provided with family education by the researchers, and the family members were provided to carry out applications to their children. Findings obtained as a result of the research showed that game-based interventions applied by family members had a positive effect on the communication skills of individuals with ASD. Similarly, five ASD-diagnosed individuals and family members participated in the study of Foster-Sanda (2014). In the study, family members were provided with the knowledge and skills to practice game-based interventions, and their children were given the opportunity to practice. As a result of the interventions applied in the home environment, it was observed that it had a positive effect on general interpretation and game-specific interpretation skills of the individuals with ASD. Despite the fact that the goals set for both the child and the family cannot be achieved without the active involvement of the family in the

intervention programs applied to children with special need (Diken, 2009; Sameroff & Fiese, 2000), it was observed that there are very limited number of physical education activities with family participation. Indeed, it is anticipated that the current research will make a significant contribution to the literature in addressing this gap.

It is thought that there are some possible reasons for the positive changes observed in the communication skills of the inclusive student who participated in the study after the family-mediated physical activities. First of all, physical activities offered within the scope of the study were prepared in order to develop the communication skills required by student with ASD who participated in the study in line with the literature and expert opinions, and in the activity program, emphasis was placed on collaborative activities where student with ASD could interact with his mother. On the other hand mother who participated in the study were trained on strategies such as initiating a game, offering a game, inviting to the game, searching for a playmate and offering a reward. It is evaluated that this situation contributes to student with ASD to find a learning environment with rich stimulants for their communication skills during physical activities.

As a result, it was obtained the impression that the family-mediated physical activities are effective methods in supporting the communication skills of the inclusive student with ASD. The positive changes observed in the communication skills of the student with ASD, which were obtained one month after the study compared to situation before the study, strengthened this impression. Although highly significant and positive results were obtained regarding the communication skills of an inclusive student with ASD, who participated in the family-mediated physical activities in an experimental environment, the limitation of the study that it was carried out only on one student with ASD should be considered when interpreting the results. In line with the results and limitations of the study, the following suggestions can be made for teachers, experts, academicians and future studies:

- In-service training activities can be organized in the field of family mediation physical activities for teachers who take part in physical education and sports classes of student with ASD.

- Family-mediated physical activities can be offered to students with ASD who attend inclusive education in general education schools during physical education and sports classes.
- While physical education applications for students with ASD are offered on a family-mediated basis on certain days, they can be offered on certain days by providing the family's participation as audience.
- In future studies, the effects of the family-mediated physical activities on different communication skills (gesture-mimic use and communication maintenance) of students with ASD can be examined.

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