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AKRAN ARACILI FİZİKSEL AKTİVİTELERİN OTİZM SPEKTRUM BOZUKLUĞU OLAN ÇOCUKLARIN İLETİŞİM EKSİKLİĞİ ÜZERİNDEKİ ETKİSİ

THE EFFECT OF PEER-MEDIATED PHYSICAL ACTIVITIES ON COMMUNICATION DEFICIT OF CHILDREN WITH AUTISM SPECTRUM DISORDER

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Akran Aracılı Fiziksel Aktivitelerin Otizm Spektrum Bozukluğu Olan Çocukların İletişim Eksikliği Üzerindeki Etkisi

ÖZ

Bu çalışmada, akran aracılı fiziksel aktivitelerin otizm spektrum bozukluğu (OSB) olan çocukların iletişim eksikliği üzerindeki etkisi incelenmiştir. Çalışma grubu, OSB olan 12 çocuk ve tipik gelişim gösteren (TGG) 6 çocuktan oluşmuştur. Katılımcılar random olarak bir uygulama grubuna (OSB olan çocuklar n= 6, ortalama yaş= 12.66; TGG çocuklar n= 6, ortalama yaş= 12.83) ve bir kontrol grubuna (OSB olan çocuklar n = 6, ortalama yaş= 12.33) ayrılmıştır. Uygulama grubunda yer alan çocuklar ile birlikte 10 hafta süreyle akran aracılı fiziksel aktiviteler gerçekleştirilmiştir. Veriler, Gilliam Otizm Derecelendirme Ölçeği-2 kullanılarak elde edilmiştir. Ölçek, OSB olan çocuklara ön test, son test ve izleme testi olarak uygulanmıştır. Bulgular, uygulama grubundaki OSB olan çocukların iletişim eksikliğinde akran aracılı fiziksel aktiviteler sonrası olumlu yönde anlamlı bir azalma olduğunu göstermiştir. OSB olan çocukların iletişim eksikliğinde gözlenen bu olumlu değişimin, araştırmadan bir ay sonra elde edilen izleme testinde devam ettiği saptanmıştır. Sonuç olarak, akran aracılı fiziksel aktivitelerin OSB olan çocukların iletişim eksikliği üzerinde olumlu yönde bir etki oluşturduğu izlenimi edinilmiştir.

Anahtar Kelimeler: Otizm spektrum bozukluğu, iletişim eksikliği, akran aracılı, fiziksel aktivite

The Effect of Peer-Mediated Physical Activıties on Communication Deficit of Children with Autism Spectrum Disorder

ABSTRACT

This study examined the effect of peer-mediated physical activities on communication deficit of children with autism spectrum disorder (ASD). The study group constituted of 12 children with ASD and 6 typically developing (TD) children. Participants were randolmly divided into an application group (children with ASD n= 6, mean age=12.66; TD children n= 6, mean age= 12.83) and a control group (children with ASD n= 6, mean age= 12.33). Peer-mediated physical activities were carried out for 10 weeks with children in the application group. Data were obtained using the Gilliam Autism Rating Scale-2. The scale was administered to children with ASD as pre-test, post-test and follow up test. The findings showed that there was a positively significant decrease in the communication deficit of children with ASD in the application group after peer-mediated physical activities. It was determined that this positive change observed in the communication deficit of children with ASD continued in the follow-up test one month after the study. As a result, it was gained the impression that peer-mediated physical activities had a positive effect on communication deficit of children with ASD.

Key Words: Autism spectrum disorder, communication deficit, peer-mediated, physical activity

INTRODUCTION

One of the core deficits in the majority of individuals with Autism Spectrum Disorder (ASD) is the profound and striking impairment in communication skills[1]. This deficit includes: a) lack of eye contact, b) distance from people c) difficulties in initiating communication and responding, d) lack of communicative gestures, e) difficulties in initiating or joining social activities, f) non-functional use of language, g) lack of progress in joint attention skills, and h) engaging in inappropriate behaviors[2,3,4,5,6,7].

Communication is one of the prerequisite skills for individuals with ASD to be able to interact with others around them[8], and especially it is one area of vital importance for development of children with ASD[9]. Typically developing (TD) children learn communication skills at school, home, and in social environments[10]. However, as children with ASD have limited communication skills, they may not learn communication opportunities as properly as TD children[8]. Communication deficits, which are unique to ASD, have a major influence on adaptation skills of children with ASD[11], and can lead them to a social isolation[12, 13]. Therefore, the intervention programmes aimed at increasing communication skills in children with ASD are critically important to achievement both in real-world adaptation and school programs[14]. This has revealed the need to assess the effectiveness of interventions used in the field of ASD[15]. With the aim of determining effective interventions used in the field of ASD, a wide variety studies were analyzed by National Autism Center, (2015)[16], and the results of the research review studies have been published[15].

According to the National Standards Report from the National Autism Center, (2015)[16], these interventions but are not limited to modeling, pivotal response treatment, parent training, sory-based intervention, language training, comprenhensive behavioral treatment, and peer-mediated intervention (PMI). PMI is listed among the evidence-based practices (EBPs) that are frequently used and recommended for the individuals with ASD[17]. PMI is a set of practices in which TD children are selected, trained, and supervised to teach or support individuals with ASD[18]. PMI provides children with ASD the possibility of social interaction with TD children[19, 20, 21], increases communication among children with and without ASD[22, 23], and encourages children with ASD for social skill use[24].

Nowadays, PMI is one of the most frequently used techniques in diverse fields such as education[25], pharmacology[26], nurse[27], engineering[28], geology[29], and music[30]. PMI has also been successful in improving the performances of students with disabilities in the physical education (PE)[9]. A growing number of studies indicate the beneficial effects of engaging in peer-mediated PE across a wide variety of skills in children with disabilities[31, 32, 33, 34, 35, 36, 37] including children with ASD[38].

However, the efficiency of utilization of PMI in PE on communication deficit of children with ASD has been infrequently studied. Only, three studies administered a peer-mediated physical activity program as an intervention to improve communication deficit of children with ASD. For example, in the study of Brookman et al. (2003)[39], it was determined that the social interaction skills of children with ASD changed positively after a full-inclusion summer day camp program with their TD peers. In the study carried out by Chu and Pan, (2012)[9], it was revealed that peer- and sibling-assisted aquatic program was effective in interaction behaviors and aquatic skills of children with ASD. In another study, Yarımkaya et al. (2017)[40] stated that the

individual with ASD positively increased eye contact, joint interest, initiating communication and responding to communication during the peer-mediated physical activity program.

With a paucity of studies in the area of peer-mediated physical activity and communication skills of children with ASD, the aim of the present study was to examine the effect of 10-weeks peer-mediated physical activities on communication deficit of children with ASD. In this regard, it is considered that the present study will provide an important contribution to the understanding towards utilization of PMI in the general physical education (GPE) context. The following research hypotheses guided this study:

- The 10-weeks peer-mediated physical activity program will have a significant improvement in communication deficit of children with ASD in the application group compared to children with ASD in the control group.

- This improvement in communication deficit of children with ASD in the application group will continue in the follow-up measurement thirty (30) days after the completion of the peer-mediated physical activity program.

MATERIALS AND METHODS

Research Design and Procedures

This study adopted the quasi-experimental model with a control group and an application group. In this model, two groups are created as application and control groups[41]. An independent variable is applied to one of these groups (application 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[42]. Firstly in this study, the TD children were trained about the PMI. Then, the 10-weeks peer-mediated physical activity program was implemented with 3 days on a week and 1 hour on a day. Data were collected at pre-intervention, post intervention and 1 month follow-up. Children with ASD in the control group did not participate in formal physical activities.

Participants

Participants of the present study were 12 children with ASD and 6 TD children (see Table 1 for participants' demographic characteristic). Children with ASD, age from eight to ten years old, were recruited from a education center of children with ASD in Ankara province of Turkey. The children with ASD were determined based on the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5)[1], and were randomly divided into an application group (n = 6, mean age = 12.66; SD = .51 years), and a control group (n = 6, mean age = 12.33; SD = .82 years). Children with ASD were eligible to participate in the peer-mediated physical activity program after an experienced doctor and a physical therapist examination.

TD children (mean age = 12.83; SD = .98 years), who may be effective in helping to increase communication skills of children with ASD were recruited from similar neighborhoods to the children with ASD. To select TD children, information was gathered from teachers and school administration in a public school. Then, the primary researcher interviewed TD children who were willing to participate in the study and had no ongoing medical treatment. As a result of the interview, 6 TD

children were determined as peer volunteers. The parents of the all participants were informed and their approvals were received.

Table 1. The Demographic Characteristic of the Participants

Group	Variables		N	%
Application group (N: 6)	Gender	Girls	3	50
		Boys	3	50
	Age (years)	12	2	33.3
		13	4	66.7
	Diagnosis	ASD	6	100
Control group (N: 6)	Gender	Girls	2	33.3
		Boys	4	66.7
	Age (years)	11	1	16.7
		12	2	33.3
		13	3	50
	Diagnosis	ASD	6	100
Peer volunteers (N: 6)	Gender	Girls	3	50
		Boys	3	50
	Age (years)	12	1	16.7
		13	2	33.3
		14	3	50

*ASD: Autism Spectrum Disorder.

Peer Training

Before the 10-weeks peer-mediated physical activity program, all TD children were trained by the primary researcher in 40 minutes per session and total 6 sessions. In the peer training sessions were used the steps proposed by Klavina and Block, (2008)[32]. At the beginning of peer training, researcher and TD children discussed differences in people, empathy, and the way to treat children with ASD. Next, they conversed rules and roles of being a peer volunteers (e.g. being friendly, talk softly, and providing praises). Then, TD children participated the practice sessions which were taught various physical and social initiation strategies: a) interdependent play, b) offering assistance, c) seek a playmate or playmates d) talking together, e) propose a game f) demonstration, g) inviting peers to play, h) cues and i) gestures. During the practice sessions, role-play scenarios which primary researcher promoted TD children to use learned physical and social initiation strategies were typically utilized.

Staff

The staff in this study were two male GPE teachers and two male special education (SE) teachers. One of the GPE teachers was the author of the study. He is a GPE teacher with 10 years of teaching experience, and is interested peer instruction in children with autism. The other GPE teacher has master's degree and with 10 years of teaching experience. Both GPE teachers served adapted PE in several schools where children with disabilities were educated. SE teachers were recruited based on their possession of information about peer-mediated instruction. They were teachers with 18 years and 16 years of teaching experience, and worked in a education center serving children with ASD. Prior to the 10-weeks peer-mediated physical activity program, staff training was implemented with a total of 3 sessions (with 40 minutes per session). This training was basically held to teach and introduce the peer-mediated physical activity program to both GPE and SE teachers.

Peer-Mediated Physical Activity Program

In the study, a peer-mediated physical activity program with distinctive features and advantages was designed, and carried out over 10-weeks (40 minutes a day for 3 days a week). The program was depended on PE and PMI recommendations for children with ASD in the literature[37,40]. It was also a specialized program that included interactive activities to improve communication skills of children with ASD. In brief, the program consisted the peer-mediated warm-up activities, one-to-one and group games (traditional children games, funny athleticism and educational games) and cool down activities. During the peer-mediated physical activity program, all of the participants were encouraged to say hello and goodbye to influence communication skills of children with ASD. The intervention program was carried out in the gym of a public school of Ankara province.

Material

To monitor changes in communication deficits of children with ASD, the researchers used the communication subscale of Gilliam Autism Rating Scale-Second Edition (GARS-2)[43]. GARS-2 is one of the most widely used instruments for the assessment communication deficits of children with ASD. The communication subscale of GARS-2 includes 14 items in which parents, teachers or other caregivers use a six-point Likert scale, from (0) *never observed* to (3) *frequently observed.* Parents, caregivers, and teachers evaluate the frequency of occurrence of each communication behavior over a 6-h period and under ordinary circumstances. The Turkish validity and reliability of GARS-2 was carried out by Diken et al. (2012)[44]. The Cronbach's Alpha internal consistency of the communication subscale of the GARS-2 in the present study was calculated as .92.

Data analysis

Data of the study were analyzed with Version 20.0 of the Statistical Package for the Social Sciences. Due to the small number of data, Wilcoxon Signed Ranks Test and Mann Whitney U Test from non-parametric tests were used to determine whether peer-mediated physical activity program was effective on the communication deficit of children with ASD[45]. Significance was tested at the $p<0.05$ level.

FINDINGS

In this section, findings regarding comparison of communication deficit of children with ASD in the application and control groups at each assessment period (pretest, posttest, and follow-up test) are presented.

Table 2. Comparison of the Pretest Scores of the Application and Control Groups

	Group	N	Mean Rank	Sum of Ranks	U	p
Pretest	Application	6	6.67	40.00	17.000	0.867
	Control	6	6.33	38.00		

As shown in Table 2, it was found no significant difference in the mean score of communication deficit between two groups before the peer-mediated physical activity program (*U*: 17.00, *p*>0.05). The mean scores of communication deficit were similar between two groups before the peer-mediated physical activity program.

Table 3. Comparison of the Posttest Scores of the Application and Control Groups

	Group	N	Mean Rank	Sum of Ranks	U	p
Posttest	Application	6	3.75	22.50	1.500	0.007*
	Control	6	9.25	55.50		

*p<0.05.

When Table 3 is examined, a significant decrease was seen in the mean score of communication deficit for the application group compared with the control group after the peer-mediated physical activity program (U: 1.500, p<0.05). These findings indicated that the peer-mediated physical activities had a positive influence on communication deficit of children with ASD in the application group.

Table 4. Comparison of the Follow-up Test Scores of the Application and Control Groups

	Group	N	Mean Rank	Sum of Ranks	U	p
Follow-up test	Application	6	3.58	21.50	0.500	0.005*
	Control	6	9.42	56.50		

*p<0.05.

As shown in Table 4, a significant difference was found in the mean score of communication deficit between two groups at follow-up test (U: 0.500, p<0.05). Significant differences of communication deficit between the groups' mean score of communication deficit at follow-up test continued.

Table 5. Comparison of the Pretest - Posttest Scores of the Application and Control Groups

Group	Posttest - Pretest	N	Mean Rank	Sum of Ranks	Z	p
Application	Negative Ranks	6	3.50	21.00	-2.264	0.024*
	Positive Ranks	0	0.00	0.00		
	Ties	0				
Control	Negative Ranks	2	1.75	3.50	-0.272	0.785
	Positive Ranks	1	2.50	2.50		
	Ties	3				

*p<0.05.

When Table 5 is examined, it was found that there was a significant difference between the pretest - posttest scores of the application group in favor of the posttest (Z: -2.264, p<0.05). However, it was seen that there was no significant difference between the pretest-posttest scores of the control group (Z: -0.272, p>0.05).

Table 6. Comparison of the Pretest - Follow-up Test Scores of the Application and Control Groups

Group	Follow-up test - Pretest	N	Mean Rank	Sum of Ranks	Z	p
Application	Negative Ranks	6	3.50	21.00	-2.232	0.026*
	Positive Ranks	0	0.00	0.00		
	Ties	0				
Control	Negative Ranks	1	4.00	4.00	-0.378	0.705
	Positive Ranks	3	2.00	6.00		
	Ties	2				

*p<0.05.

As seen in Table 6, it was determined that there was a significant difference between the pretest - follow-up test scores of the application group in favor of the follow-up test (*Z*: -2.232, *p*<0.05). However, it was found that there was no significant difference between the pretest - follow-up test scores of the control group (*Z*: -0.378, *p*>0.05).

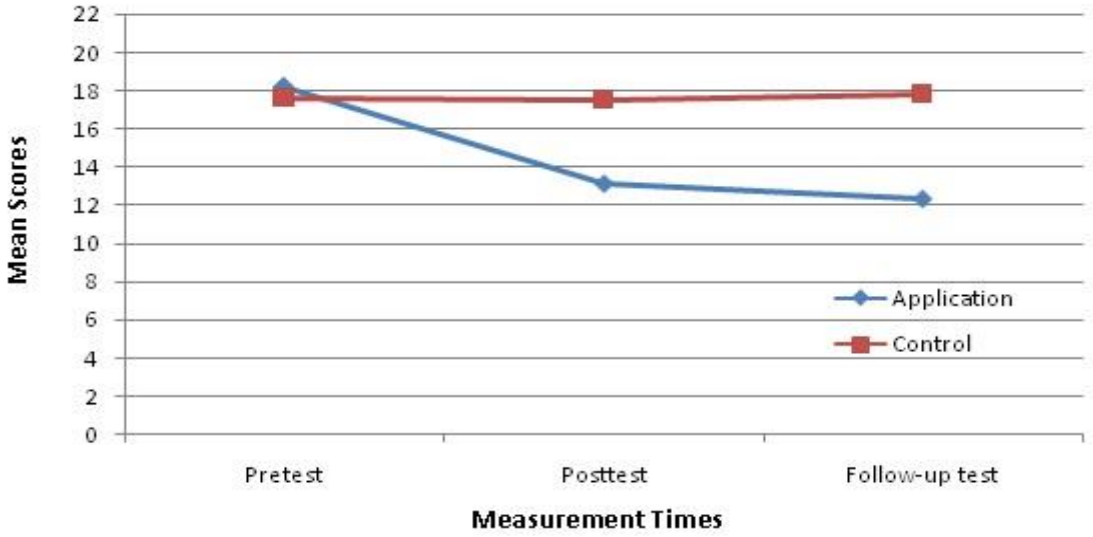

Figure 1. Mean Communication Deficit Scores of the Groups in Pre-test, Post-test, and Follow-up Test

As reported in in Figure 1, the findings revealed that there was a positive decrease in communication deficit of children with ASD for the application group at the pretest, posttest, and follow-up test. In contrast, no significant difference was found in communication deficit for the control group at the pretest, posttest, and follow-up test.

DISCUSSION

With increasing in the number of of students with ASD in general education classrooms, school personnel need evidence-based practices (EBPs) that can be implemented in inclusive settings for children with ASD[46, 47, 48]. It is crucial to identify EBPs that are acceptable and feasible to school personnel[25]. But, fewer EBPs are available for children with ASD at school[49]. Especially, despite their status as an EBP, PMIs are not yet commonplace in school settings[50]. Therefore, in the present study, it is aimed to determine the effectiveness of peer-mediated physical activities on communication deficits of children with ASD. It is considered that this study would have important implications for the planning and execution towards utilization of PMI in the GPE context.

The results of the present study showed that peer-mediated physical activities had a positive effect on communication deficit of children with ASD in the experimental group. An additional positive result was that the effect in communication deficit of the children with ASD at 1 month follow-up remained unchanged compared to posttest. More importantly, this positive improvements were observed in all children with ASD in the experimental group.

The possible explanations for the effectiveness of peer-mediated physical activities on communication deficit of children with ASD in the experimental group were that (1) the intervention program were designed based on recommendations on physical activity and peer instruction, and previous successful researches which aimed to improve communication deficit to children with ASD. (2) Prior to intervention program, all TD children were trained in various physical and social initiation strategies such as seek a playmate or playmates, talking together, propose a game and inviting peers to play. Thus, TD children provided a rich learning environment to children with ASD. (3) During the peer mediated physical activity program, all of the participants were encouraged to social interactions.

In the global literature, the extensive researches investigating the effect of physical activities on communication skills of children with ASD are limited[51]. The results of these previous studies showed that physical activities positively affects the communication skills of children with ASD. However, in the majority of these studies were implemented the activities such as karate[51], swimming[9, 52], hydrotherapy[53], summer camp[39] and therapeutic horseback riding[54, 55], that were difficult to use in GPE settings, and required special ve costly equipment. Moreover, only three studies[39, 9, 40] included TD children to determine whether the physical activities were effective on communication skills of children with ASD. However, the present study provides to teachers and researchers with cost-effective peer-mediated activities that can be easily applied in the GPE settings to improve the communication deficits of children with ASD.

Results of the present study demonstrated that 10-weeks of peer-mediated physical activity program effectively decreased communication deficit of children with ASD. The results of this study provided useful information for future research, and extend the literature on how PMI may be implemented in GPE to improve the communication deficit of children with ASD. Because this study is among the few studies revealing the positive influences of peer-mediated physical activity on communication deficit of children with ASD. Given that peer-mediated physical activities had a positive influence on communication deficit of children with ASD, GPE seem a good context to implement PMI.

This study did suffer from some important limitations. First, this study was conducted with a relatively small group of children with ASD and their TD children, so the number of participants in this study may not represent the larger population of children with ASD and TD children. Second, this study did not report quantitative results. Therefore, it was not revealed which communication skills (e.g. eye contact, joint attention, communication initiation, and reaction to communication) developed. Further research is needed that has a larger, more representative sample, and report quantitative results. This will help the understanding towards utilization of PMI in the GPE context.

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