

THE EFFECTS OF SPORTIVE EXERCISES ON PHYSICAL FITNESS OF CHILDREN WITH SPECIFIC LEARNING DISABILITY

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Abstract

This research was conducted to examine the effects of learn long-term and repetitive physical activities on physical fitness of children with specific learning disabilities. In the study, pre-test - post-test with a control group which one of the real experimental models and intended sampling method was used. Children between 9-12 age with special learning disability were included in the study. This study group (N: 20) (\bar{X} age: 10.45 ± 1.23) was separated into two groups as experiment (n: 10) and control (n: 10) by using random sampling method. While the experiment group was included in a 45-minute exercise program for 2 days in a week (in 20 weeks), the control group was not included in any exercise program during this time. In order to measure the physical fitness levels of children with specific learning disabilities, hand-paw force, standing jump, standing-up jump, push-up, straight shuttle, reverse shuttle, squat and flexibility tests were applied. The related tests was applied separately for each child as pre-test and post-test. Descriptive statistics and Wilcoxon signed rank test were used in the analysis of the data. In the analysis, the level of significance was considered as .05 using SPSS 22 package programs. When the results of the analysis were examined, after 20 weeks of exercise, a significant increase in experimental group children was observed in all parameters (paw force, standing jumping, standing jump, push-up, straight shuttle, reverse shuttle, squat and elasticity) according to their own pre-test values and control group. Consequently it can be said that regular and long-term exercises positively contribute to the physical fitness of children with specific learning disabilities and improve their physical fitness levels.

Key words: specific learning disability, exercise, sport, physical fitness.

Introduction

Many factors (Arteche & Murray, 2011; Belsky & Pluess, 2012), which reveal learning difficulty findings and are not fully known, are thought to negatively affect development in children. Although intelligence of children with learning disabilities is normal and above normal, they have a significant neurological disorder at the point of acquisition and application of speech skills, listening, reading, writing, reasoning, self-expression, social perception, mathematics, motor functioning, organizational skills (Beitchman & Young, 1997; Arnold et al., 2005; Mayes & Calhoun, 2006; Sabornie, Evans & Cullinan 2006; Lane, Carter, Pierson & Glaesar, 2006; Silver et al., 2007; Judge & Bell, 2010; Judge & Watson, 2011; APA, 2013). Therefore the importance of learning for these children has increased. Exercise is a continuous activity aimed at improving one or more elements of physical fitness (Özer, 2013: 11). It is known that the adoption and regularization of sportive exercises started at an early age as a way of life (İlhan, Kırımoğlu & Filazoğlu Çokluk, 2013), affects individuals and people with specific learning disability more positively, also it contributes to their social, psychological, physical and mental developments (Kırımoğlu, 2008; Morgan, Roberts, Feinerman, 1971; Haapala, 2013; Ekeland et al., 2005; Fernhall, 1993). This way, sportive exercises are expected to have positive effects on existing physical fitness situations as well as its contribution to the development of individuals experiencing the problem of specific learning disability.

Considering these positive effects, it is thought that long-term and regularly repetitive exercises will facilitate learning of children with specific learning disabilities, thereby as well as physical development, it will contribute to their mental development because long-term repetitive behaviors are known to persist and enhance learning (Sugrue, 2008). With the positive developments that can occur in the body along with learning, the physical fitness levels of the people will be increased and they will be progressed towards becoming healthier individuals.

Therefore, the strength and importance of this study is to draw attention to the activities that are regularly carried out in learning difficulties. The main problem that needs to be answered in this way is whether there is a significant difference and improvement in physical fitness levels of people who did and did not exercise for a long time and before and after exercise of those who exercised for a long time. In order to find answers to these questions; investigating the effects of long-term and repeated exercises on the physical fitness of children with specific learning disabilities was aimed in this study.

Methods

In this study, in the scope of quantitative research the real experimental model that based on the positivist view was used (Büyüköztürk et al., 2014).

In the experimental models, pre-test post-test control group design was applied. In this model, pre- and post-measurements of the control and experimental groups generated by neutral assignment are taken and the effect of the independent variable is tried to be revealed in the experimental group (Karasar, 2015).

Universe and sample

Sample of the study was constituted from the children who were diagnosed with the specific learning disability between the ages of 9 and 12 by using the objective sampling method. The fact that living place of the children has different socio-cultural and socioeconomic diversity, lack of sportive facilities and the children have never done any sporting activity before became a criterion for the study place. The experimental group (n: 20) (\bar{X} age: 10.45 ± 1.23) was divided into experimental group (n: 10) and control group (n: 10) using the random sampling method (Creswell, 2016: 158). When the experimental group was included in the relevant sportive exercise program for 20 weeks, the control group did not take any action.

Data collection tools

In the study, to measure physical fitness levels of children with specific learning disabilities; hand-paw force, standing jumping, standing up jump, push-up, straight shuttle, reverse shuttle, squat and sit-in tests were applied. The relevant tests was applied separately for each child as pre-test and post-test.

Collection of data

The study was conducted in education centers of the children outside of their lesson times and after getting necessary permits. The experiment group got involved in 45 minutes sports activity for 2 days a week during 20 weeks. During the 45-minute lesson, 15 minutes warm-up games, 25 minutes general force exercises and 5 minutes cooling and flexibility exercises were conducted. The control group was not included in any exercise program during this time. Data was obtained by applying the tests as pre-test and after 20 weeks as post-test to the experimental and control groups.

Analysis of data

Descriptive statistics (percent, frequency, arithmetic mean, standard deviation, kurtosis and skewness) was used for scores obtained from pre-test-post-test data. Wilcoxon signed rank test was used for non-parametric methods in the application of test techniques for the analysis of data. In order to apply non-parametric tests, sample size should not exceed 30 (Altunışık et al., 2007). SPSS 22 package program was used in the analysis of data and the level of significance was considered as .05.

Results

The Wilcoxon signed rank test results for pre-test and post-test scores of the children in the experimental group are given in table 1.

When looked at the pre-test and post-test data, a significant difference in all the parameters was observed (paw power ($z=-2.805, p<.05$), flexibility ($z=-2.842, p<.05$), standing long jump ($z=-2.829, p<.05$), standing vertical jump ($-2.842, p<.05$), push up ($z=-2.831, p<.05$), shuttle ($z=-2.814, p<.05$), reverse shuttle ($z=-2.814, p<.05$), squat ($z=-2.814, p<.05$).

When the average values of the tests were examined, the physical fitness parameters' post-test averages were found to be higher than pre-test and increased.

When the differences between the means of the tests were examined, maximum increase was determined respectively in reverse shuttle ($\bar{X}_{pre-test}=26.90 \pm 4.89 < \bar{X}_{post-test}=33.70 \pm 6.90$), squat ($\bar{X}_{pre-test}=21.80 \pm 3.76 < \bar{X}_{post-test}=28.50 \pm 5.03$), and sit-up ($\bar{X}_{pre-test}=14.60 \pm 3.40 < \bar{X}_{post-test}=20.90 \pm 4.48$), while the parameter with the least difference is hand grip strength ($\bar{X}_{pre-test}=17.60 \pm 5.70 < \bar{X}_{post-test}=20.67 \pm 6.10$).

Table 1. Experimental group pre-test and post-test Wilcoxon analyzes

		n	Mean Rank	Sum of Ranks	z	p
Hand Grip Strengths	Negative Ranks	0	.00	.00	-2.805	.005 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Flexibility	Negative Ranks	0	.00	.00	-2.842	.004 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Standing Long Jump	Negative Ranks	0	.00	.00	-2.829	.005 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Standing Vertical Jump	Negative Ranks	0	.00	.00	-2.842	.004 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Push-Up	Negative Ranks	0	.00	.00	-2.831	.005 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Sit-Up	Negative Ranks	0	.00	.00	-2.814	.005 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Back Sit-Up	Negative Ranks	0	.00	.00	-2.814	.005 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				
Squat	Negative Ranks	0	.00	.00	-2.814	.005 [*]
	Positive Ranks	10	5.50	55.00		
	Ties	0				

p<.05

Table 2. Control group pre-test and post-test Wilcoxon analyzes

		n	Mean Rank	Sum of Ranks	z	p
Hand Grip Strengths	Negative Ranks	2	7.25	14.50	-1.328	.184
	Positive Ranks	8	5.06	40.50		
	Ties	0				
Flexibility	Negative Ranks	1	4.00	4.00	-.378	.705
	Positive Ranks	3	2.00	6.00		
	Ties	6				
Standing Long Jump	Negative Ranks	2	3.00	6.00	-.973	.330
	Positive Ranks	4	3.75	15.00		
	Ties	4				
Standing Vertical Jump	Negative Ranks	1	4.50	4.50	-1.298	.194
	Positive Ranks	5	3.30	16.50		
	Ties	4				
Push-Up	Negative Ranks	2	4.00	8.00	-1.134	.257
	Positive Ranks	5	4.00	20.00		
	Ties	3				
Sit-Up	Negative Ranks	1	3.50	3.50	-1.633	.102
	Positive Ranks	5	3.50	17.50		
	Ties	4				
Back Sit-Up	Negative Ranks	1	4.00	4.00	-.378	.705
	Positive Ranks	3	2.00	6.00		
	Ties	6				
Squat	Negative Ranks	2	3.50	7.00	-.816	.414
	Positive Ranks	4	3.50	14.00		
	Ties	4				

The Wilcoxon signed rank test results for pre-test and post-test scores of the children in the control group of the study are given in table 2. When the pre-test post-test data of the control group were examined, no significant difference was determined in any parameters (paw power/ Hand Grip Strengths ($z=-1.328, p>.05$), flexibility ($z=-.378, p>.05$), standing long jump ($z=-.973, p>.05$), standing vertical jump ($z=-1.298, p>.05$), push up ($z=-1.134, p>.05$), sit up ($z=-1.633, p>.05$), back sit up ($z=-.378, p>.05$), squat ($z=-.816, p>.05$). No significant difference was determined between pre and post test results of the control group ($p>.05$).

In the Mann Whitney-U analyzes comparing the pre-test data of the experimental and control groups, no significant difference was found between two groups related to pre-test data ($p>.05$). No difference between groups in pre-test data of physical fitness parameters was determined (Table 3).

Mann Whitney-U analysis results of the post test data of experimental and control groups are given in Table 4.

According to this, a significant difference between experiment and control group was determined in the parameters of hand grip strength ($z=-2.118, p<.05$), flexibility ($z=-2.356, p<.05$), standing vertical jump ($z=-2.508, p<.05$), sit up ($z=-2.479, p<.05$), batch sit up ($z=-3.186, p<.05$) and squat ($z=-2.773, p<.05$).

It was determined that experiment group had a higher average in post test significant parameters and related parameters were determined to improve positively in these groups. No significant differences were found between the experimental and control groups according to the posttest in the parameters of standing long jump ($z = -.340, p>.05$) and push-up ($z = -1.409, p>.05$).

Table 3. Experimental and Control Groups Pre-Test Mann Whitney-U Analyzes

Parameters	Group	n	Mean Rank	Sum of Ranks	U	z	p
Hand Grip Strengths	Exp.	10	12.30	123.00	32.000	-1.361	.173
	Control	10	8.70	87.00			
Flexibility	Exp.	10	10.10	101.00	46.000	-.305	.760
	Control	10	10.90	109.00			
Standing Long Jump	Exp.	10	10.05	100.50	45.500	-.341	.733
	Control	10	10.95	109.50			
Standing Vertical Jump	Exp.	10	11.95	119.50	35.500	-1.102	.270
	Control	10	9.05	90.50			
Push-Up	Exp.	10	9.50	95.00	40.000	-.766	.444
	Control	10	11.50	115.00			
Sit-Up	Exp.	10	10.10	101.00	46.000	-.306	.760
	Control	10	10.90	109.00			
Back Sit-Up	Exp.	10	12.35	123.50	31.500	-1.413	.158
	Control	10	8.65	86.50			
Squat	Exp.	10	11.15	111.50	43.500	-.493	.622
	Control	10	9.85	98.50			

Table 4. Experimental and Control Groups Post-Test Mann Whitney-U Analyzes

Parameters	Group	n	Mean Rank	Sum of Ranks	U	z	p
Hand Grip Strengths	Exp.	10	13.30	133.00	22.000	-2.118	.034*
	Control	10	7.70	77.00			
Flexibility	Exp.	10	13.60	136.00	19.000	-2.356	.018*
	Control	10	7.40	74.00			
Standing Long Jump	Exp.	10	10.95	109.50	45.500	-.340	.734
	Control	10	10.05	100.50			
Standing Vertical Jump	Exp.	10	13.80	138.00	17.000	-2.508	.012*
	Control	10	7.20	72.00			
Push-Up	Exp.	10	12.35	123.50	31.500	-1.409	.159
	Control	10	8.65	86.50			
Sit-Up	Exp.	10	13.75	137.50	17.500	-2.479	.013*
	Control	10	7.25	72.50			
Back Sit-Up	Exp.	10	14.70	147.00	8.000	-3.186	.001*
	Control	10	6.30	63.00			
Squat	Exp.	10	14.15	141.50	13.500	-2.773	.006*
	Control	10	6.85	68.50			

Discussion and conclusion

In this study that was conducted to examine the effects of learn long-term and repetitive physical activities on physical fitness of children with specific learning disabilities, after 20 weeks of exercise done by the children in experiment group, a significant increase was observed according to their own pre-test values and control group in all

parameters (hand grip strength, Jump, push-up, sit up, back sit up, squat and flexibility). The pre-tests of control and experiment groups gave a similar results and it has been a good start in terms of healthy follow-up of intergroup development. In addition, examination of the post test results of control and experiment group showed that 20 weeks regular exercise revealed significant differences in favor of the experiment group and this indicates exercises to be effective. The absence of a significant change in pre-test and post-test of a control group is also evidence that the lack of regular activity returned to children as negative development. From these results, it can be said that regular and long-term exercises positively contribute to the physical fitness of children with specific learning disabilities and improve their physical fitness levels. It is also pointed out in the literature that in addition to the developed physical fitness of children with special needs, regular physical activity has positive results in terms of healthy relationships, self-expression and socialization of children with special needs (Morgan, Roberts, Feinerman, 1971, Pollatschek & O'Hagan, 1989, 1997, Kırımoglu, 2008, Pelitbaş, 2000, Haapala, 2013). In the study on children with specific learning disabilities, it was concluded that the participation to physical activities enabled the improvement of coarse and fine motor fitness levels and consolidation of perceptual motor functions (Demirci and Toptaş Demirci, 2016). This study is parallel with the study in that it is an experimental study for children with learning disabilities and results in favor of those participating in physical activities. When the literature was examined, studies that link the physical fitness of children with learning disabilities to exercise are rarely encountered. However, when studies on children with learning disabilities are less likely to have rough motor skills than children with normal

development (Woodard and Surburg, 2001; Westendorp et al., 2011) was examined, it can be observed that the regular physical activities have positive effects on children with special needs (Baran, 2012; Demir, 2006; Volman, Visser & Mulders, 2007; Hartman et al., 2010; Top, 2015; Rintala & Loovis, 2013). In parallel with these studies, there is also studies that show the positive effects of long-term regular exercise on physical fitness of mentally disabled. In these studies, it was found that the exercise increased positively in the parameters of grip strength, flexibility, vertical jump, visual simple reaction time, 20m sprint, balance, push-up, long jump, sit-rise, sit-up, back sit-up (Biçer et al., 2004; Savucu et al., 2007; Akyüz et al., 2011; Atan et al., 2016).

The results support this study and parallel with positive increase in hand grip strength, flexibility, standing up, jump, stopping forward jump, sitting up and down test results. In conclusion, it can be concluded that children with specific learning disabilities may develop inadequacies in their motor skills by regular and planned exercises. It is also thought that the development of modules and programs for physical activity and play applications in schools, special education schools, rehabilitation centers for children who have learning disabilities, and to be put into practice them regularly under the guidance of specialist and trainers are expected to contribute positively to children's development. Moreover, it is of utmost importance that the children are directed to exercise by increasing their families' consciousness level together with the exercises for the development of physical fitness of children with specific learning difficulties (İlhan, 2009; İlhan, Kırımoglu & Filazoğlu Çoklu, 2013; Esatbeyoğlu and Karahan, 2014). From this point of view, it is thought that this work will give a light to other planned works.

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UČINCI SPORTSKIH VJEŽBI NA FIZIČKU SPOSOBNOST DJECE S POSEBNIM TEŠKOĆAMA U UČENJU

Sažetak

Ovo je istraživanje provedeno kako bi se ispitali učinci učenja dugotrajnih i ponavljajućih tjelesnih aktivnosti na fizičku sposobnost djece s posebnim teškoćama u učenju. U studiji je predtest - post-test s kontrolnom skupinom kod koje je korišten jedan od pravih eksperimentalnih modela i metoda uzorkovanja. U istraživanje su uključena i djeca od 9-12 godina s posebnim teškoćama u učenju. Ova ispitna skupina (N: 20) (dob: $10,45 \pm 1,23$) razdvojena je u dvije skupine kao eksperiment (n: 10) i kontrola (n: 10) metodom slučajnog uzorkovanja. Dok je eksperimentalna grupa bila uključena u 45-minutni program vježbanja tijekom 2 dana u tjednu (u 20 tjedana), kontrolna grupa nije bila uključena u bilo koji program vježbanja za to vrijeme. Da bi se izmjerila razina tjelesne kondicije djece s posebnim teškoćama u učenju, primijenjene su ručna snaga, skakanje u stojećem položaju, sklekovi, ravni shuttle, obrnuti shuttle, čučanj i fleksibilnost. Slični testovi primijenjeni su posebno za svako dijete kao pred-test i post-test. U analizi podataka korištene su deskriptivne statistike i Wilcoxonov potpisani rang test. U analizi je razina značenja razmatrana kao .05 pomoću programskih paketa SPSS 22. Kada su rezultati analize ispitani, nakon 20 tjedana vježbanja, u svim parametrima zabilježen je značajan porast eksperimentalne skupine djece (snaga šake, skakanje u stojećem položaju, skok u stojećem položaju, push-up, ravni shuttle, obrnuti shuttle, čučanj i elastičnost) u skladu s vlastitim vrijednostima prije testiranja i kontrolnom skupinom. Slijedom toga može se reći da redovite i dugoročne vježbe pozitivno pridonose fizičkoj sposobnosti djece s posebnim teškoćama u učenju i poboljšavaju njihovu razinu tjelesne kondicije.

Ključne riječi: specifična invalidnost učenja, vježbanje, sport, tjelesna kondicija.

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